Risk factors for job turnover among Dutch nurse anaesthetists

The influence of job satisfaction, burnout, work climate, work context and personality dimensions

Cover illustration: Hall of Fame of nurse anaesthetists of the Catharina hospital in Eindhoven, The Netherlands

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ISBN 978-90-9025699-3

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Risico factoren voor personeelsverloop onder anesthesiemedewerkers in Nederland

De invloed van arbeidstevredenheid, burnout, werkklimaat, werkcontext en persoonlijkheid dimensies.
(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit Utrecht op gezag van de rector magnificus, prof. dr. J.C. Stoof, ingevolge het besluit van het college voor promoties in het openbaar te verdedigen op
maandag 6 december 2010 des middags te 4.15 uur.

door

Vera Christina Henriette Meeusen

geboren op 3 november 1971 te Eindhoven

Promotor
Prof. dr. J.T.A. Knape

Co-promotor
Dr. K. van Dam

Unbuntu
I am because you are
Laureate Desmond Tutu

Abbreviations

AA	anaesthesia assistant
AANA	American Association of Nurse Anesthetists
AHA	American Hospital Association
ANA	American Nurses Association
AOTT	Association of Operating Theatre Technicians
APA	Anaesthesia physician assistant
ASA	American Society of Anesthesiologists
ASA	Australian Society of Anaesthetists
AT	anaesthesia technician
CN	circulation nurse
CRNA	certified registered nurse anaesthetist
EN	enrolled nurse
FFM	five factor model
IADE	infirmier anesthésiste diplômé d'État.
ICU	intensive care unit
IEDP	iedereen elke dag plezier
IFNA	International Federation of Nurse Anesthetists
ISAR	infirmier spécialisé en anesthésie réanimation
IV	intravenous
MAC	monitored anaesthesia care
MAfA	Medizinische Assistent fűr Anästhesie
MBI	Maslach Burnout Inventory
MBTI	Myers-Briggs Type Indicator
NA	nurse anaesthetist
NVAM	Nederlandse Vereniging van Anesthesiemedewerkers
ODP	operating department practitioners
OR	operating room
OTA	operating theatre attendants
OTT	operating theatre technician
PE	person- environment
PO	person-organisation
POLS	permanent onderzoek leefsituatie
QCA	quality certificate accredited
RN	registered nurse
RNA	registered nurse anaesthetist
SNI(A)A	Syndicat National des Infirmiers (Aide) Anesthésistes
TNO	toegepast natuurwetenschappelijk onderzoek
TOMO	toetsingslijst mens en organisatie
UEMS	Union of European Medical Specialists

Contents

The scientist is not content to stop at the obvious

Charles H Mayo (1865-1939)

Chapter 1

Study design and theoretical background

Introduction

The provision of high quality health care in general, and anaesthesia care in particular, is one of the basic requirements of a modern society. This can only be achieved with an adequate infrastructure and efficient organisation, and above all, with a well-trained and highly motivated health care workforce. However, the modern health care work place is also subject to the employment instability, rapidly changing demands, and increased pressure that are widely prevalent consequences of economic globalization and technological change.[1, 2]

The pressure to produce is a priority of the workplace caused by organisational, economical, and social demands. Contrary to the past, work no longer poses physical demands for most employees, but primarily mental and emotional demands. The requirement to produce high quality work while operating under tight time constraints necessitates decisions about quality versus quantity; it is a potential source of conflict or a stressor, in health care settings as much as other workplaces

In Europe in general, but in the Netherlands in particular, anaesthesia is considered to be a team effort. Anaesthesiologists and non-physician anaesthesia professionals work closely together in various clinical settings to provide high quality care to their patients. It is predicted that increasing demands and a shortage of both physician and non-physician anaesthesia professionals will jeopardize health care provision in Europe in the next decade.

National developments in health care

There are several reasons - caring for the ageing population and the retirement of Baby Boom anaesthesia personnel - for the increased demand for and shortage of anaesthesia health care professionals, and specifically nurse anaesthetists.[3,4] The composition of the population is changing; the number of elderly people is increasing due to improvements in health care and advances in family planning. In 2002, 23% of the Dutch population was older than 55; this is expected to increase to 35% by 2030.[5] For almost 50% of health conditions, the treatment requirements have increased 25%-60%, especially in cases of cancer (bowel, lung, prostate), heart disease, aneurysm, diabetes, and loss of vision.[3,4] After age 60, the demand for care, and consequently the need for health care services, increases very fast.

In 2002, the Dutch Ministry of Health published ‘future developments in health care’;[3] it stated that: 1) Dutch people are too inactive and eat too much fat and too few vegetables and fruits, resulting in an increase in morbid obesity; 2) one out of three Dutch people smokes cigarettes/cigars; and 3) work pressure and pace, and demands on people’s

time, are increasing. Seven percent of total deaths, and 10%-40% of the number of employees that become unfit for work, are due to physical and social work-related factors.

There is an absolute need for a healthy environment and a healthier way of life to prevent sickness absenteeism among the workforce. For the ageing workforce population, a number of factors are of special importance: as physical abilities decrease, chronic health complaints increase; work motivation depends on the nature of the task; the work environment and social relations are important in determining workload; limited growth possibilities increase job turnover; and variation in tasks is essential to decrease mental fatigue. Taking those factors into consideration, lower productivity from older employees seems possible. However, different studies have demonstrated higher efficiency in older employees compared to their younger counterparts, which may compensate for a hypothetical loss in productivity.[6]

Studies among employers revealed several different points of view about ageing employees. These included: older employees show an increased resistance to change; they have a lack of interest in new technologies; there is an increase in benefits costs and sickness absenteeism with older employees; and, it's necessary to reorganize work procedures and the environment for older employees. Some of these views are not consistent with reality. For instance, the incidence of sickness absenteeism is equal among older and younger employees.[5,7]

The work domain of the anaesthesiologist is continually expanding, and now encompasses all aspects of peri-operative medicine, intensive care, trauma care, and pain therapy. These extra demands, together with the need to replace retiring personnel, will result in a need for 1430-1605 new anaesthesiologists between now and 2025. The system requires 75% more nurse anaesthetists than the number of practising anaesthesiologists; this means that between 3146 and 3531 new nurse anaesthetists will be required between now and 2025.[8]

Recently, two major Dutch studies -- one by a pension fund and one by a health insurance company -- revealed a 50% turnover intention among health care employees.[9,10] The job turnover of nurse anaesthetists had always been relatively low (average length of employment – 10 years), but increased from 3.5% to 5.3% at the beginning of this century. In 2002, a survey among Dutch operating room personnel revealed significant reasons for job turnover: limited career options, high work pressure, and long hours of work.[11] Unfortunately, this survey did not study the causes of the work pressure, nor did it question the relationship between job satisfaction and mental health. Two major problems are found in anaesthesia practice. First, since the profession of nurse anaesthetist was introduced in the 1970s, the percentage of nurse anaesthetists older than 55 reached almost 11% in 2001,

16% in 2006, and will further increase to 22% in 2011 (Figure 1).[11] We are now looking at the first large group of nurse anaesthetists reaching the age of 55+ who will have to work till age 65.

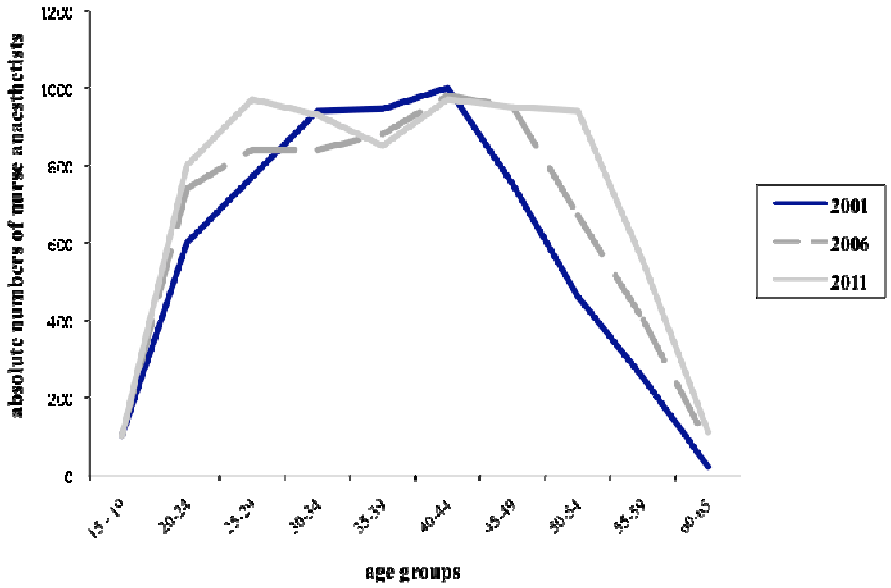

Figure 1: Development of the different age groups.

The second problem is that in the Dutch system, nurse anaesthetists can perform the job without having obtained a nursing degree. This results in professionals who are certified at a very young age (20-25), and reach their top salary as early as age 30, after 10 years working as a nurse anaesthetist. Furthermore, there are only limited career options in the profession of anaesthesia, especially for those who have no nursing degree.

Training and retaining nurse anaesthetists will become increasingly important to keep up with the growing demands. In this respect, it is essential to reduce job turnover and increase the recruitment of nurse anaesthetists, by developing an optimal work environment. A hospital organization can influence the work environment, skills and competencies of its employees. However, the process of doing so, as well as the factors involved, is not clear, which makes it very difficult to develop an effective policy to increase the numbers of nurse anaesthetists. Therefore, when we explore future developments in human resources, we need information about environmental work factors and their relationship to the well-being of personnel.

Organisational demands should be in balance with the personal capacities and individual needs of the employees.[12] Personnel management and the different life stages of the individual have to be geared to one another.[13,14] Understanding the causes of turnover among nurse anaesthetists is especially important in a tight labour market with a high demand for specialized nurses, which is the case in most Western countries.

Since turnover intention has been found to be a strong antecedent of actual turnover behaviour, studying the precursors of nurse anaesthetists' turnover intention will inevitably provide information about these nurses' reasons for leaving their jobs.[15] Job satisfaction is one of the most important and well-researched work attitudes, because it has the potential to affect a wide range of organisational behaviours and outcomes, including turnover and turnover intention.[16] Burnout is considered another precursor of nurses' intentions to leave their jobs.[17]

Precursors of job turnover intention: job satisfaction and burnout

Job satisfaction

The term 'job satisfaction' dates back to the 14th century. Although there is no universally accepted definition of job satisfaction, commonly cited definitions include: compensation for sin, fulfilment of a need or want, repayment for loss or injury, or assurance. We define job satisfaction as an attitude about the job or task within the job, being sufficiently rewarded, or a feeling of a need being met.[18,19]

Job satisfaction has also been described within the context of global versus facet perspectives. While the facet perspective refers to job satisfaction with specific components within the job, the global perspective refers to job satisfaction as a whole. Because we were interested in the relationship between job satisfaction and other constructs, in this study the global construct is used.

Job satisfaction is an attitude with two components: an affective and a cognitive component. The affective component of job satisfaction, often described as likeability or pleasure, encompasses how individual nurse anaesthetists feel about their jobs.[20,21] In other words, employees who find pleasure or enjoy their work are more likely to have job satisfaction. The cognitive component explains the perception of fulfilled need or expectations.[22,23] Both components are responsible for their own contribution to job satisfaction.

Job satisfaction fluctuates across the working day, and these fluctuations are in part driven by mood and emotions.[24-27] Mood states are longer lasting but weaker, and have

no causal object, while emotions are intense, short lived, and have a clear cause. Emotion is a reaction to an event, and the experience is fundamental. By stimulating emotions that are strongly positively related to job satisfaction, and reducing the incidence of emotions that are negatively related to satisfaction, it is possible to modify the work environment.[24,28] Efforts to improve emotions pay off in better job attitudes.[24,29]

Job satisfaction is related to personality, job characteristics, and situational and genetic determinants. The finding that separated twins have the same job satisfaction levels suggests that there is a genetic basis for job satisfaction. This genetic component explains why people choose a job which is compatible with their own intellectual levels.[30-32] Job attributes like challenge, significance, task feedback, opportunity for growth, autonomy, variation, distributive justice, supervisor support, friendships among co-workers, and pay are related to job satisfaction.[31-36] Determinants that lower job satisfaction include availability of jobs outside the organisation, role ambiguity, role conflict, and role overload.[36,37] Job satisfaction has a protective effect against the negative consequences of work stress,[35,38-41] is significantly related to organisational commitment,[32,42] and is the best predictor for turnover.[43,44]

Burnout

Sickness is determined for the most part by three different dimensions: life style (eating habits, smoking, drinking, etc.), personal physical factors (weight, blood pressure, cholesterol, etc.), and surrounding factors (working conditions, quality of air and water, skills, etc.). For any organisation, it is only possible to influence surrounding factors such as working conditions, skills, and knowledge. Chronic stressful experiences at work can adversely affect physical and mental health. Recurrent job stress is associated with an increased risk of ill health, morbidity, and mortality.[45] Burnout is, by definition, a work-related psychological disorder.

Burnout is defined as a work-related psychological syndrome in response to chronic job stress, characterized by feelings of emptiness, fatigue, exhaustion, physical symptoms, and an increased incidence of sickness absenteeism.[46] There are three stages in the development of burnout, and it starts with a decline in personal accomplishment: [46-48]

I. Lack of professional accomplishment: personal performance and competence function as the core resources to better handle the strains of the job (feelings of incompetence). A lowered sense of efficiency has been linked to feelings of insufficiency and poor self-esteem.
II. Depersonalization (mental distance/cynicism): defensive coping with the demands of the job results in an indifferent attitude towards one’s work.

III. Emotional exhaustion: maladaptive coping (bad coping style) causes overextension and depletion of one's physical and emotional resources and finally results in exhaustion.

Emotional exhaustion can be considered the essence of 'burnout', and is characterized by feelings of emptiness, absenteeism, job turnover, decreased effectiveness, impaired work performance, fatigue, atypical physical symptoms, and a mental hollowing-out.[45, 46, 48-50]

In 1969, Lofquist and Dawis introduced their Person Environment-fit (PE-fit) Theory, which argues that job requirements and rewards received (immaterial and material) have to be in balance with the capacities and needs of the individual employee to prevent stress reactions. Others, e.g. Karasek and Demerouti, continued to develop this 'balance' concept, and identified several demands (e.g. autonomy, social support, physical demands) and rewards (money, self-esteem, job security, career opportunities) that were all relevant to coping with stress.[51-54]

In these models, individual differences between people are not considered. But certain personality dimensions may determine how people react to job demands and rewards. High job demands and low rewards have negative effects on the health of all workers, but the effect is more pronounced in relation to personality dimensions.[55, 56]

Study questions and methods

The aim of this study was to examine problem areas, and to make recommendations for optimising the work of nurse anaesthetists in order to retain them in the profession. The work environment of Dutch nurse anaesthetists is evaluated in terms of work context, work climate, personality, job satisfaction, burnout, psychosomatic symptoms, and turnover intention in different studies amongst Dutch nurse anaesthetists and their supervisors. For a professional group that is getting older, and at the same time needs to grow in numbers, it is important to (re)design the work to optimise it, keeping in mind the organisational limitations.

Central question of this PhD thesis:

Can we find predictors which cause nurse anaesthetists to definitely abandon their job?

Study I: work environment of Dutch nurse anaesthetists

This study focused on the different variables in the work environment of nurse anaesthetists which may interact with job turnover intention and was launched at the annual Dutch national congress of nurse anaesthetists (Nederlandse Vereniging van Anesthesiemedewerkers - NVAM[a]) in January 2007. All participants of the congress received an invitation to fill out the online questionnaire, which sought socio-demographic information, and also included questions about the following variables: work context, burnout, psychosomatic symptoms, sickness absenteeism, perceived general health, personality, work climate, cognitive job satisfaction and turnover.

In addition, to promote and expand the study as well as to include those who did not attend the congress, individual letters of invitation were sent to every member of the NVAM. As well, information was published in the Dutch Journal of Nurse Anaesthetists, and all the chairs of the anaesthesia departments of all Dutch hospitals were informed. The online questionnaire was closed three months after the launch, in April 2007.

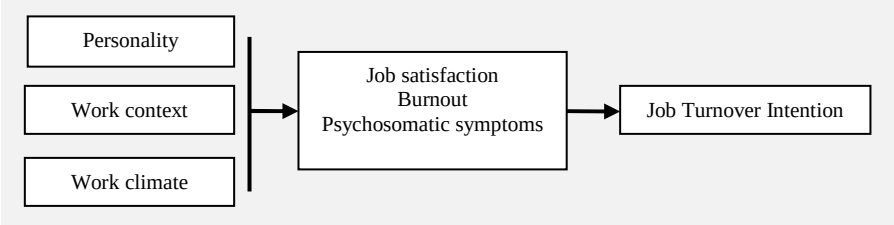

Figure 2: Schematic overview of the study model used in the first study.

Important queries which have to be answered:

Nursing background:

- Have nurse anaesthetists with nursing backgrounds more positive job perceptions when compared to their colleagues without a nursing background?

Work context:

- Which work context factors are of importance in the working environment?
- Are work context factors related to the profession itself or to the type of hospital nurse anesthetists are working in?

Work climate:

- Is there a relationship between work climate, by ways of using the potentials of nurse anaesthetists, and job satisfaction?
- Which work climate characteristics are related to job satisfaction?

[a] Dutch Society of Nurse Anaesthetists

Personality:

- Can specific personality dimensions predict the levels of job satisfaction?
- Are personality dimensions age-related?

Burnout, psychosomatic symptoms and job satisfaction:

- Are burnout and psychosomatic symptoms positively related to each other but negatively related to job satisfaction?
- How is sickness absenteeism related to job satisfaction?
- Is perceived general health related to job satisfaction?
- Is age of nurse anaesthetists a predictor for burnout?

Job turnover intention:

- Do burnout and job satisfaction act as predictors for job turnover intention amongst Dutch nurse anaesthetists?
- Is there a relationship between the work context factors 'career and rewards', 'relation with supervisor', 'task contents', and 'social environment', and turnover intention, that is mediated by burnout and job satisfaction?
- Is there a relationship between work climate and turnover intention that is mediated by burnout and job satisfaction?
- Is burnout and job satisfaction related to personality?

Study II: work context characteristics

In addition to the first study, directors of private clinics and employment agencies, specialized in nurse anaesthetists, were asked to fill out the same questionnaire about work context so that we were able to compare the supervisor's view with those of the nurse anaesthetists.

Work context:

- Do supervisors (head nurse anesthetists) judge the work context characteristics of nurse anesthetists in a similar way as their personnel?

Study III: the influence of events and emotions on job satisfaction

In this study, performed in March 2008 among supervisors of 24 anaesthesia departments in Dutch hospitals, we investigated the affective component of job satisfaction. We collected data on events and emotions, and their effects on job satisfaction. Demographic information (age, gender, student/certified, number of years of practice since certification), and the day of the week they participated, were recorded and used as a control variable.

Participants received, at the beginning of the working day, the first questionnaire about emotions and expectations. The second questionnaire asked about emotions, positive and negative events, expectations and job satisfaction, and was filled in at the end of the working day, before leaving for home. The questionnaires were anonymous; both were returned in a sealed envelope by the participant. Only fully-completed questionnaires were subsequently processed.

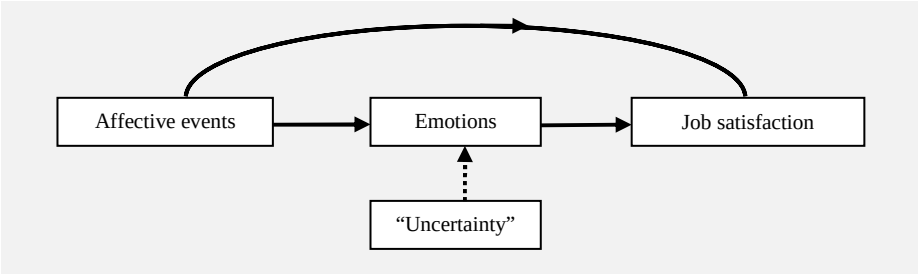

Figure 3: Schematic overview of the study model used in the third study.

Important queries which have to be answered:
Events, emotions and job satisfaction:

- How do events and emotions influence job satisfaction?
- Do 'uncertainties' (in terms of expectations) influence this process?

Study IV: European team members

In many European countries, where a varying degree of task substitution and responsibilities can be identified, anaesthesia service is provided by a team of physician and non-physician anaesthesia members. This study was performed to assess the availability, as well as the roles and functions, of non-physician anaesthesia team members in European countries. Questionnaires were sent to thirty-one European countries. A questionnaire was sent to all the respective representatives of the Union of European Medical Specialists (UEMS) Anaesthesiology section, and the International Federation of Nurse Anaesthetists (IFNA), to collect information available on the status quo as of 1st January 2008. After one month, reminders were sent to those who had not responded. There were also numerous e-mail and phone solicitations to collect the desired data. We also cross-checked the numbers of anaesthesiologists and anaesthesia team members against the national anaesthesia societies and the official government institution of each country (Ministry of Health, National Institute of Health, Medical Council). This data received from the official

government institutions of each country is the only source that is also used by the European Union (Eurostat).

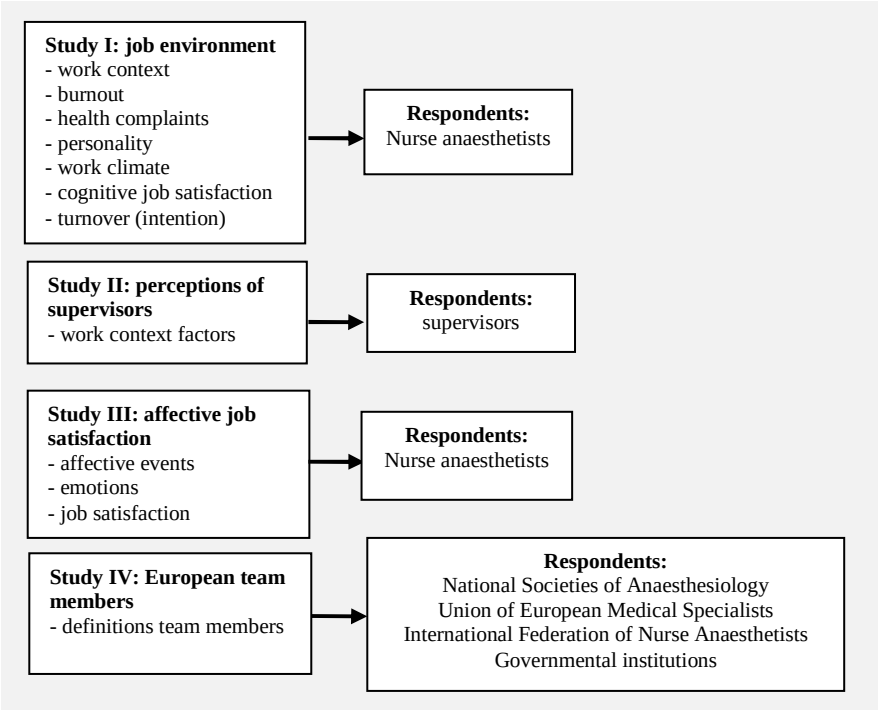

Figure 4: Study design.

Outline of the thesis

In order to understand the challenges, nurse anaesthetists are faced with today, it is essential to look at the roots and the early days of anaesthesia. The very first anesthetic was administered by a dentist Abbott who was allowed to show his performance to the surgeon Warren. In general anesthetics were administered by surgeons in the USA (1846), although the very first nurse anaesthetists were trained in Europe. Until the 1950s in most countries induction of anesthesia was performed by the surgeon, and the nurse took care during maintenance of anaesthesia. After the 1950s anesthesiologist took over the role of the surgeons. However a shortage of anesthesiologists resulted in a continued important role for

nurse anaesthetists. The development of these non-medical professionals in anaesthesia is described in chapter 2.

In many European countries initiatives were taken to train nurses to perform distinctly circumscribed medical acts and monitoring of patients under direct or indirect supervision of an anaesthesiologist. The result was a varying degree of task substitution and responsibilities and anaesthesia service was provided by close cooperation between physician and non-physician anaesthesia staff. Later, European employment law allowed and stimulated the liberal exchange of professionals between European Union countries. In chapter 3 we overview the availability, as well as the roles and functions, of non-physician anaesthesia providers in European countries.

As the only exception in Europe, the Dutch healthcare system does not require nurse anaesthetists to have nursing backgrounds. At the end of three years education and training in anaesthesia, the Dutch nurse anaesthetist professional can be compared to a registered nurse anaesthetist (RNA) at bachelor's level in other countries. The debate is whether nurse anaesthetists with nursing backgrounds are better prepared and more "fit for the job" than those without nursing background. This Person-Environment (PE) fit was operationalized by measuring a variety of characteristics. In chapter 4 we test the perceptions of both nurse anaesthetists with and without nursing degree to find possible differences in PE-fit.

In chapter 5 we discuss the work context factors which are important for nurse anaesthetists. We also check if supervisors of nurse anaesthetists think similar about these factors which is essential for creating an effective department policy and maintaining a healthy balance between the nurse anesthetist and his/her work environment.

One way to alleviate the shortfall of manpower is via recruitment, although this is not always successful. Selecting suitable nurse anaesthetist candidates, people with the potential to become 'career' nurse anaesthetists, is increasingly important. In chapter 6 we try to identify the personality dimensions which are relevant in predicting job satisfaction. This could mean that employers who are effective at selecting the right person for the job, are better able to retain employees and build more stable workforces because of the higher job satisfaction amongst those nurse anaesthetists.

Motivational models often emphasize the importance of autonomy, use of skills and knowledge, and social interactions. Motivating nurse anesthetists to the utmost is about realizing their full potential, and the work climate can be seen as an indication of how well the organisation is realizing its full potential. A positive work climate based on using the potentials of employers proved to have positive effects on team engagement and productivity. The attractiveness of the work climate is evaluated by how nurse anesthetists

perceive their environments. In chapter 7 we focus on the relationship between work climate and job satisfaction. We also set out to determine which work climate characteristics relate to job satisfaction.

The interaction between an employee's competence, emotions, behaviour and their social interactions determines the level of perceived healthy psychosocial work environment. When this interaction does not occur smoothly, the result is stress, caused by an imbalance between competence of the employee and demands to meet the requirement and expectations of the organization. The role of the nurse anaesthetist can be stressful because they are repeatedly confronted with changing patient needs, medical problems and suffering, while dealing with demands from surgeons, supervising anaesthesiologists and their hierarchical supervisors. Longstanding stress at work can adversely affect physical and mental health. In chapter 8 we discuss stress related symptoms (burnout and psychosomatic symptoms), sickness absenteeism and age in relation to job satisfaction.

Job turnover has been seen as the result of an employee's decision-making process related to organizational characteristics and perceived alternatives. A high rate of job turnover among nurse anaesthetists negatively impacts the morale, productivity, organizational efficiency, quality of services provided, and costs of the workforce. Work environment characteristics and personality dimensions are factors influencing burnout, job satisfaction and job turnover. In chapter 9, our final model of the thesis, including the variables work context and climate, personality, burnout, job satisfaction and turnover intention, is tested for their relationships

Job satisfaction is an attitude with two components: an affective and a cognitive component. The cognitive component refers to attitudes towards the job, and is represented by the evaluation of a set of concrete features. The affective component of job satisfaction relates to feelings and emotions. Job satisfaction fluctuates throughout the working day, and these fluctuations are in part driven by moods and emotions. However, not every emotion has the same impact. In chapter 10 we discuss the influence of events and emotions on job satisfaction. This relationship could be an essential mechanism to increase job satisfaction.

In the general discussion we focus on the differences between Dutch hospitals and the practical implications of our findings. Finally, we discuss some possible future developments which are important for retaining nurse anaesthetists for their profession and creating an effective recruitment instrument.

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The moderns are, in relation to the ancients, as a dwarf placed on the shoulders of a giant; he sees all that the giant perceives plus a little more

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Submitted to:

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Chapter 2

The history of nurse anaesthetists – a global perspective

The progress of non-medical professionals in anaesthesia

Abstract

In order to understand the challenges nurse anaesthetists are faced with today, it is essential to look back at the roots and study the early days of anaesthesia. The first general anesthetics were administered by surgeons or obstetricians in the USA (1846), although the very first nurse anaesthetists were trained in Europe.

Induction of anesthesia, traditionally, was performed by the surgeon but the nurse took over during maintenance of anaesthesia. The surgeon was ultimately responsible for the entire operation, including the 'anaesthesia'. Patients were anaesthetized by dropping ether or chloroform onto a gauze mask. Anaesthesia by stupefaction using the vapours of ether or chloroform was used for many years, without anyone really worrying about how this anaesthesia actually worked. Indeed, in those days, anaesthesia was considered an indispensable part of surgery, but, of itsef, it was considered a boring, insignificant matter. It was even not thought necessary to pay the anaesthetizer anything. From the 1920s onwards, nitrous oxide and oxygen anaesthesia, supplemented with ether became the standard technique for general anaesthesia, while after WWII intravenous anaesthesia took off.

In virtually every country the history of nurse anaesthesia is one of trial, tribulation and travail. These nurses regularly faced obstacles constructed by both the nursing and the physician cadres. This history is often one of continuous battle and conflict driven by an impulse of survival by the profession of nurse anaesthesia.

In the USA, initially, most surgeons were using graduate nurses as nurse anaesthetists and backed-up their nurse anaesthetists (later, followed by the hospital administrators). They were often opposed by other nurses and by physicians and by their respective societies. Ongoing efforts in areas such as education, the granting of national diplomas, and organization of national professional organizations produced groups of nurse anaesthetists with a well demarcated place in anaesthesia; this position was legalized by both the government and the nursing and physician communities. A continuous effort to bring their profession at a higher level led to an increase in the requirements for their training. In some countries a Master's degree and eventually even a doctorate became mandatory for entry into the profession.

In Europe, with the introduction of anaesthetic drugs, of neuromuscular relaxants and of an increasingly broad range of anaesthesia machinery, physicians decided that anaesthesia should remain within the domain of a physician's profession. Anaesthesia duties were assigned by the surgeon to the least experienced member of the staff, often a novice just out of the medical school or even to a last year medical student. After both WW

I and II, periods of acute shortage of anaesthetists, nurses were again allowed to give anaesthesia supervised by surgeons and later by anaesthesiologists. Competition between nurse anaesthetists and anaesthesiologists was not really an issue in Europe, where both members worked as team players each with their own competencies, responsibilities and limitations.

It is virtually impossible to give an accurate, detailed account of the development of anaesthesia and nurse anaesthesia in each country because the progress of anaesthesia in each country differed as much as did the development of medicine. However, almost everywhere, nurse anaesthetists specifically challenged the boundaries between the nursing and medical practices which were to fashion the basis for the responses of organized medicine.

Introduction

One of the greatest contributions to the relief of human suffering is undoubtedly the discovery of anaesthesia in 1846. Before anaesthesia, surgery was a terrifying last resort action, a final attempt to save life. Few operations were possible and surgical prowess was judged by speed of intervention rather than by outcome or competence. Some doctors had tried using alcohol, morphine and other sedatives to dull the pain of surgery but most patients were held or strapped down; luckily, some fainted from the agony and suffering. Many patients perished; overall surgical mortality was 10 to 15%.

Figure 1. Copy of Morton's inhaler for ether anaesthesia, first used 16 October 1846 (Courtesy Wellcome images).

Virginia Thatcher's *"History of Anaesthesia"*,[1] (first published in 1953, reissued in 1984) emphasises the role of the nurse specialist in anaesthesia. In Marianne Bankert's *"Watchful Care – a History of America's Nurse Anesthetists"* one can find much evidence of the struggles of nurse anaesthetists (NAs) from their first appearance in the second half of the 19th century onwards.[2] Contrary to the situation in the USA, where NAs left documented and published testimonies, in

Europe, hardly anything was found written by nurses themselves so we have to rely on what was written by physicians.

The reader should remember that there is a historical perspective and backdrop which applies to the times. In that male dominated environment, medicine was a man's business in which the surgeon was monarch. Nursing was women's business and women had to obey and, yet, were seen as naturally caring, empathetic and humanitarian. Men had to earn a living to support their families but would never apply for a job in anaesthesia because of the low pay and minimal respect. Women still had to fight to find a place in society.

A combination of social and economical factors dictated that anaesthesia was to be initiated by men and then executed by women. Initially, it was religious sisters (nuns), who were given these tasks; in either case, they were not paid for their effort. By a strange twist of fate, nursing became attractive to women mainly because it became one of the sole independent, autonomous functions within society where a woman could achieve and be seem to do so without the aid of their men folk.

Progress of early non-physician administered anaesthesia

Early methods of surgical anaesthesia were crude and dangerous, sometimes even barbaric. Patients were not afraid of the operation but were horrified about undergoing anaesthesia.

According to the Dutch surgeon, Van Der Laan, one of the nurses would provide the narcosis and a second one would guard the pulse and inform the former if anything went wrong.[3] A third (and fourth) nurse would assist the surgeon and a fifth nurse would circulate. The narcosis nurse should not focus on either the operation or the environment but be responsible for nothing else but anaesthesia. She was to order silence as any noise would disturb her and her patient. Nobody should talk to her and others should refrain from talking to her. Those who talked to her anyway would not expect to receive an answer." During the First World War, Dr. Crile and his NA, Miss Agatha Hodgins, literally introduced the gas-oxygen anaesthesia into war surgery later adopted in British and French hospitals.[4] Spinal subarachnoid anaesthesia was still given by surgeons. Physician anaesthetists but not NAs were using gas-oxygen-ether anaesthesia and the IV anaesthetic, thiopentothal (Pentothal). When cyclopropane was first introduced it was not issued to either a medical unit or a hospital but to an anaesthesiologist and was, therefore, not available for NAs. New devices were being designed (by surgeons) for superior administration of anaesthesia. These included: bottles for dropping rather than pouring

ether or chloroform; anaesthesia masks (designed by the German surgeons Skinner and von Esmarch); and, later, the first gas-ether machine (the Boise-Young apparatus). Although the introduction of new devices was often achieved by brilliant surgeons, the implementation of the techniques into daily practice was left to the nurses. In Germany, the first Dräger anaesthesia machine was produced in 1902 and the first anaesthesia machine with a carbon dioxide absorber and circle system was built in Lubeck, Germany in 1925. By 1967, in army hospitals in Vietnam, a new (smaller and lighter) Dräger field anaesthesia machine with a more efficient carbon dioxide absorbing canister and dispenser of ether, nitrous oxide, cyclopropane, methoxyflurane, halothane and oxygen or air, as needed, became standardized.

Anaesthesia developments in the USA

Although, in the beginning, surgeons became the masters of loco-regional anaesthesia, general anaesthesia was performed far more commonly by nurses and religious nuns, especially in peripheral hospitals.

Because of a lack of financial and professional incentives for physicians to specialize in anaesthetics, some surgeons felt impelled to recruit low-ranking physicians from marginal medical specialties. Often, physicians of disrepute or with dubious qualification gravitated towards providing services. Multiple incidents followed and some surgeons felt that, perhaps, recruiting a skilled person might improve matters. Surgeons turned to religious hospital sisters, who devoted complete attention to the well-being of the patient and who accepted the gravest responsibilities without any economic reward.

Timeline 1870 - 1910

Nurse anaesthesiologists predated physician anesthetists in the US as anesthesia providers by a number of years. Four women played a major role in the development of the profession NA in the USA.[2] The first identifiable USA NA was Sister Mary Bernard (St. Vincent's Hospital, Erie, Pennsylvania) in 1877.[5] In 1880, the administration of chloroform and ether was taught by the surgeons to Sister Aldonza Eltrich in a community in Springfield, Illinois (USA). Soon some fifty other Sisters took up the work as a NA and provided courses in anaesthesia for Sisters who were graduate nurses.

Outstanding work was done by NA Alice Magaw at the Mayo Clinic in Rochester, USA, who studied in Germany to become skilled in the ether drop method.[6] Coming back to work in Rochester, her experience was reflected often in talks she gave for the medical society. Magaw had already reported, in 1899, over three thousand cases in "Observations

in Anaesthesia", which were published in the *Northwestern Lancet*.[7] Many would follow, making Magaw the "mother of anaesthesia". She tried out several methods (including nitrous oxide, scopolamine and morphine), stressed the unique needs of the patient and paid attention to the psychological dimension of the anaesthetic experience. Medical people came from around the world to observe the technique of the highly regarded Mayo NAs, and were charmed by the way they "talked their patients to sleep". The Rochester method was adopted in many US States.

Figure 2. **Sister Mary Bernard, a nurse at St. Vincent's Hospital in Erie, PA, USA (1877), (Courtesy AANA).**

One of America's greatest surgeons, Dr. George W. Crile played an important role in the development of the anaesthesia nurse profession. He worked at Lakeside, Cleveland, USA, where nurse Agatha Hodgins became associated with surgeon Crile and dentist Dr. Charles Teterwho were experimenting with a new method of administering nitrous oxide-oxygen anaesthesia. In 1908, Hodgins was placed in charge of anaesthesia for Crile's private service at Lakeside.[5] After returning from her anaesthesia studies in Heidelberg, Germany, NA Agnes McGee, established, in 1909, the first school of nurse anaesthesia, a six months course in anaesthesia at St. Vincent's Hospital, Portland, USA.[1,8] Courses included instruction in anatomy, physiology of the respiratory tract and the pharmacology of the anaesthetic drugs, as well as training in the administration of the then commonly used anaesthetic agents.[1] This first school of anaesthesia in the world was often attended by future physician anaesthetists as well. Hodgins developed, in 1915, a course of study for a post-graduate anaesthesia school at Lakeside Hospital where she propagated the nitrous oxide-oxygen technique. Prior to WWI, five hospitals in the US - Lakeside, Portland, Springfield, New York City and Brooklyn - provided postgraduate courses in anaesthesia. Some NAs were even appointed to medical school faculties to train the medical students in anaesthesia. For example, Agnes McGee taught third year medical school students at the University of Oregon.

Figure 3. Anaesthesia given by mask in a hospital in New York, USA (1900).

Timeline 1910-1940

The propagation, development and expansion of the NAs' profession received new impetus when the USA entered the first World War in Europe and over a thousand nurse anaesthetists were deployed to Britain and France. While, in Europe, the US NAs were risking their lives on the front (WWI), establishing an enviable record of honour and bravery and winning the admiration of the most celebrated surgeons and medical practitioners in the medical world, on the US mainland discussions were being raised into the need for professional physician anaesthetists.[7] Nurses were trained to carry out doctors' orders promptly, accurately and faithfully, underlining, once again, the male surgeon's role as "Captain of the Ship".

In those days, women accepted that sex differences implied a "natural" separation of activities with a "natural" dominant role of male over female and, consequently, that the NAs would occupy a lower place in the professional hierarchy. The problems for the male physicians in anaesthesia were dual: because there were no incentives, little attraction or chance for competitive remuneration. There was no appeal for talented physicians to accept a secondary role, as anaesthesia entailed a "born a slave" mentality. Besides, while they were seeking to gain status for anaesthesia as a medical specialty, with its accompanying

privileges and remuneration, they had to contend with the 'female' stigma of anaesthesia. To make anaesthesia a respectable field for the physician, the contribution of a NA had to be ignored, denied or even denigrated.

Although the British had founded, already, in 1905, the National Association of Physician-Anaesthetists, US physician-anaesthesia only began to be effectively organised in the 1920s. A new word - "anaesthesiologist" - was coined in the 1930s to distinguish the work of physician-anaesthetists from that of nurse-anaesthetists.

In the USA, the battle between NAs and physicians continued. Dr. Francis McMechan refused to recognize NAs as "there was no place in organized anaesthesia for them" and the New York Society of Anesthetists wanted no part in any organization that either tolerated or endorsed NAs. He used the editorial pages of the *Anaesthesia Supplement of the American Journal of Surgery (1915)* to ask for support in legal and political action to be taken against NAs. He tried to abolish the administration of anaesthetics by non-medical anaesthetists[2]. McMechan even petitioned the Ohio State Medical Board to take action against Lakeside Hospital, where Agatha Hodgins had organized the Lakeside School of Anaesthesia in 1915 (and later – in 1923 – the Alumnae Association of Lakeside School of Anaesthesia).[2]

Figure 4. Agatha Hodgins (at the head of the table) administers anesthesia during World War I in Neuilly-sur-Seine, France. Hodgins volunteered with the Lakeside Unit of the American Ambulance Hospital from 1915 (www.digitalpast.org).

Following the Board's resolution to withhold all recognition of the Lakeside Hospital as an acceptable Training School for Nurses and the recognition of its graduates as Registered Nurses pending a "hearing", Lakeside Hospital discontinued the anaesthesia school. The surgeon Dr. Crile, however, supported his NAs, arguing that the Lakeside Hospital was taking the lead being followed by many of the large clinics in the

USA. The “hearing” resulted in a withdrawal of the edict and the Lakeside School reopened in 1917 with even more applications (141 nurses and 31 physicians) than previously.

In the US, similar legal actions (e.g. *Frank v. South, 1917 and Chalmers-Francis v. Nelson, 1936*) were taken against NAs to legislate them out of existence, so that several NAs had to stop their work.[2] Several cases were brought forward to court to outlaw NAs. USA physician anaesthetists often referred to their colleagues from Britain and Canada, who protected their population from a lower standard produced by NAs. The outcome of these trials definitively established the legality of NAs. Far too many surgeons favoured, defended and depended upon their NAs. Not only District Attorneys, but also the Attorney General, the Superior Court and later the Supreme Court, ruled that the NA, giving anaesthetics, was under the active orders of the operating surgeons and was not practicing medicine independently. Anaesthetic work by NAs was not in violation of the law. Nurse anaesthetists in the US work with a physician or dentist who does not have to be an anaesthesiologist. Consequently, many NAs were rehired again as clinical anaesthetists in most hospitals.

Figure 5. Nurse anaesthetists provided anaesthesia for the wounded in World War II (Courtesy AANA).

The need for uniformity and professionalization led to the first meeting of the California Association of NAs in Los Angeles (1930) where they started the Nurse Anaesthetists Association.[9] National registration and securing legislation was necessary to consolidate an effective, well-defined status for NAs throughout the USA and to counteract all the legal actions against these nurses. The national Association established uniform and stringent criteria for the education of NAs, a national certification examination and an accreditation system for NAs’ schools. Agatha Hodgins was elected President of the National Association of Nurse Anaesthetists (in 1939 changed to the American Association of NAs, ANAA). The NANA/AANA strongly declared a conviction that the NA service be a separate hospital service and not a part of nursing service (“nurse anaesthesia is a special service that cannot be defined as nursing”). Hodgins, though, sought, in vain, affiliation with the American Nurses’ Association.

Fortunately, recognition was obtained from the American Hospital Association (AHA), who gave support to the NAs for several reasons: 1) it was unlikely that there would ever be a sufficiently large number of medical anaesthetists to fill the requirements of the hospitals, which were now employing NAs; and, 2) there was a desire to meet the wishes of surgeons who preferred the services of NAs. In the eyes of the hospital administrator, anaesthesia was still viewed as the "handmaiden" of surgery.

Timeline 1940 – 2010

The second World War accelerated the specialization of medicine and gave great impetus to anaesthesia as a medical specialty. The increased need for anaesthetists in the armed forces also created an acute shortage of NAs back home. Efforts were made to increase the number of Schools of Anaesthesia to meet the greater demand of active NAs. A vigorous pro-anaesthesiologist (and anti-nurse anaesthesia) national public-relations campaign was launched as the anaesthesiologists were now in a strengthened position. "Anaesthesia is safe only when delivered by a physician", "Bad anaesthesia causes more operating-room deaths than surgery", and "Hospitals have physician anaesthetists to protect you", were some of the headlines of major articles in lay magazines.[2] The problem, however, was that no more than five to ten percent of the hospitals were serviced by anaesthesiologists. Help again came from the American College of Surgeons, which supported the increasing tendency of having physician anaesthesiologists in charge of surgical anaesthesia but deplored the propaganda for the elimination of the trained NA.[10] The specialty of nurse anaesthesia continued to take steps to increase its legitimacy as the AANA instituted mandatory certification for CRNAs in 1945.[8,11] Official recognition came from the AHA Council on Professional Practice in 1948.[10]

Nurse anesthetists in the US were the first nurses to specialize beyond general duty nurses. The AANA founders approached the American Nurses Association (ANA) seeking a place under their umbrella to develop the specialty but were denied. In 1946, nursing was catching up with nurse anaesthesia. The ANA affirmed its interest in the NAs as a field of specialization, which development they "watched with interest and with a certain amount of pride".[12] In 1947, the ANA even appealed for an affiliation which was subsequently denied by the AANA. The AHA once again came to rescue of the NAs because, in the vast majority of instances, nurse anesthetists were hired by hospital administrators outside of nursing or physician groups. The AHA leadership helped the young organization and all meetings of AANA were with AHA until 1974.

Following an appeal to the Department of Health, Education and Welfare for accrediting their schools, the AANA was officially recognized in 1955.[2] In order to make it

clear to the general public and to the employers that an individual NA had met the standards required for Association Membership, the choice fell on the term “Certified Registered Nurse Anaesthetist” (CRNA) and its use became effective in 1957.

Anaesthesiology began training substantial numbers of physicians in the 1950s as medical specialization blossomed, although its supply of anaesthesiologists remained meager through the 1960s. US anaesthesiologists tried to eliminate or control the practice of nurse anesthesia. This need to control had nothing to do with patient safety or quality of care but was more to do with economics and politics. In 1963, unofficial contacts between the presidents of the ASA and the AANA took place to investigate the possibility of a dialogue between the two organizations but this was not successful.[2] Tension between physicians and NAs continued, particularly in relation to malpractice policies and antitrust and restraint of trade issues. Despite progress on the educational front, interprofessional conflicts with medical doctors continued.[11] CRNAs were winning most legal battles and overcoming barriers to their practice erected by physicians and hospital administrators. In the 1980's, the ASA would not meet with AANA unless CRNAs agreed to their, unilaterally developed, position paper on the anesthesia care team. This paper argued that nurse anesthetists were a stop gap measure until all anesthetics could be administered by a physician. Later, the ASA would not meet with the AANA until they accepted anesthesia as a practice of medicine. Both conditions were unacceptable to the AANA. The ASA sponsored the development of the Anaesthesia Assistant (AA) recognizing the AA as the dedicated assistant of the anaesthesiologist.[13]

Far too often, the two organizations, the ASA and AANA, were competing against each other instead of cooperating with each other. A survey, in 1994, among CRNA’s and anaesthesiologists found that their relationship was the main source of workplace stress and dissatisfaction resulting in a climate of competition, not collabouration.[14] Even today, tension exists between US-CRNAs and US-anaesthesiologists because clear agreements are lacking.[13] However, Torgersen et al. argue that the traditional nursing , gender and sex roles along with discrepancy in social status and economics are the main factors behind the resultant tension.[14] Most of the battles are philosophical and occur at leadership level. They do not take place in theatre. In fact, daily, nurse anaesthetists, anaesthesia assistants and anaesthesiologists work well together and have good working relationships.[13] Later, new generations of NAs worked hard to increase the quality of care by adding recertification and continuing education or updates, such as Master's entry qualification to start training, with the ultimate goal that all NAs will need to hold a doctorate for entry into the profession by 2025.

Anaesthesia developments in the United Kingdom

In Great Britain chloroform was not freely available as “it was so easy to kill deliberately someone”. Indeed, the first fatality from chloroform occurred on January 28, 1848, when a healthy 14-yr old girl died on chloroform anaesthesia during removal of a toe-nail. Many others would follow, with an incidence of 1 in 3,000 patients. Soon, the Medico-Legal Society in London ordered that anaesthesia be administered only by physicians, who had to be educated in narcosis.

This was the main reason that nurses were not involved in administering anaesthesia in Great Britain and, to a certain extent, across the British Empire except in remote areas (*vide infra*). Most of the time, in the early days, anaesthesia duties were assigned to the least experienced member of the staff, often a novice just out of the medical school, or even a last year medical student. As a rule in university hospitals, one of the

Figure 6. Operating theatre Metropolitan Hospital, London, UK (1896) (Courtesy Wellcome).

younger surgical interns, were selected by the surgeon to administer the general anaesthetic.[15,16]

At the beginning of the 20th century general practitioners administered the anaesthesia. Medical education was very expensive and most doctors bought themselves into a general practice. Only the rich were able to train as specialists. General practitioners often claimed the right to anaesthesia, as it helped to gain extra income. None of them had either received special training or experience in the administration of an anaesthetic. In the teaching hospitals and provincial towns a few 'real' anaesthetists were working although they were general practitioners too.[15] Differences in practice between the USA ('absolute continuous administration with a drop on the mask every two seconds') and Britain ('the anaesthetist poured a few drops, then stopped for a few minutes') existed. The "Great Trans-Atlantic Debate" over the relative merits of ether (US favourite) versus chloroform (preferred in Britain) anaesthesia went on for years. As anaesthesia in Britain was a physician practice, it was intrinsically superior to anaesthesia in the US, where NAs were permitted to practice. Because there were only a few anaesthetists, surgeons often had to ask a newly qualified or even untrained house surgeon or physician to give anaesthesia. To prevent these situations surgeons occurring, surgeons favoured the training of NAs who would always be available in the hospital but this was unacceptable to the anaesthetists.[15]

The British Army had only ever experienced anaesthesia delivered by doctors and the arrival at the front of US female NAs astonished them. The great skill and care that was displayed by these NAs soon caused amazement to yield to admiration and, in 1918, classes were formed for British nursing sisters and these nurses started performing duties in various hospitals. However, the British physicians kept calling these nurse "technicians" a rather derogatory term. Between the first and second world wars, Operating Theatre Attendants (OTA) or Theatre Porters were helping the surgeons and anaesthetists. Their main function was to fetch patients from the wards to the operating table, to look after the unsterile items or equipment and to assist the anaesthetist during induction.

The 1940s were a revolutionary decade for medicine and anaesthesia. Four developments affected anaesthesia in particular: 1) the set-up of a national blood transfusion service; 2) the discovery of penicillin; 3) the introduction of curare (1948) into the practice of anaesthesia (which extended the boundaries of surgery); 4) the introduction of the endotracheal tube and laryngoscopy; and 5) the founding of the National Health Service (1948). The latter recognized anaesthesia as a specialty alongside medicine and surgery. Anaesthetists no longer needed to practice general medicine and could now devote their whole time to the specialty.

After the second world war, the OTA changed their names to Operating Theatre Technician (OTT) and extended their role following the model used in the military. Sir Ivan Magill was one of the first who recognised the importance of the OTT and formed, in 1945, with a group of OTTs, the Association of Operating Theatre Technicians (AOTT). They became the assistant to the anaesthetist and were responsible for the anaesthesia equipment and assisted the anaesthetist during complex tasks including transfusion, resuscitation and endotracheal intubation. In certain unusual circumstances, the NAs or technicians were allowed to administer anaesthesia under direct supervision of a physician anaesthetist. Until the 1950s, nurses were working, under supervision of anaesthetists, in hospitals in the UK. In 1965 the Minister of Health recognised the OTTs as a special group of men that needed a special six months' training.

Besides the OTT's, an anaesthetic nursing service was established during the eighties. These relatively few registered professionals could take more responsibility in comparison to the OTT and were, for example, allowed to administer drugs and to set up intravenous infusions. As late as the early nineteen nineties the recognition of the OTT's, by now called the Operating Department Practitioners (ODPs), reached a comparable level to that of the nurses. At the same time, a shortage of physician anaesthetists resulted once again in the question of whether NAs could practise anaesthesia.[16] The prospect of training non-physicians to administer anaesthesia had been suggested, intermittently, for several years, but has been resisted strongly by the Association of Anaesthetists of Great Britain and Ireland.[17] Both the anaesthetic nurses and ODP work in relative harmony but the exact difference in roles was not always clear for every professional working in the operating department.[18] In Europe, only Belgium and the UK have relied entirely on physician-based anaesthesia but, in recent years experimental training schemes for non-medical graduates have been introduced to address the staffing crisis problem.[16,19]

Anaesthesia developments in Australia, New Zealand and other British possessions and dominions

Anaesthesia arrived early in Australia so that, within a few months of the very first demonstrations of anaesthesia by Morton in Boston in 1846, medical (William Ross Pugh, Launceston GP – ether) and dental (John Belisario, Sydney dentist –nitrous oxide) practitioners were administering anaesthesia in 1847.[20] From 1847 to 1900 much nitrous oxide was used by dentists and ether and chloroform for surgery. In outback Australia, anaesthesia was frequently administered by non-medical assistants, attracting strong

criticism by the medical establishment.[21] The 'man with the rag and bottle' would hand over to the 'trained attendants' who 'would supervise the later stages of recovery.[22] By the early 1930s, in Australia, it was widely recognised that 'most surgeons are coming to realise that the anaesthetist is not so much a necessary evil as a helpful collabourator and an essential part of the operating team'.[22]

The same applied to the situation in other parts of the British Empire – in Singapore, Malaya, Hong Kong, India, Malta, Aden and Gibraltar. Physicians became the sole administrators of anaesthesia. In Singapore, for example, the Society of Anaesthesiologists was formed in 1967 but the first anaesthetic was administered by an English surgeon only 10 months after Morton's demonstration.[23] In these British Empire outposts, initially, anaesthesia, both general and regional, were administered by the junior medical staff within each of the surgical firms. Anaesthesia skill, e.g. the Liverpool technique of balanced anaesthesia was acquired through Government-sponsored scholarship to the UK. Anaesthesia was seen as a dangerous undertaking with an inordinately high degree of hazard, so that more and more senior staff was roped in to undertake the more difficult cases.

The Australian population is mostly aggregated in half a dozen or so major coastal cities on the periphery of the continent. In these areas, citizens were well served with medical anaesthesia services. The first full-time specialist in Australia was Rupert Hornabrook in 1909. The standard pattern of anaesthesia administration in the early 1900s in Australian cities was that the general practitioner referring the patient to the surgeon would administer the anaesthetic.

More than 75 years ago, in 1934, anaesthesia specialist practitioners became organised industrially and educationally very early with the Australian Society of Anaesthetists (ASA) with seven members antedating the American Society of Anesthesiologists (also, ASA) by some years. ASA was formed twenty years (in 1934) before Germany formed its Facharzt (1953) and more than thirty years before the Japanese Society (1967) and the Chinese Society. The Australasian Faculty of the College (of Surgeons) followed soon afterwards. An early principle was that, whenever possible, one anaesthetist (and not an assistant) would care for and supervise one patient and that the anaesthetised patient would receive priority over all other activities. Though there were both specialist and general practitioner anaesthetists administering anaesthesia, anaesthesia enjoyed, very early, a level of kudos, recognition and professionalism in Australia much higher than that in the USA. As in Germany and the UK, anaesthesia services developed within surgery and obstetrics but were seen as a very separate function. The anaesthetist enjoyed the protection and patronage of the surgeon even if, at times, the general public did

not understand that the anaesthetist was a qualified specialist doctor rather than a glorified nurse. This became especially so when women flocked to the specialty in increasing numbers.

Recognition that anaesthetists were good at securing airways, at resuscitation, at pain alleviation and at ventilation, meant that they started to assume roles outside formal anaesthesia – surf life saving, ambulance services, disaster triage and, eventually, critical care and hyperbaric, aviation, military and pain management. The smartest and best flocked to the specialty such that the manpower issue was rarely grave or dire except in rural and remote areas. Anaesthesia developed within and enjoyed the patronage of surgery (and, indeed, Anaesthesia was a Faculty within the Surgical Royal College) but was largely autonomous with broad faculty for establishing identity and determining its future. The surgeon was, largely, not trained in anaesthesia and not in a position to dictate 'best practice' except in certain areas, e.g. caudal analgesia for obstetric perineal procedures. Remuneration was reasonable and gradually became better than that of some of the surgeon. Unlike the situation in the USA, anaesthetists and surgeons stood as equals and job prospects and career development opportunities for anaesthetists were good.

The issue of nurse practitioners' role never really arose. Instead, the main tensions in anaesthesia were directed between the new full time 'specialists' and the 'general practitioner' anaesthetists (with varying degrees of training) and the different types of assistants to the anaesthetists – initially, surgical dressers (theatre porters) and, later, enrolled nurses, registered nurses and anaesthesia technicians. All the nursing and technical groups organised excellent training programmes but were reluctant to assume responsibility for administration of anaesthesia especially when medical indemnity became an issue. As nursing shortages were widespread there was little scope for branching out into anaesthesia administration; nurses gravitated towards operating theatre scout and scrub duties. While the concept of nurse practitioners surfaced and was successful in the different states of Australia and in New Zealand, in many areas – midwifery, general practice, palliative care, chaplaincy, oncology, wound care – anaesthesia remained the role of qualified medical staff who branched additionally into virtually every area of available space and void within the hospitals.

Instead, much of the turf wars within the nursing anaesthetic area were between enrolled nurses (EN) and registered nurses (RN) where the latter felt that all assistants should be fully-trained nurses specifically trained in anaesthesia and between the anaesthetic technicians ('techies'), who were often not nurses but well trained in anaesthesia assistance and the registered nurses. Often, hybrids emerged, e.g. enrolled nurses who developed a career path by qualifying from the anaesthesia technicians course

and, sometimes, later, became registered nurses. In general, the assistance offered to anaesthetists was of a very high quality. The (Medical) Royal Colleges eventually moved to define and dictate the minimum standards of care for these Anaesthesia Assistants and hospitals were prevailed upon to use these guidelines to determine staffing levels, duties and roles. The philosophical debate about which group – EN, RN, Techie - offers 'best' serves the anaesthesia services is an ongoing one and very variable between one hospital and the next.

The nurse practitioner, nurse medic, paramedic or technician has been more prevalent within the sub-branches of the anaesthesia services – in acute pain management, in preoperative assessment and triage, in hyperbaric and diving medicine, in cardiopulmonary bypass, in venous access services, in medical emergency management, in naval and military medicine and in hospice and palliative care.

Anaesthesia developments in Germany

German surgeons made large contributions to the development of medicine and anaesthesia.[24] Several famous German discoveries occurred in the field of pharmacology: the first local anaesthetic cocaine (Albert Niemann, 1860); first spinal anaesthesia (1898);[25] intravenous regional anaesthesia (1908) by August Bier;[26] first barbiturate Veronal (Emil Fischer, 1902); and ultrashort barbiturate, hexobarbital (Helmut Weese, 1932).

The development of anaesthesia machines was greatly influenced by Heinrich Dräger and his son, Bernhard. Until after WWII, the surgeon administered anaesthesia because he was the master in the OR-department. He performed the operation and supervised the nurse who administered anaesthesia. Anaesthesia was a subspecialty of the surgical department. Because surgery became increasingly more complex, the "Facharzt für Anästhesie" was introduced and the German Society for Anesthesiology and Intensive Care was founded in 1953. However, the surgeon kept his right to make the final decisions and acted as a supervisor over the Fachartz. Because of this, many conflicts arose regarding the 'responsibility' aspects of patient care. Meanwhile, in 1959, the "Deutsche Schwesterngemeinschaft" (the German Nurses Society) stated that they were willing to give anaesthesia under direct supervision of the surgeon as a transition for the shortage of anaesthesiologists. In 1961 the "Deutsche Gesellschaft fur Anästhesie" (German Society of Anaesthesiology) was established and anaesthesia was recognized as a speciality with their own professional domain. Engisch published, in 1961, a report about the dominant role of the surgeon and the autonomy of the Fachartz.[27] At that time their relationship was more

like a ‘cold war’. Engisch argued that jurists should decide about the responsibilities between the two specialities so that the boundaries would become more clear for everybody. In 1962, Weiβauer published a report in which he argued for a more horizontal division of labour instead of the vertical, hierarchical structure. This would create more ‘equal’ professionals. Nevertheless, also according to Weiβauer, in case of disagreement, the surgeon would make the final decision while both would stay within their own professional domain. The patient would have the ultimate right to make a choice. The surgical society did not respond to the report of Weiβauer, neither did Engisch.[27] Finally in 1964, both the surgical and anaesthesia societies edited guidelines and determined each others’ equivalence. At that time, Germany could count on only 200 anaesthesiologists (1 per every ten hospitals). Therefore NAs administered anaesthesia under supervision of the surgeon and filled in for the shortage of anaesthesiologists. Almost from the beginning, the German anaesthesiologists worked together with an anaesthesia assistant (comparable to the anaesthesia technicians in the UK). After completing their nursing program these nurse anaesthetists (NAs) were trained for two more years within anaesthesia and intensive care. The NAs were considered to be a ‘rescue solution’ in times of an anaesthesiologist shortage. It was not until 1992 that enough anaesthesiologists were trained to abandon the NA concept.[27]

In 2004, the German private HELIOS hospitals started, once again, to train nurses to become ‘Medizinische Assistent fűr Anästhesie’ (MAfA) comparable to the NA.[28] To become a MAfA, nurses first had to work for at least two years in an anaesthesia or intensive care department, followed by an one year of practical training in anaesthesia (400 hours). The training involved 200 hours of theoretically training and three days of training in an anaesthesia simulator. The HELIOS hospitals initiated this MAfA training so that they could introduce parallel anaesthesia, i.e. one anaesthesiologist giving anaesthesia in two different theatres. In every OR, a MAfA would administer the anaesthesia and receive supervision from the anaesthesiologist. Sadly, three weeks after certification of one of the first MAfAs, a fatal complication occurred in a healthy 18-year old male while a MAfA was giving anaesthesia. After this incident, much criticism was leveled by the National Physician’s Board in Germany and MAfA training was stopped immediately.[28]

Anaesthesia developments in France

The French Society of Anaesthesia and Analgesia (La Société d'Etude de l'Anesthésie et de l'Analgésie) made up of 7 anaesthesiologists in 1937 and 19 in 1951 was in existence in the mid-1930s. Anaesthesia was performed by either the surgeon's wife, a nun or the best nurse available in the hospital but was always under the supervision of the surgeon. The profession of NA did not exist before WWII in France. After WWII, the Medical Faculty in Paris decided to start its first theoretical training for paramedics (1949) and initiated joint education for physicians and nurses. The hospital de Saint-Germain-en-Laye offered practical training for these paramedics.

Anaesthesia was regarded as an unimportant activity and, therefore, the task was often devolved to religious sisters, nurses or young undergraduates. The role of non-physician anaesthetists was, therefore, an important one. Until the 1970s, many general hospitals had no appointed physician anaesthetists in France.[29]

Some tensions between anaesthesiologists and the first NAs developed and Anne Casamajor founded the le Syndicat National des Infirmiers Anesthésistes (SNIA), the National Society of NAs. In 1960, the Ministry of Health defined the first study resulting in a certificate of competence as "infirmier aide anesthésiste" (IAA for NAs). From now on only specialized nurses and midwives, but no other paramedics, were allowed to administer anaesthesia. These NAs, in 1964, developed as their own specialty independent of the surgeon. In 1967, the French surgeon Prof Baumann moved proposals against NAs. The Ministry of Health refuted these assertions and continued to cooperate with the SNIAA in developing a new curriculum which meant the end of the exclusive right of the Faculty of Medicine in Paris to make such decisions. Because of the huge shortage of NAs, the French Government expanded the education of NAs to several schools.

In 1974, the Professional Association of Physician Anaesthetists submitted a bill in order to extinguish NAs. Thanks to the immediate reaction of the SNIAA, the hospital directors and a large number of physician anaesthetists, the bill was withdrawn and a campaign was started for the legal recognition of the NAs. In the eighties, the profession of NA was legalized, although the society of physician anaesthetist tried to limit their powers. Finally, in 1988, the NA was given a new professional title 'infirmier spécialisé en anesthésie-réanimation (ISAR). This was accompanied by an official training program and an official State diploma: 'infirmier anesthésiste diplômé d'Etat' (IADE). Training to become a nurse anesthetist requires at least two years' experience as a general nurse and followed by success at an examination following two years' special training in an anaesthetic nurse school to acquire the national certification. The IADE now aims to bring

the profession to a higher level of professionalism and competence by proposing that this become a Master's degree. In general, in France, the relationship between the certified anesthesiologist and the nurse anaesthetist is marked by mutual respect, confidence and cooperation at each step of anaesthesia management from induction to recovery of anesthesia.[30]

Anaesthesia development in the Scandinavian countries

While the Nordic countries followed the same steady pattern of development in medicine as other European countries, 'anaesthesia' took somewhat longer to reach the northern part of Europe. This explains why the first anaesthetics were administered in February 1847 (Sweden and Denmark) and March 1847 (Norway and Finland) a few months later than the first anaesthetics in other countries.[31,32]

Initially, nurses took a great deal of responsibility for the practice of anaesthesia and worked, in a fashion similar to that pertaining many other countries, under the leadership of a surgeon. Some prominent surgeons, in the mid 19th century, realized that developments in surgery required a parallel, appropriate development in anaesthesia. Scandinavian nurses developed general anaesthesia into a craft that required high levels of qualification characterized by expert knowledge, observational expertise and skills.[33] Formal education of nurse anesthetists has taken place since 1962 in Sweden, 1963 in Finland and 1965 in Norway. National societies of nurse anaesthetists were founded in 1959 in Denmark, 1960 in Sweden, 1965 in Norway and 1966 in Finland.

The first Swedish anesthesiologist, the late Prof. Torsten Gordh trained under the first Professor of Anesthesiology in the world, Prof Ralph Waters (Madison,Wisconsin USA) and was appointed, in 1940, to Stockholm's Karolinska Hospital. Gordh was, in fact, the first recognized professional full time anaesthetist in Europe outside the UK.[34] In Norway, the first anesthesiologists were educated towards the end of the 1940s. With the introduction of new medication, sophisticated anaesthesia apparatus and the ability to treat several diseases, anaesthesiology became a medical category of its own in the aftermath of WWII. However, the number of anaesthesiologists in Scandinavia was relatively small until the 1970s and increased fivefold between 1970 and 1990.[35]

The Danish nurse anaesthetists in the early years had many tasks besides the anaesthesia – administering the Coombs and other blood tests and helping in the emergency room, the intensive care unit, and the wards. Their Nurse Anaesthetists' Society was founded in 1959. At the start, there was no formal education for nurse anaesthetists but they

were trained by the physicians / anaesthesiologists and worked under their tutorship and responsibility. Formal education for nurse anaesthetists started in 1977.

Anaesthesia developments in The Netherlands

After the first anesthetic in Boston in 1846, when surgeon Warren said his legendary words: "Gentlemen, this is no humbug", the news of the new invention "aether narcosis" spread quickly all over the world. In the Netherlands, surgeon A.C. van Woerden (Utrecht) introduced the first ether narcosis on February 26 and 27, 1847.[36] Unfortunately, few data about the early days of anaesthesia is available and hardly any record was kept by nurses, who actually administered the anesthetic. For decades, only publications in medical journals and some textbooks referred to anaesthesia. Sister Meyboom, an icon of pioneering nursing in the Netherlands, got her nursing diploma in 1900 and was immediately responsible for three wards and the barracks for diphtheria patients. She also administered narcosis, without help, for patients who were operated upon and brought the laundry to the cellar, admittedly, too broad a range of duties![36]

A 1897 book, translated into Dutch from the German, Dr. Kurt Witthauer's "Manual for Nurses", contained a chapter on "Monitor on chloroform-narcosis".[37] Since the turn of the 19th century, books for nurses became readily available where the subject 'technique of ether, bromomethyl and chloroform narcosis' was discussed briefly. Theodoor Hammes (Amsterdam) and his colleague Eduard Arrias (The Hague) were the only two physician anaesthetists (they called themselves "narcologists") working in the Netherlands in the early 1900s.[38] Despite the rise of physician anaesthetists responsible for anaesthesia, nurses and religious nuns largely took care, in the first half of the twentieth century, of the anaesthetic aspects of an operation under supervision of a surgeon. Usually, these were operating theatre nurses who provided ether-narcosis because they had the necessary skills or were interested in removing pain during operations. Contrary to junior doctor availability, nurses could always be prevailed upon in the operating theatre and 'providing anaesthesia' was part of nurses' appointment to the OTs.

Surgeon Van der Laan described in his book on "Nursing, Surgical Patients and Care" "eight tasks for a nurse in the operating theatre: 1) cleaning the operating room; 2) preparation of the operating room; 3) preparation of the patients; 4) assisting the surgeon; 5) administering narcosis; 6) teaching of instruments; 7) patient transportation; and 8) patient aftercare.[3] However, also in The Netherlands, some surgeons, e.g. Drs. A.N. Noltst Trenité and J.A. Stumpff, were against the concept of nurses giving anaesthesia, especially

if physicians were present.[39] Many felt that ether narcosis should be reserved only for physicians. Nevertheless, when, in 1927, the second edition of Van der Laan's text was released, almost nothing was changed regarding the tasks of a nurse. The chapter on narcosis included new material such as the Roth-Dräger machine where compressed air or oxygen is guided through ether or chloroform and possessing many new features (e.g. overpressure narcosis). The Dutch General Medical Council instituted, in 1932, a Specialist Registry consisting of 20 medical specialties, of which 'narcology' was one. Before 1940, there were only four medical practitioners who specialized in anaesthesia in the Netherlands.[39] Surgeons began to understand that, in order to further surgery, they needed qualified physicians specialized in anaesthesia. In 1944, the surgeon Dr. J.H. Zaaijer confirmed the situation extant at the time that "wherever there is a physician anaesthetist, the NA assists him; but in the overall majority of hospitals, the NA is essential and has to provide anaesthesia herself, on behalf of the surgeon".[40] The first Dutch physician anaesthetists began their training, most often in England, after the end of WWII.

Figure 7. Nursing sisters in the operating theatre, a postcard from the St. Gerardus Hospital in Bussum, The Netherlands, postmarked 1940.

Nevertheless, it was not until 1946 that modern anaesthesia was introduced into The Netherlands. The first English-trained anaesthetist, the later Prof. D.M.E. Vermeulen-Cranch, FFARCS (Amsterdam) became the first Professor in Anaesthesia (1958) in the Netherlands. More difficult surgical interventions and even thoracic operations became possible. On January 24th 1948, the Dutch Society of Anaesthetists was established officially.

The training and education of physician anaesthetists took off and was specifically geared towards general practitioners. Also first year residents in surgery were obliged to do a six months training period in anaesthesia which was an integral part of their curriculum in the Netherlands which existed till almost the end of the 20th century. Theoretical knowledge was completely lacking. There was no particular status conferred by 'giving anaesthesia'. Financial rewards were low, making anaesthesia very unattractive to the medical community. Anaesthesia was considered a 'mindless job' which one performed 'as an extra'. In spite of this, any physician was presumed to possess the proficiency to provide anaesthesia and was deemed capable to actually perform anaesthesia on demand. Fortunately 'narcotic' nurses and nuns were often the person training the residents in the initial steps of anaesthesia and then stayed on next to the general practitioner to assist - just in case!

Remuneration for NAs and physician anaesthetists was always a matter of concern. NAs were paid a salary by the hospital. Physician anaesthetists were paid a small honorarium in the early 1950s; such attitudes were not by statements of the Dutch Concilium Chirurgicum such as: "anaesthetists only carry a fraction of the responsibility of a surgeon and provide only a fraction of the work". Together with this low honorarium and the fact that there was an abundance of operations and a shortage of anaesthetists, the physician anaesthetists often covered and supervised up to three operating theatres at a time with an NA permanently in each of the rooms. It was a common belief that, after induction, a steady state was established and that in this stable comatose condition, provided there was low blood loss, only needed monitoring. As in other areas of medicine, this monitoring function could be delegated to skilful nurses and the NA was considered the best monitor of all. In this stable phase, the physician anaesthetist could be used more efficiently by inducing a second patient.

The flexible 'two table' system known as "parallel anaesthesia" is still in practice. Since 1966, NAs were officially trained by the Nationale Vereniging van Ziekenhuizen (National Society of Hospitals).[41] According to a survey held in 1969, a shortage of 80-100 anaesthesiologists existed in the Netherlands. This deficit was solved by allowing NAs to administer anaesthesia but only under direct supervision of the surgeon. In 1970, the Dutch

National Health Council stated that every anaesthesiologist needed the help of a qualified NA.[39] The flexible two table system was henceforth only allowed if an NA stayed with the patient throughout the operation. During the end of the 1960s and early 1970s, in the Netherlands, NAs were exclusively supervised by anaesthesiologists and no longer by surgeons. It was not until 1984 when the training of NA received approval from the Ministry of Health.

Figure 8. Cardiac surgery with the first professor of anaesthesia in the Netherlands (Prof. Vermeulen-Cranch) at the head of the operation table (Amsterdam, 1950).

At the beginning of the nineteen eighties, an important shortage of NAs developed caused by a lack of nurses who wanted to specialize in anaesthesia. This problem was solved by allowing nursing students - without a nursing degree – to enter into the three year NA training. This turned out to be successful, although these 'NA without nursing degree' were not allowed to practice in other nursing areas, e.g. emergency medicine, intensive care. In daily anaesthesia practice, no distinction is made between these two types of professionals – the equivalent of enrolled nurses and registered nurses in countries like Australia - by either the anaesthesiologists or by the hospital managers, and they function at

a similar level.[42] Often, in practice, few would even know whether an anaesthesia nurse did or did not obtain a nursing degree.

Anaesthesia in Japan and China

In Japan, by 1850, the six copies of the Dutch edition of Schlesinger's German book on ether anaesthesia imported in 1848 were translated by the official translators of the Tokugawa Shogunate, the Japanese Government at the time, and the word 'masui' for anaesthesia was coined. The Dutch physicians Otto Mohnike and Pompe van Meeredervoort brought chloroform to Japan and it was used in the Inland Wars. After 1869, Japanese medicine came under German influence such that regional anaesthesia was dominant over general anaesthesia. It was not until 1950, when Meyer Sakland from USA conveyed modern knowledge of anaesthesia to the Japanese that general anaesthesia became popular and developed rapidly. Until now, there have been no nurse anesthetists in Japan; however, recently, the debate has started regarding its potential introduction into Japanese operating theaters. In 2010, a first, important step was taken by starting an exchange education program with the United States of America.[43]

In China, the history is not much different. Some early pioneer anaesthesiologists came back from the USA bringing with them the message of anaesthesia but it was not till the early 1950s that modern anaesthesia was introduced only to come to an abrupt halt during the Cultural Revolution (1966-1976) when only acupuncture and Chinese herbal medicine were encouraged. After 1979, anaesthesia developed rapidly and achieved independence from surgery by 1989. The role of anesthesia helpers is very limited in China; circulation nurses are only available in very large hospitals in the major cities.

Anaesthesia development in other countries

In some countries, women's original involvement in anaesthesia as NAs was one of convenience. Mostly male physicians viewed anaesthesia delivery as an undesirable, low-paying and subservient position. General nursing, even nowadays, remains a female profession attracting only a small number of males. This is not so for nurses in anaesthesia.

Anaesthesia administered by non-physicians worldwide

Today's field of nurse anaesthesia has evolved from a low status women's specialty to a high status profession where males comprise nearly half of all employees. The inclusion of

men in nurse anesthesia (and as surgical dressers) began with the increased demand for military nursing corps during WWII. Males are now drawn to nurse anaesthesia for many reasons: 1) its autonomy; 2) higher pay than general nursing; 3) more technical nature of the work; 4) better work conditions; 5) intellectually more demanding job requiring more complex skills; and 6) increase in professional status.

Worldwide, the development of non-physician anaesthesia occurred in a similar way as in the USA where NAs work independently but under supervision of a physician, in the UK where nurses work under supervision of the anaesthesiologist or in Germany where nurses work under supervision of the surgeon.[44] Though not universally so but especially in those countries where anaesthesia developed after WWII, Health Departments opted not to employ NAs and chose, essentially, to restrict anaesthesia to physician anaesthetists. One should not forget that specialist anaesthetists had to fight for their position in a dominantly surgical world and against a large general practitioner workforce. In order to find their place in society anaesthetists had to do better at their craft than surgeons, medical students, GPs, religious sistes and nurses. With the introduction of muscle relaxants, induction agents, potent inhalational agents and other anaesthesia-specific medications as well as a burgeoning array of anaesthesia delivery systems, and regional anaesthesia modalities anaesthesia became progressively more difficult for surgeons. It was no longer medicolegally possible to administer anaesthesia without a profound knowledge of drugs and techniques (such as intubation and ventilation). Nowadays, there are still countries (eg. the former Eastern European bloc) which struggle to provide anaesthesiologists with suitable hospital positions. Consequently, physician anaesthetists may be very reluctant to work with NAs because they are afraid that nurses could take over their job and their income. On the other hand, they are caught in the horns of the dilemma that they cannot admit that “if nurses can do the job, it is not really an important job” because this would decrease their own position’s standing.

In many countries nurse-based anaesthesia assistants participated fully in anaesthesia delivery especially during phases of shortage among anaesthesiologists. Unfortunately, in several countries, some tragic accidents with patients happened while non-physician NAs were administering / maintaining anaesthesia. Often, these incidents were used by anaesthesiologists as the main reason for denying NAs the facility to administer anaesthesia independently.

In many European countries and the USA, NAs and anaesthesiologists work harmoniously within teams sometimes to the financial advantage to the physician. The tasks delegated to the NA are such that NAs always works under the supervision of a physician anaesthesiologist. There are clear definitions of each task, responsibility and limitation.

Actually, nurse anaesthetists are the most highly educated and best compensated of all the advanced nurse professionals in some countries (e.g. in the USA).

Results of an international study, conducted by the World Health Organization, showed that overall worldwide, in hospital practice, NAs provide 85% of all anaesthesia for Caesarean Sections; administer drugs to induce anesthesia (77%); perform tracheal intubation (74%); administer spinal anaesthesia (57%); epidural anesthesia (44%); manage anaesthetized patients intraoperatively (79%); perform tracheal extubation (77%); and manage patients in immediate postoperative period (54%)[45]. Fifty-seven per cent of respondents reported they were required to have a physician anaesthetist supervise their work (most were from the European region), although 43% reported having no such requirement. An additional finding was that although NAs currently provide much, and in some countries, virtually all the anaesthetics, their contribution to health care often goes unrecognized by their national governments.[45]

Conclusion

One of the most important contributions made towards the perfection of surgery has been attributable to improvements in the conduct of anaesthesia. NAs have been providing anaesthesia care in the United States and in some European countries for nearly 150 years and were the first "nursing specialty group". The skilled, well-trained NAs have most certainly played a keystone role in improving anaesthesia practice.

Anaesthesia nurses struggled with self-definition before accepting that they were a clinical specialty within nursing. Medicine became increasingly complex, increasingly scientific and increasingly controlled by organized medical societies. National organization and international integration has been the key to progress for advanced practice nursing and have been of critical importance in enhancing the growth and protection of the specialty. NAs have challenged the boundaries between nursing and medical practice. They understood that the survival of NA, as a specialty nurse, had to be based on a sound curriculum, extensive specialty training, certification, accreditation, quality assurance and national organization. In almost every country, the anaesthesia profession is still searching for the perfect balance between physician anaesthesiologists and NAs/technicians. Unfortunately, solutions to this “balance question” often depend on the shortage of anaesthesiologists at any particular instance in time.

Anaesthesia is and has to be considered to be a separate medical act. Anaesthesia is best achieved by close cooperation between physician and non-physician anaesthesia

personnel. The definition and recognition of skills and competencies both of medical and non-medical anaesthesia professionals and its respective responsibilities in anaesthesia practice will contribute to identify the role of and the relationship between medical and non-medical anaesthesia professionals to improve quality and safety for our patients at reasonable cost.

It is in the best interest of the patient who has to undergo surgery, to receive anaesthesia care from anaesthesia providers who are well-trained and well-educated. Society forces, gender, war, economy, education, certification and organization issues all had a powerful effect on the development of NAs as a nursing specialty. NAs currently provide much of anesthesia care world-wide. Although responsibilities, tasks and roles have differed widely across nurse anaesthetist (certified or otherwise), nursing assistant (enrolled or registered) and anaesthesia technician groups around the world, it is clear that anaesthetic nurses have made a significant contribution to health care and are, in most countries, an indispensable member of the anaesthesia team**.**

Acknowledgements

We thank the following persons for their help in providing historical notes: Prof. dr. M. van Lieburg, Professor Medical History, Erasmus University, Rotterdam & University of Groningen, Groningen, Netherlands; Em. Prof.dr. L. Deen (University Amsterdam, Netherlands); and Mr Henk Norder, nurse anaesthestist, Martini Hospital, Groningen, The Netherlands. Pictures were provided by AANA (American Association of Nurse Anesthetists); Wellcome Images, 183 Euston Road, London NW1 2BE, UK (http://medphoto.wellcome.ac.uk); and Prof.dr. D. Vermeulen-Cranch, Emeritus-Professor of Anesthesiology, University of Amsterdam, Amsterdam, Netherlands.

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Have plenty of assistance, but not many assistants

Augustus Charles Bernays (1854-1907)

Published as:

Meeusen V[1], Van Zundert A[1], Hoekman J[2], Kumar C[3], Rawal R[4], Knape H[5]. Composition of the anaesthesia team: a European survey. Eur J Anaesthesiol 2010;27:773-779.

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Chapter 3

Composition of the anaesthesia team: a European survey

Abstract

Background. The anaesthesia workforce in Europe is understaffed and may not meet the growing demands of surgery. In many European countries where responsibilities can be identified and a varying degree of task substitution occurs, the anaesthesia service is provided by a team of physician and non-physician anaesthesia members.

Aim. This study assesses the availability, as well as the roles and functions, of non-physician anaesthesia team members in European countries.

Methods. A survey was carried out to examine differences in anaesthesia practices and the strength of anaesthesia workforces in Europe. A questionnaire, seeking information about perioperative anaesthesia input by non-physician anaesthesia team members, was sent to all the national representatives of the Union of European Medical Specialists (UEMS) Anaesthesiology section and the International Federation of Nurse Anaesthetists (IFNA).

Results. The responses to the questionnaire revealed that each European country has its own unique type of non-physician anaesthesia team member and the roles of these caregivers vary substantially. Their levels of organization vary from country to country and whereas nurse anaesthetists are often well organized, circulation nurses are not.

Conclusions. This study demonstrated the heterogeneity and variety of anaesthesia practices throughout Europe. Standardisation of the training and practice of European nurse anaesthetists is desirable for patient safety and quality of care if they seek to work in more than one European country. Those countries that anticipate a shortfall in the supply of anaesthesiologists should examine working models from other countries that currently work with fewer physicians and more nurse anaesthetists.

Keywords: anaesthesia team members; circulation nurse; Europe; nurse anaesthetist.

Introduction

In Europe, anaesthesia services are mainly provided by trained physician anaesthesiologists, although many countries also have non-physician anaesthesia team members. Currently, there is risk of a significant shortage of human resources in medicine, especially in anaesthesia, and the anaesthesia workforce may be inadequate to meet the growing demands of surgery and other areas where anaesthesia expertise is required. A shortfall of anaesthesia team members in one country provides an opportunity for members of the anaesthesia workforce, both the physician and the non-physician groups, from other countries. Migration occurs despite anaesthesiologists and other anaesthesia team members in Europe having different roles specific to their individual countries.[1]

Although, non-physician anaesthesia team members have traditionally played an important role in many European countries and in North America, to date there has been no study of the demographic and practical characteristics of their work. To address the quality or scope of the working domain of anaesthesia team members, an examination of the validity of their training and supervision, and the diploma or degree awarded, is essential. In this study, we examined the profiles of non-physician anaesthesia team members and their tasks within different European countries. We also sought to establish whether the international exchange of non-physician anaesthesia team members within the European Union is feasible in its present form. Finally, information was collected on the national organisations representing non-physician and physician anaesthesia team members throughout Europe to determine the level of organization.

Methods

Following approval by the Medical Ethics Committee of the Catharina Hospital in Eindhoven, The Netherlands, thirty-one European countries were surveyed. A questionnaire was sent to all the respective representatives of the Union of European Medical Specialists (UEMS) Anaesthesiology section, and the International Federation of Nurse Anesthetists (IFNA) to gather information regarding the position on 1st January 2008. After one month, reminders were sent to those who had not responded with further email and telephone contacts as required. We also cross-checked the numbers of anaesthesiologists and anaesthesia team members against the national anaesthesia societies and the official government institution of each country (Ministry of Health, National Institute of Health,

Medical Council). The latter represent the only source of data that is used by the European Union (Eurostat).

Survey questions

The survey (Appendix 1) compared the job characteristics of the non-physician anaesthesia team members and asked questions regarding: a) categories of non-physician anaesthesia team members available; b) total number of physician and non-physician anaesthesia team members in the country. c) whether and how long the non-physician anaesthesia team members are trained in basic nursing and in an additional specifically anaesthesia training; d) the scope of the non-physicians' involvement in preoperative, perioperative and postoperative care; e) additional duties non-physician anaesthesia team members are allowed to perform (preparing the operating room, checking anaesthesia 'tools' and supplies, such as monitors, equipment, and materials; monitoring patients' parameters); and f) the anaesthesia task they are allowed to perform under direct or indirect supervision. 'Direct supervision' was defined as the continuous presence of the anaesthesiologist in the operating room, whereas 'indirect supervision' was when the anaesthesiologist was not physically in the operating room but readily available to help. We also asked physician and non-physician anaesthesia team members whether they were affiliated to a national society, the date of the society's establishment, their website URL, and whether they had a national anaesthesia journal.

All relative workforce figures are given per 100,000 people. The group averages for the relative workforce figures were calculated in order to reflect the situation in the more populated countries. Population statistics of the European countries were provided by the World Health Organisation (January 1, 2008).

Results

Sufficient data regarding anaesthesia team members were obtained from all thirty-one countries surveyed to permit international comparison. Two different categories of non-physician anaesthesia team members were identified: nurse anaesthetists and circulation nurses (Table 1).

NURSES

Nurse anaesthetists

Nurse anaesthetists have a nursing degree (not essential in The Netherlands), have acquired additional education and training in anaesthesia, and administer anaesthesia under the direct or indirect supervision of a physician anaesthesiologist to patients undergoing surgical or diagnostic procedures, according to the plan defined by the supervising anaesthesiologist. They are allowed to administer medication to patients, according to a written protocol or in accordance with the anaesthesiologist's agreement/order, and they may perform intubations and extubations and insert intravenous and arterial lines, depending on local protocol and terms and conditions of service. The number of formal study years (theory and practice) to become a nurse anaesthetist varies widely across Europe, from 1 year up to 4 years (Table 2). All courses of study result in a diploma provided by the local school of nursing, ministry of health, government or university school of medicine.

Nurse anaesthetists are currently working in the following countries: Bulgaria, the Czech Republic, Denmark, Estonia, France, Hungary, Iceland, Lithuania, Luxembourg, The Netherlands, Norway, Poland, the Slovak Republic, Sweden and Switzerland. In Poland, nurse anaesthetists were introduced in 2003, though they still have only limited responsibilities (Table 2).

Professional work domain

No European country allows nurse anesthetists to provide anaesthetic services independently, without the anaesthesiologist's pre-evaluation and agreement. In Denmark, France, Norway, and Sweden, nurse anaesthetists are allowed to start general anaesthesia to ASA I and II patients independently, according to specified protocols and agreements, but with indirect supervision from an anaesthesiologist. Although they are not allowed to start anaesthesia independently, in The Netherlands and Norway, nurse anaesthetists with additional training are allowed to give sedation under MAC (Monitored Anaesthesia Care) for procedures like diagnostic endoscopies, under the indirect supervision of an anaesthesiologist. According to national guidelines in Denmark, France, Hungary, The Netherlands and Poland, four hands are always required during the induction of anaesthesia: an anaesthesiologist together with a nurse anaesthetist, or two nurse anaesthetists (Denmark and France). In Europe nurse anesthetists do not work without an anaesthesiologist's supervision, in the manner of Certified Registered Nurse Anesthetists (CRNA) in USA. Specifically trained nurse anaesthetists may participate in the pre-

operative assessment of patients ASA I and II only in The Netherlands, Norway,[2] Slovenia and Sweden.

Legal and professional terms

Although all the above countries employed nurse anaesthetists, differences exist between the national groups. In The Netherlands, a basic nursing diploma is not an absolute prerequisite to become a nurse anaesthetist. In France, by law, practicing nurse anaesthetists must be registered with the National France State Diploma.[3] Although the responsibilities of Hungarian nurse anaesthetists are rather limited, similar to those of circulation nurses, Hungarian law requires that each anaesthetic must be provided simultaneously by an anaesthesiologist and a nurse anaesthetist.

Circulation nurses (also called anaesthetic nurses)

Circulation nurses are employed in the operating theatre, and can be asked to help the anaesthesiologist during the induction, maintenance or emergence of anaesthesia. Following basic nurse training, they can proceed to training in operating theatre practice in schemes that vary substantially according to local circumstances. Circulation nurses are never allowed to take any responsibility for the anaesthetic care of patients, or to have direct patient-related roles during the induction and maintenance of anaesthesia. Because they are still nurses, they retain their nursing qualifications and can prepare medication and administer intramuscular injections and intravenous solutions, except in Ireland, Malta and Romania where they only assist the anaesthesiologist.

Circulation nurses are currently working in the following countries: Austria, Belgium, Cyprus, Finland, Germany, Greece, Ireland, Italy, Latvia, Malta, Portugal, Romania, Spain and the United Kingdom. In Austria, Germany, Latvia, and Spain, circulation nurses are specifically certified, which is not the case in the other countries.

Responsibilities and qualifications

Although circulation nurses have little influence on how anaesthesia is actually performed, they have important roles within the anaesthesia team that differ from country to country. Not only do their roles differ, but also their scope of responsibilities and qualifications. In Belgium, anaesthesia circulation nurses generally have an ICU and/or an emergency nursing diploma, and are allowed, under the direct supervision of an anaesthesiologist, to perform certain nursing tasks within anaesthesia such as the insertion of IV-lines, intubation, and the injection of medication. Until 1994, there were nurse anaesthetists in Finland (n = 1700), but with very limited working responsibilities; since 1994, only

circulation nurses have been trained. Latvia started with a new system in 2009 in which nurses are trained in anaesthesia and receive university diplomas under the regulation of Riga Stradins University. Currently, Latvian nurses (n = 400) are working in the ICU and the anaesthesia department under the direct supervision of an anaesthesiologist. Greece has circulation nurses as well as anaesthesia technicians. Both groups are trained in the theatre to assist the anaesthesiologist, and their roles are similar though anaesthesia technicians have three years of education in a polytechnic rather than a nursing degree. Italy is similar to Greece, with theatre nurses and anaesthesia technicians who, in some regions, do not require nursing training.

Other work domains of non-physician anaesthesia team members

In many European countries, nurse anaesthetists participate in the acute pain service (Denmark, Finland, Germany, Italy, Luxembourg, The Netherlands, Norway, Portugal, Romania, Slovak Republic and Switzerland), or work in the recovery room (Denmark, Belgium, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden, Switzerland and the United Kingdom). These functions may differ within each country and again at local level.

OTHER PERSONNEL

Anaesthesia Physician Assistants

Apart from nurse anaesthetists and circulation nurses, in some countries other personnel also can participate in anaesthesia care. In Switzerland and the United Kingdom, (non-physicians) anaesthesia physician assistants (APAs) participate in the preoperative assessment of ASA I and II patients (www.ifna-int.org).[4] They can also start general anaesthesia for ASA I and II patients with indirect supervision according to specific protocols and agreements, comparable to nurse anaesthetists in Denmark, France, Norway and Sweden. The Swiss APA is even allowed to perform spinal and epidural anaesthesia under indirect supervision. In Exeter (UK), on a trial basis only, the APA provides sub-Tenon's blocks for cataract surgery, as well as Bier's blocks.[5] In the UK, the APA does not need to be a nurse, nor do they need to have attained a nurse anaesthetist diploma. They are allowed to provide sedation under MAC for procedures such as diagnostic endoscopies, under the indirect supervision of an anaesthesiologist (www.ifna-int.org).[4]

Anaesthesia technicians

In Ireland, Sweden, Turkey and the UK, anaesthesia technicians are responsible for preparing the operating room, checking the anaesthetic machine, monitors and equipment, and transporting the patient. These technicians have no involvement in monitoring patients, administering drugs or resuscitation and have no direct patient-related role during the induction and maintenance of anaesthesia. Only in Turkey (n = 3950) an official training is given and a state diploma is required. In several other countries, anaesthesia departments have dedicated technically trained staff that is only responsible for the technical support/repair of theatre equipment in general. In addition to the above, several countries have personnel who are responsible for the logistics of the anaesthetic supply.

Several countries (Sweden, Switzerland and the United Kingdom) have a combination of one or more of these types of non-physician anaesthesia employees.

Table 2. **Anaesthesiologists and nurse anaesthetists in Europe.**

European Country	Population country x 1000	Anaesthesia team members			Anaesthesia training		Nursing Training	
		Nr Physician Staff Anesthesiologists per 100.000 (absolute numbers)	Nr Physician Residents per 100.000 (absolute numbers)	Nr Nurse Anaesthetists per 100.00 (absolute numbers)	Numbers of years	Diploma*	Numbers of years	Bachelor (B) / Diploma (D)
Austria	8 210	17.8 (1 460)	8.4 (690)	0	1**	SN	3	D
Belgium	10 500	17.5 (1 840)	3.4 (354)	0	nt	No	3	B + D
Bulgaria	7 760	9.0 (700)	5.2 (400)	15.5 (1 200)	1	USM	3	D
Czech Republic	10 200	11.1 (1 136)	4.1 (420)	?	2	MH	4	B
Cyprus	850	14.1 (120)	1.4 (11)	0	nt	No	4	B
Denmark	5 506	16.3 (900)	5.5 (300)	27.2 (1 500)	2	SN	3.5	B
Estonia	1 330	21.4 (285)	1.8 (24)	41.1 (547)	4	USM	3.5	B
Finland	5 261	19.0 (1 000)	4.1 (218)	0	nt	No	3.5	B
France	62 000	12.9 (8 000)	1.2 (750)	13.7 (8 500)	2	MH	3	D
Germany	82 210	21.2 (17 418)	6.1 (5 000)	0	2**	No	3	D
Greece	11 500	8.7 (1 000)	1.7 (200)	0	nt	No	4	B

Hungary	10 000	9.0 (900)	3.0 (300)	12.0 (1 200)	1	MH	2	B
Iceland	300	19.0 (57)	1.7 (5)	22.3 (65)	2	GOV	4	B
Ireland	4 250	8.2 (350)	7.1 (300)	0	nt	No	3 - 4	B
Italy	59 400	18.5 (11 000)	0.9 (535)	0	nt	No	3	B
Latvia	2 300	15.2 (350)	2.2 (51)	0	0.5**	SON	3	D
Lithuania	3 600	14.0 (505)	2.4 (87)	66.4 (2 392)	1	USM + SN	3.5	B
Luxembourg	485	16.1 (78)	0	63.1 (306)	2	GOV	3	D
Malta	400	12.5 (50)	3.8 (15)	0	0.5**	No	4	B
Netherlands	16 500	9.3 (1 536)	2.4 (393)	12.1 (2 000)	3	SN	4	B
Norway	4 672	15.9 (741)	5.4 (252)	32.9 (1 535)	1.5	SN	3	B
Poland	38 200	7.5 (2 848)	2.3 (876)	1.6 (625)	2.5	USM	4	B
Portugal	10 600	9.0 (950)	2.3 (233)	0	nt	No	4	B
Romania	22 330	4.7 (1 044)	1.3 (300)	0	nt	No	4	D
Slovak Republic	5 404	9.3 (500)	5.1 (275)	27.8 (1 500)	3	USM	4	D
Spain	45 000	11.1 (5 000)	2.3 (1 047)	0	1**	SN	3	B
Sweden	9 048	23.7 (2 142)	3.9 (350)	44.2 (4 000)	3.5	SN	3	B
Switzerland	7 500	19.7 (1 474)	5.9 (425)	25.3 (1 900)	2	MH	3 - 4	B
Turkey	73 000	4.1 (2 971)	2.2 (1 629)	0	4***	MH	N/A	N/A
UK	60 590	10.7 (6 510)	7.4 (4 500)	0	0.5**	No	3	B

* Abbreviations: SN (School of Nursing); USM (University School of Medicine); MH (Ministry of Health); GOV (Government). ? = numbers unknown; nt = no training. ** Circulation nurses or ***anaesthesia technicians who received training in anaesthesia.

Table 1: Type of Non-physician Anaesthesia Personnel.

Anaesthesia personnel:	Tasks	Responsibilities
Nurse Anaesthetists	• Surgical or diagnostic procedures • Administer medication to a patient • Intubation, extubation, insert intravenous and arterial lines	• No independent activities • Administer anaesthesia under direct/indirect supervision of a anaesthesiologist
Circulation Nurses	• Can be asked to help • Prepare medications and intramuscular injections • Administer crystalloids and colloids	• No direct patient-related role • Never allowed to take any responsibility • Nursing competences
Anaesthesia Technicians	• Prepare operating room • Check anaesthetic machine, monitor and anaesthetic equipment • Transport patient	• No direct patient-related role
Anaesthesia Physician Assistants	• Give sedation under MAC • Pre-operative assessment of ASA I and II patients • Start general anaesthesia to ASA I and II patients • Some regional anaesthesia blocks	• Indirect supervision

Anaesthesia workforce in Europe

Where national registration does not exist, the exact number of the anaesthesia workforce (physician and non-physician) in European countries is often unknown, especially the number of circulation nurses. In the Scandinavian countries, the relative number of anaesthesia team members is high (e.g. Sweden has 24 anaesthesiologists, 4 residents and 44 nurse anaesthetists per 100,000 population), whereas Turkey has the lowest ratio of anaesthesia manpower per population (4 anaesthesiologists, 2 residents and no nurse anaesthetists or circulation nurses per 100,000 population).

The establishment of national anaesthesia societies for both groups, and the institution of anaesthesiology as an independent specialty are fairly recent developments. In most European countries, these milestones were not reached until after World War II.

Tables 3 and 4 contain information regarding national associations of nurse anaesthetists and anaesthesiologists, and their websites and journals. Nurse anaesthetists are generally represented by national societies, but not circulation nurses. In some countries, the national associations of nurse anaesthetists have websites and even journals of their own. However, anaesthesiologists are usually much better organised. In all the European countries, anaesthesiologists have their own associations, and in most, they have their own websites (except Cyprus, Iceland and Luxembourg) and anaesthesia journals as well (except Cyprus, Estonia, Iceland, Latvia, Lithuania, Luxembourg and Switzerland).

Figure 1. Non-physician anaesthesia team members in Europe (see also back cover).

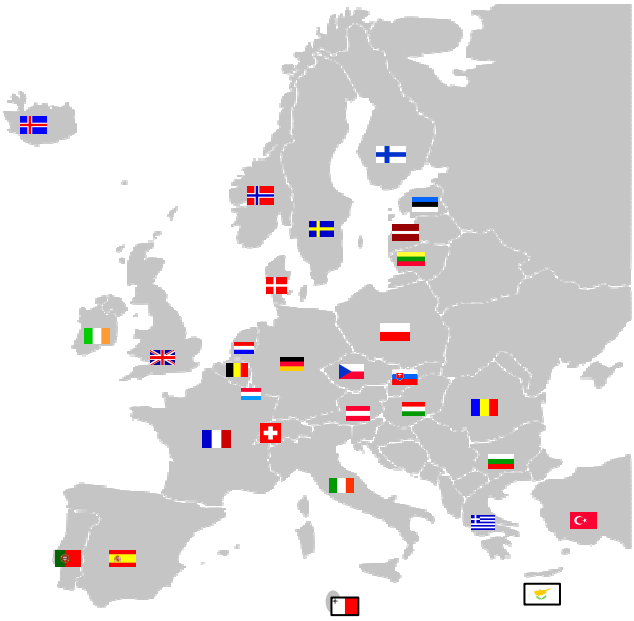

Table 3. Information about national associations of nurse anaesthetists and circulation nurses in Europe (society, website, journal).

Country	National Association	Website	Local Journal
Austria	Österreichischer Berufsverband für Anästhesie- und Intensivpflege	www.oebai.at	None
Belgium	None	None	None
Bulgaria	Bulgarian Society of Nurse Anaesthetists (1994)	www.rtb-mu.com/anestsoc	None
Cyprus	None	None	None
Czech Republic	None	None	None
Denmark	Danish Society of Anaesthesia and Critical Care Nurses (DSACCN 1959)	www.dsr.dk/fsaio	Draaben (1985) www.draaben.com
Estonia	None	None	None
Finland	Finnish Association of Nurse Anaesthetists (FANA 1966)	www.sash.fi	Spirium (1966)
France	French Union of Nurse Anesthetists / Syndicat National des Infirmiers Anesthésistes (SNIA 1951)	www.snia.net	Oxymag (1988)
Germany	Deutsche Gesellschaft für Fachkrankenpflege und Funktionsdienste E.V. (DGF 1974)	www.dgf-online.de	Anästhesiepflege (1994)
Greece	None	None	None
Hungary	Hungarian Society of Anaesthesia and Intensive Therapy Nurses (Aneszteziológus és Intenzív Terápiás Szakápolók Magyarországi Egyesülete) (1998)	None	Szuszogó (Puff and bowl) (2001)
Iceland	Icelandic Association of Nurse Anaesthetists	None	None
Ireland	Irish Anaesthetic & Recovery Nurses Association (IARNA 2002)	www.iarna.ie	Irish Journal of Anaesthetic & Recovery Nursing (IJARN 2003)
Italy	Associazione Nazionale Infermieri di Anestesia, Rianimazione e Terapia	www.aniarti.it	None

	Intensiva (ANIARTI 1981)		
Latvia	None	None	None
Lithuania	Association of Nurse Anaesthetists in Lithuania (2008)	In preparation	None
Luxembourg	Association Luxembourgeoise des Infirmiers en Anesthésie en Réanimation (ALIAR 2004)	www.aliar.lu	Aliar bulletin (2005)
Malta	None	None	None
Netherlands	Nederlandse Vereniging van Anesthesiemedewerkers (NVAM 1983)	www.nvam.nl	Nederlands Tijdschrift voor Anesthesiemedewerkers (NTVA 1983)
Norway	Norwegian Association of Nurse Anaesthetists - Anestesisykepleiernes Landsgruppe av Norsk Sykepleierforbund (NANA 1965)	www.sykepleierforbundet.no	Anestesisykepleierforbund (1975)
Poland	Polish Association of Anaesthesiology and Intensive Care Nurses (PTPAiIO 1997)	www.ptpa.amp.edu.pl	None
Portugal	None	None	None
Romania	None	None	None
Slovak Republic	Slovak Society of Nurse Anaesthetists (SSAIM 1998)	www.ssaim.sk	Sestra a lekár v praxi (2002)
Spain	Asociación Española de Enfermería de Anestesia-Reanimación y Terapia del Dolor (1987)	www.aseedar-td.org	none
Sweden	Swedish Association of Nurse Anaesthetists and Intensive Care Nurses (1960)	www.aniva.se	Anlva Ventilen
Switzerland	Swiss Federation of Nurse Anaesthetists (SIGA-FSIA 1995)	www.siga-fsia.ch	Anästhesie Journal (1995) SBAB-Bulletin (1978)
Turkey	None	None	None
UK	British Anaesthetic and Recovery Nurses Association (BARNA 1987)	www.barna.co.uk	British Journal of Anaesthetics & Recovery Nurses (BJARN 1999)

Table 4. Information about national associations of anaesthesiologists in Europe (society, website, journal)

Country	Association	Website	Local Journal
Austria	Österreichische Gesellschaft fur Anaesthesiologie, Reanimation und Intensivmedizin - Austrian Society of Anaesthesia and Intensive Care Medicine (ÖGARI 1973)	www.oegari.at	Der Anaesthesist (1951)
Belgium	Belgische Vereniging voor Anesthesie en Reanimatie (BVAR 1964) Société Belge d'Anesthésie et de Réanimation (SBAR 1964)	www.sarb.be	Acta Anaesthesiologica Belgica (1950)
Bulgaria	Bulgarian Society of Anaesthesiologists (1958)	www.rtb-mu.com/aestsoc	Bulgarian Journal of Anaesthesiology and Intensive Care (1975) www.kail.medfac-sofia.eu
Cyprus	The Anesthesiology Society of Cyprus (1989)	None	None
Czech Republic	Czech Society of Anaesthesiology and Intensive Care Medicine (Česká společnost anesteziologie, resuscitace a intenzivní mediciny) (CSARIM 1992)	www.csarim.cz	Anaesthesiology and Intensive Care Medicine (Anesteziologie a intenzívní medicína) (1992)
Denmark	Danish Society of Anaesthesiology and Intensive Care Medicine (DASAIM 1949)	www.dasaim.dk	DASinfo (2001) Acta Anaesthesiologica Scandinavica (1957)
Estonia	Estonian Society of Anesthesiology (Eesti Anestesioloogide Selts) (EAS 1967)	www.eas.kliinikum.ee	None
Finland	Finnish Society of Anaesthesiologists (1952)	www.say.fi	Finnanest (1967), www.finnanest.fi Acta Anaesthesiologica Scandinavia (1956)
France	Société Française d'Anesthésie et de Réanimation (SFAR 1951)	www.sfar.org	AFAR Annales Française d'Anesthésie et

			de Réanimation (1982)
Germany	German Society of Anaesthesiology and Intensive Care Medicine (Deutsche Gesellschaft für Anästhesiologie und lntensivmedizin) (DGAI 1953)	www.dgai.de	Der Anaesthesist (1951) Anästhesiologie - Intensivmedizin - Notfallmedizin – Schmerztherapie (AINS) (1965).
Greece	The Hellenic Society of Anesthesiologists (1956)	www.anaesthesiology.gr	Hellenic Anesthesiology (1967) Anaesthesiology and Intensive Medicine (1990), www.anaesthesia.gr
Hungary	Hungarian Society of Anaesthesiology and Intensive Care (Magyar Aneszteziológiai és Intenzív Terápiás Társaság) (1958)	www.anesztinfo.hu	Anesthesiology and Intensive Therapy (Aneszteziológia és Intenzív Terápia) (1970)
Iceland	Icelandic Society of Anaesthesiology and Intensive Care Medicine (1960)	None	None
Ireland	The Association of Anaesthetists of Great Britain and Ireland (AAGBI 1932)	www.aagbi.org	Anaesthesia (1946)
Italy	Societa Italiana di Anestesia Analgesia Rianimazione e Terapia Intensiva (SIAARTI 1934)	www.siaarti.it	Minerva Anestesiologica (1953)
Latvia	Latvian Anaesthesiologists and Reanimatologists Association (1966)	www.anest.lv	None
Lithuania	Lithuanian Society of Anaesthesiology and Intensive Care (1967)	www.anest-rean.lt	None
Luxembourg	Cercle des Médecins Spécialistes en Anesthësie et Réanimation (CMARL 2007)	None	None
Malta	Association of Anaesthesiologists of Malta (AAM 1983)	www.aam-malta.org	Acta Anaesthesiologica Melitensis (1983)
Netherlands	Nederlandse Vereniging voor Anesthesiologie – Dutch Society of Anesthesiology (NVA 1968)	www.anesthesiologie.nl	Nederlands Tijdschrift voor Anesthesiologie (NTvA 1988)
Norway	Norwegian Society of Anesthesiology (1949)	www.nafweb.no	NAForum (1975) Acta Anaesthesiologica Scandinavia (1957)

Poland	Polish Society of Anaesthesiology and Intensive Therapy (Polskie Towarzystwo Anestezjologii i Intensywnej Terapii) (PTAiIT 1959)	www.ptaiit.org	Anestezjologia i intensywna terapia (1973) (Anaesthesiology Intensive Therapy)
Portugal	Sociedade Portuguesa de Anestesiologia (SPA 1955)	www.spanestesiologia.pt	Revista da Sociedade Portuguesa de Anestesiologia (1970) Revista do Clube de Anestesia Regional
Romania	Romanian Society of Anaesthesia and Intensive Care Medicine (SRATI 1958)	www.srati.ro	Roumanian Journal of Anaesthesia and Intensive Care
Slovak Republic	Slovenska Spolo Nos Anesteziologie a Intezivnej Mediciny (Slovak Society of Anaesthesiology and Intensive Medicine) (SSAIM 1993)	www.ssaim.sk	Anesteziologie & Intenzivni Medicina (1989)
Spain	Sociedad Española de Anestesiología, Reanimación y Terapéutica del Dolor (SEDAR 1953)	www.sedar.es	Revista Española Anestesiología y Reanimación (Rev Esp Anestesiol Reanim) (1953) - www.sedar.es, Revista
Sweden	Swedish Society of Anaesthesiology and Intensive Care Medicine (SFAI 1946)	www.sfai.se	SFAI Tidningen (1994) – www.sfai.se Acta Anaesthesiologica Scandinavia (1957)
Switzerland	Société Suisse d'Anesthésiologie et de Réanimation Schweizerische Gesellschaft für Anästhesiologie und Reanimation (SSAR/SGAR 1952)	www.sgar-ssar.ch	None
Turkey	Turkish Society of Anesthesiology and Reanimation (TARD1956) Turkish Anesthesiology and Reanimation Specialists Society (ARSS 1988),	www.tard.org.tr www.arss.org	Journal of Anaesthesia (1989)
UK	The Association of Anaesthetists of Great Britain and Ireland (AAGBI 1932) RCA Royal College of Anaesthetists (1948)	www.aagbi.org www.rcoa.ac.uk	Anaesthesia (1946) British Journal of Anaesthesia (since 1923) CPD Anaesthesia (1999)

Discussion

The present study demonstrates the heterogeneity and variety of anaesthesia practices throughout Europe, with a large diversity amongst non-physician anaesthesia team members. Generally two European models can be defined: the nurse anaesthetists who are allowed to maintain anaesthesia without direct supervision of the anaesthesiologist; and circulation nurses who can assist for a specific procedure under direct supervision of the anaesthesiologist and cannot monitor patients and maintain anaesthesia alone. Their diversity is apparent not only in terms of job titles, but also in the required education, the responsibilities of their roles, the tasks performed and their work domain. A specific diploma is not always awarded after the study or training period.

In Europe, in general, the anaesthesia team consists of an anaesthesiologist and a nurse anaesthetist or a circulation nurse. The importance of anaesthesiologists and non-physician anaesthesia personnel working on anaesthesia teams was demonstrated by Kluger *et al.* who found that the most reported factor for reducing job stress among anaesthesiologists was the presence of trained anaesthesia personnel.[6] Some countries, such as Poland, have only recently come to appreciate the value of well-trained nurse anaesthetists after the training of circulation nurses was found to be inadequate.

A recent study estimated the current shortage of anaesthesiologists in USA to be 4,655 (2009), a figure that is likely to be considerably higher by 2020.[7] Expectations are that a similar situation will prevail in Europe. However, as the financial and workforce pressures of healthcare systems increase, support for the appointment of more physicians to work as anaesthesiologists can be expected to decrease. This should create an incentive for European anaesthesiologists to consider the different models of organization that currently exist. These models may offer solutions for other countries experiencing shortages in anaesthesiologists, prompting an examination of those that currently work with less physicians and more nurse anaesthetists (e.g. the two-table system with nurse anaesthetists in The Netherlands).

In Europe, the certification required to practice as a non-physician anaesthesia team member lacks a recognised standard. The duration of training and education varies widely, not only between European nurse anaesthetists and circulation nurses, but also within these two groups. Before starting anaesthesia training, a nursing degree is compulsory in every European country, except in The Netherlands. However, the level of basic nursing training, and the diploma awarded, lacks consistency, they meet European standards (Table 2).[8] In 2010, IFNA will launch its accreditation system for educational institutes (www.ifna-int.org). This system may lead to a more standardised educational

system and practice for nurse anaesthetists. Ideally, this will result in similar certification criteria for nurse anaesthetists, producing healthcare professionals who are able to transpose their training and skills from one country to another.

When dealing with a shortage of anaesthesiologists, there may be two choices: changing the model or training a greater number of nurse anaesthetists. One advantage of the latter is the short duration of training of nurse anaesthetists (on average three years). Unfortunately, if anaesthesiologists are in short supply, so also are nurse anaesthetists. That moves the emphasis from training to retaining these healthcare workers in their jobs by promoting high levels of job satisfaction, something that involves offering career perspectives, personal development, or opportunities to work in foreign countries.[9]

Although APAs working under the supervision of anaesthesiologists are allowed to give anaesthesia under MAC, they should not be confused with nurses, nurse practitioners or physician assistants who are working under supervision of surgeons, cardiologists and other medical personnel. The existence of APAs in the UK and Switzerland is relatively new. Their higher level of education, in comparison to the nurse anaesthetists and circulation nurses, allows them to practice with a degree of independence, but only with an anaesthesiologist as supervisor. In both countries the introduction of the APA could be seen as an answer to the increased demand on the service. In line with the use of non-physicians in cardiology, endoscopy and surgery, the introduction of the APA may allow a reallocation of anaesthesia tasks, which are now solely performed by the anaesthesiologist. This, of course, is a question of priority.

We suggest that it is in the best interest of patients to introduce a European standard for education, training and competencies, which outlines the specific tasks to be undertaken by specific groups and defines the job titles of the different types of anaesthesia team members according to the level of responsibility appropriate to each group. Currently, there is no body with this remit, but the IFNA and the European Board of Anaesthesiology are possible organisations that might recognise the benefits. As well as being required for exchange programmes, uniformity will also contribute to the legal status of nurse anaesthetists, furthering the professionalism, increasing patient safety and enhancing anaesthesia as a speciality.[10]

The availability of reliable, systematic, country-based workforce statistics is generally poor throughout Europe. The accuracy of the data presented should be interpreted cautiously and may not necessarily reflect the true number of active anaesthesiologists in a particular country. Differences between sources (UEMS, national anaesthesia societies, ministry of health, IFNA, Eurostat) do exist. The number provided by the national government authorities may be higher than the actual number of practising

anaesthesiologists in a particular country because some of these anaesthesiologists may be working abroad. The number provided by the national anaesthesia societies may not reflect the actual number of practising anaesthesiologists because the list might include honorary and retired members, and not all anaesthesiologists are obliged to join their national society. The data provided in Table 2 is the most reliable data available. The numbers of the residents are well regulated and sources are reliable.

This survey has several limitations: 1) the figures given in Table 2 are not 'full-time equivalent' and, therefore, influence the total number of anaesthesia team members per 100,000 inhabitants of a country; 2) in several countries, nurse anaesthetists or circulation nurses may be involved in recovery room duties and some may also partly cover the acute pain service and intensive care and consequently, the actual number of these anaesthesia team members working in the operating theatre may not be comparable between countries; 3) similarly, some anaesthesiologists may work in intensive care; 4) due to the recent split of the former USSR and Yugoslavian countries, accurate information from some regions could not be obtained and these were omitted from further analysis; 5) this study was only a questionnaire survey and not an observation or on-site reporting of the actual situation and, therefore, it cannot reflect the skills and knowledge of a specific anaesthesia team member; 6) the theory and practical training of specific anaesthesia team members was outside the scope of this study; 7) the information obtained might differ between the national society, a university hospital and a local hospital within a particular country; and 8) this area is subject to perpetual evolution, the numbers of personnel will vary according to the timing of the questionnaire.

In conclusion, our survey has revealed that at present, the anaesthesia workforce in Europe is very diverse in name, education, training, certification, and with regards to tasks allocated within the anaesthesia team. Uniformity in training and certification of nurse anaesthetists and circulation nurses in Europe is essential and needs urgent attention, especially where workforce migration occurs. Institutions and hospitals should be given the freedom to work with nurse anaesthetists or circulation nurses, as long as the role and responsibilities of team members are clear and based on strict criteria. These recommendations may become increasingly relevant in view of the imminent shortage of anaesthesiologists in Europe.

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Appendix 1: Questionnaire about job tasks in practice

Do you perform the following tasks in practice yourself?		Never	Under direct supervision	Supervisor on call / according to protocol	Autonomous (without supervision)
1.	**Preoperative assessment**				
	1.1. Patient history ASA 1	O	O	O	O
	1.2. Patient history ASA 2	O	O	O	O
	1.3. Patient history ASA 3	O	O	O	O
	1.4. Patient history ASA 4	O	O	O	O
	1.5. Physical examination	O	O	O	O
2.	**Preparation operating room**				
	2.1. Receiving patient in holding area	O	O	O	O
	2.2. Checking patient coordinates (name, date of birth)	O	O	O	O
	2.3. Informing patient about anaesthesia	O	O	O	O
	2.4. Administering premedication	O	O	O	O
	2.5. Taking patient to operating room	O	O	O	O
3.	**Operating room**				
	3.1. Checking anaesthesia delivery system	O	O	O	O
	3.2. Checking anaesthesia monitors	O	O	O	O
	3.3. Checking intubation materials	O	O	O	O
	3.4. Preparing infusion equipment	O	O	O	O
	3.5. Preparing medication	O	O	O	O
	3.6. Preparing anaesthesia disposables	O	O	O	O
	3.7. Intravenous injections	O	O	O	O
	3.8. Intramuscular injections	O	O	O	O
	3.9. Insertion IV-cannula	O	O	O	O
	3.10. Insertion central venous catheter	O	O	O	O
	3.11. Insertion arterial line	O	O	O	O
	3.12. Patient positioning	O	O	O	O

4.	**Monitoring during anaesthesia**				
4.1.	HR (heart rate)	O	O	O	O
4.2.	ECG (electrocardiogram)	O	O	O	O
4.3.	BIS (bispectral index monitoring	O	O	O	O
4.4.	SaO2 (saturation and plethysmography)	O	O	O	O
4.5.	BP (non invasive blood pressure)	O	O	O	O
4.6.	ABP (invasive arterial blood pressure)	O	O	O	O
4.7.	CVP (central venous pressure)	O	O	O	O
4.8.	PCWP (pulmonary capillary wedge pressure)	O	O	O	O
4.9.	NMT (neuromuscular transmission)	O	O	O	O
4.10.	Temperature	O	O	O	O
5.	**Performing anaesthesia**				
5.1.	Induction general anaesthesia	O	O	O	O
5.2.	Spinal anaesthesia	O	O	O	O
5.3.	Epidural anaesthesia / catheter	O	O	O	O
5.4.	Maintaining anaesthesia	O	O	O	O
5.5.	Taking decisions in anaesthesia management	O	O	O	O
5.6.	Termination of anaesthesia	O	O	O	O
6.	**Technical acts to provide a free airway**				
6.1.	LMA = laryngeal mask airway	O	O	O	O
6.2.	ETT = endotracheal tube	O	O	O	O
6.3.	Mask	O	O	O	O
6.4.	Guedel airway	O	O	O	O
6.5.	Extubation	O	O	O	O
6.6.	Start ventilation & adjust ventilator settings	O	O	O	O
6.7.	Endotracheal suction	O	O	O	O
7.	**Administering medication**				
7.1.	Sedatives	O	O	O	O
7.2.	Opioids	O	O	O	O
7.3.	Muscle relaxants	O	O	O	O
7.4.	Cardiovascular medication	O	O	O	O
7.5.	Pulmonary medication	O	O	O	O
7.6.	Corticosteroids	O	O	O	O
7.7.	Antibiotics	O	O	O	O
7.8.	Anti-emetics	O	O	O	O
7.9.	Others:	O	O	O	O
8.	**Administering infusion fluids**				
8.1.	Crystalloids	O	O	O	O
8.2.	Colloids	O	O	O	O
8.3.	Erythrocytes	O	O	O	O
8.4.	Fresh frozen plasma	O	O	O	O
8.5.	Trombocytes	O	O	O	O

9.	**Resuscitation**				
	9.1. Heart compressions	O	O	O	O
	9.2. Ventilation	O	O	O	O
	9.3. Defibrillation	O	O	O	O
	9.4. Connecting and adjusting pacemaker	O	O	O	O
	9.5. Laying out a deceased patient	O	O	O	O
10.	**Diverse**				
	10.1. Cleaning anaesthesia delivery system	O	O	O	O
	10.2. Cleaning anaesthesia equipment	O	O	O	O
	10.3. Transportation of a patient to the recovery	O	O	O	O
	10.4. Transportation of a patient to the ICU	O	O	O	O
	10.5. Transportation of a patient to the ward	O	O	O	O
	10.6. Training trainees/students	O	O	O	O
	10.7. Assist with informing patient's family	O	O	O	O
	10.8. Prescription of postoperative medication	O	O	O	O
	10.9. Prescription of postoperative fluids	O	O	O	O
	10.10. Sampling blood for lab analyses	O	O	O	O
	10.11. Taking care of patient's interests	O	O	O	O
	10.12. Recording anaesthesia chart	O	O	O	O
	10.13. Transfer patient to recovery room	O	O	O	O
	10.14. Transfer patient to ICU	O	O	O	O
11.	**Postoperative care**				
	11.1. Transportation and installation of the patient in the recovery room	O	O	O	O
	11.2. Monitoring patient in the recovery room	O	O	O	O
	11.3. Participation in the acute pain service	O	O	O	O
	11.4. Bladder scanning	O	O	O	O
	11.5. Starting Patient Controlled Anaesthesia	O	O	O	O

A nurse anaesthetist must have the heart of a lion, the eyes of a hawk, and the hands of a woman

John Halle (1529-1568)

Submitted to:

Meeusen V[1], Van Dam K[2], Brown-Mahoney C[3], Van Zundert A[1], Knape H[4]. No differences in job perceptions amongst Dutch nurse anesthetists. AANA J.

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Chapter 4

Comparing job perceptions amongst Dutch nurse anaesthetists with and without nursing background

Abstract

Background. In The Netherlands, employment as a “nurse anaesthetist” is comparable to that of a registered nurse anaesthetist in the Scandinavian countries Norway, Sweden and Denmark. However, the Dutch healthcare system employs nurse anaesthetists both with and without nursing backgrounds.

Aim. This study investigated whether a nursing background may affect the attitudes and perceptions of nurse anaesthetists in The Netherlands, when compared to “non-nursing” nurse anaesthetists.

Methods. A survey was distributed to all nurse anaesthetists working in Dutch hospitals to discover differences in their perceptions of their work context, job satisfaction, and work climate, as well as their health and turnover intention. The questionnaire also sought basic information on socio-demographic factors and psychosomatic symptoms. Descriptive statistics, factor analyses and independent T-tests were computed.

Results. Overall 923 of a total of 2,000 questionnaires were completed and analyzed (response rate of 46%). Independent T-tests showed no significant differences between nurse anaesthetists with and those without nursing backgrounds in all the areas examined.

Conclusions. Dutch nurse anaesthetists with and those without nursing backgrounds reported similar perceptions of and information about their work context, job satisfaction, work climate, psychosomatic symptoms, burnout, sickness absence, general health and turnover intention. Both academic tracks appeared to produce individuals who functioned similarly as professionals.

Key words: job perceptions, nursing degree, nurse anaesthetist.

Introduction

The Dutch healthcare system does not require nurse anaesthetists to have nursing backgrounds. The educational preparation for nurse anaesthetists in The Netherlands consists of a three-year program at the Higher Professional Education Bachelor's level. The program is accredited by the National College of Hospital Training, and results in a nationally certified "nurse anaesthetist" diploma from the Dutch Society of Hospitals. The admission requirements for the nurse anaesthetist program are either a senior high school diploma with a specialization in physics and health, or nursing degrees level 4 or 5 (the latter results in a bachelor degree)[*]. Therefore it is possible to go directly from senior high school to a three-year bachelor program and become a nationally certified nurse anaesthetist.

The curriculum of the program is the same for students with and without nursing backgrounds. The program includes anaesthesia, physics, anatomy, pharmacology, medical techniques, medical law and ethics and nursing skills. Students with nursing backgrounds receive exemptions from the courses in nursing skills and competences. At the end of the three years, the Dutch nurse anaesthetist professional who has completed this course of study can be compared to a registered nurse anaesthetist (RNA) at the bachelor's level in other countries.

Dutch nurse anaesthetists work in anaesthesia departments under both the direct and indirect supervision of the anaesthesiologists. They never perform an induction of anaesthesia on their own, but they are the ones who stay with the patient for the entire procedure, although an anaesthesiologist is always present in the immediate vicinity of the operating theatre, or in direct (mobile) phone contact and is readily available to help if necessary. However, it is the nurse anaesthetist who continuously monitors the patient and is responsible for the patient's anaesthesia, analgesia and safety throughout the operative period.

The debate is whether nurse anaesthetists with nursing backgrounds are better suited for and "fit for the job" than those without. "Fit for the job" is defined as a concurrence of perceptions of the work environment, personal competence, wellbeing and the organisational standards. A Person Environment (PE) fit is established when characteristics of the nurse anaesthetist and the work environment are compatible.[1] PE fit

[*] Within the Dutch Nursing Profession the system is split into three levels, i.e. nursing level 3, 4 and 5. Nursing level 3, comparable to the State Enrolled Nurse (grade C), requiring a basic high school diploma, nursing level 4 requiring a senior high school level ("Hoger Algemeen Voortgezet Onderwijs (HAVO)), and nursing level 5 (bachelor degree) which requires a senior high school level ("Hoger Algemeen Voortgezet Onderwijs (HAVO) or "Voortgezet Wetenschappelijk Onderwijs" (VWO)).

influences job satisfaction, organisational commitment, turnover intention, wellbeing and performance, and can be moderated by personality traits.[2,3] An imbalance between the nurse anaesthetist and his/her environment (PE fit) can result in sickness absenteeism, burnout, psychosomatic symptoms, and lower job satisfaction.[2,4,5]

In general, there is a common belief that nurse anaesthetists with nursing backgrounds perform better than nurse anaesthetists without nursing backgrounds. We hypothesized that nurse anaesthetists with nursing backgrounds have more positive job perceptions compared to their colleagues without. In order to test this hypothesis, we performed an explorative survey, measuring the work context factors, job satisfaction, psychosomatic symptoms, burnout, work climate and turnover intention of Dutch nurse anaesthetists with and without nursing backgrounds.

Methods

Design and Sample

All 2,000 Dutch nurse anaesthetists, working in both hospitals and private clinics, were approached to fill out an on-line multiple choice questionnaire consisting of demographic, psychosomatic and work context items. The study was launched at the annual Dutch national congress of nurse anaesthetists in January 2007; every participant of the conference received an invitation to fill out the questionnaire. To reach the nurse anaesthetists who did not attend the conference, a personal letter was sent to every member of the Dutch Society of Nurse Anaesthetists (NVAM). As well, a letter was sent to the directors of private clinics and employment agencies, asking their nurse anaesthetists to participate in the study. The on-line questionnaire was closed three months later (April 2007). The study was approved by the Medical Ethical Committee of the Catharina Hospital Eindhoven, The Netherlands.

The demographic characteristics collected in the survey included age, gender, nursing credentials, percentage of employment (part-time or fulltime), working irregular shifts (e.g. night shifts), number of training days per 5 years, and number of operating rooms.

Instruments

The multiple mechanisms of PE fit mean that multiple conceptualizations of it are likely to produce stronger evidence than a single conceptualization.[6] The questionnaire assessed not only demographic characteristics, but also the following multi-conceptual variables: work

context factors, job satisfaction, psychosomatic symptoms, burnout, absenteeism, general health, work climate, and turnover intention. The subjective fit was assessed by indirectly comparing the person and environment information from the same participant.[6]

Work context. The characteristic aspects of the individual work perceptions of nurse anaesthetists were measured using the TOMO (TOetsingslijst Mens & Organisatie; literally translation: checklist people & organisation), which is based on work motivation models introduced by Maslow, Herzberg, Hackman & Oldham and Karasek.[7] Most studies involving work context use a questionnaire consisting of one or more of the following factors: autonomy, social relations, competence and environmental conditions.[4,7,8] However, none of these questionnaires examines all four factors. This problem is addressed by the use of the TOMO, developed by Van Orden et al.,[7] who integrated all four factors into one observation list to evaluate psychosocial relations in the working environment. This observation list is considered to be one of the most comprehensive and objective lists.[9] We modified the TOMO as a questionnaire suitable for nurse anaesthetists, and coded the answers on a 5-point Likert scale: 1 = far too few, 2 = too few, 3= enough, 4= too much and 5= far too much. The scale measures four work context factors: factor 1, 'career/rewards', relates to financial rewards and development opportunities (7 items, α = .82); factor 2, 'relation to 'supervisor', relates to the participation and support of the supervisor (6 items, α = .84); factor 3, 'task contents', refers to the task responsibilities and skills that are part of the task (8 items, α = .76); and factor 4, 'social environment', refers to interactions with colleagues (5 items, α = .69). Sample items included "possibilities to influence my career", "appreciation by my supervisor'.

Job satisfaction. Job satisfaction was measured using three items (α = .72): satisfaction with the job, satisfaction with the organisation, and satisfaction with the department's atmosphere, on a 4-point scale (1 = totally disagree, 2 = disagree, 3 = agree and 4 = totally agree). Previous studies support the usefulness of global measurements in single-shot surveys that assess the cognitive component of satisfaction.[10]

Psychosomatic symptoms. Psychosomatic symptoms were measured using the POLS-questionnaire (Permanent Onderzoek LeefSituatie; literally translation: Permanent study of living conditions) (α = .67), which was developed in 1997 and has been used by the Dutch government for longitudinal studies of psychosomatic symptoms amongst members of the Dutch labour force. Seven malaise symptom items were queried:[8] gloomy, anxiety, headache, fatigue, sleeplessness, pain in the back, and pain in joints or muscles (scale: yes

= 1 and no = 0). The reported incidence of sickness absenteeism during the last year was analyzed by coding the answers as 0 days (0), 1-7 days (1), 8-14 days (2), 15-28 days (3), 1-2 months (4), 3-7 months (5) and more than 7 months (6). Every nurse anaesthetist scored his/her own general health on a 5-point scale (1 = very bad to 5 = very good).

Burnout. The Maslach Burnout Inventory (MBI) has a stable factor structure, and measures burnout as a specific type of occupational stress reaction amongst health care professionals. Its validity has been extensively investigated by different researchers, and it has been judged to be very reliable.[11,12] In our study, we used the Dutch version, the MBI-Dutch Version (MBI-DV), which is considered as valid as the original one.[13] The questionnaire consisted of 16 work-related items (α = .86) that were rated on a 7-point Likert scale anchored 'never' (1) to always (7). The prevalence of burnout and the differences between individuals with high and low scores in burnout were important, and therefore this study treated burnout as a one-dimensional variable.

Work climate. The variable 'work climate' was measured using the Gallup Institute questionnaire which contained 12 items (α = .67), which were rated on a 7-point Likert scale anchored 'never' (1) to always (7), and summed (range 12-84).[14]

Finally, nurse anaesthetists were asked about their intentions of leaving the job within the next two years (0 = no, 1 = yes).

Data analysis

The Chi-square test was performed to determine if the demographic items were equally divided among both groups. If necessary, the non-parametric Mann Whitney test was performed to establish any possible difference between the two groups (SPSS 16.0 system, SPSS Inc, Chicago, Ill, USA). A *P* value < than 0.05 was considered significant.

Results

Out of 2,000 Dutch nurse anaesthetists, 923 filled in the questionnaire (response rate of 46%) but 41 failed to complete it entirely and were excluded from further study. The study results were based on the responses of 882 nurse anaesthetists (431 women and 451 men) who filled in the questionnaire completely. Three hundred and thirty-four of the respondents were nurse anaesthetists without nursing backgrounds. The majority of the

nurse anaesthetists (89.2%) were between 25 and 54 years old, with a peak in the age range of 45-49 years (21.2%). Despite our best efforts we were unable to retrieve the characteristics of the non-respondents.

All demographic items differed between both groups significantly at level $P < 0.001$ (Table 1).

For this reason the non-parametric Mann-Whitney U test for two independent samples was used for work context factors, job satisfaction, health factors, work climate and turnover intention between nurse anaesthetists with and those without a nursing background (Table 2).

The four work context factors (i.e. career planning/reward, relationship with supervisor, task contents and social environment) showed no statistically significant differences between the two groups. Job satisfaction, as well as health characteristics (i.e. burnout, psychosomatic symptoms, general health and sickness absenteeism), showed no evidence of statistically significant differences between the two groups. Finally, work climate and turnover intention showed no statistically significant differences between the group with and those without a nursing background. In summary, controlling for the demographic items, the results for all variables showed no statistically significant differences between nurse anaesthetists with and those without a nursing background.

Table 1. Mean (M), standard deviation (SD) and Chi-Square test for demographic variables among the two groups of nurse anaesthetists.

	Without nursing background (n = 334)		With nursing background (n = 548)		
	M	SD	M	SD	Chi-Square (df)
• Age[1]	4.82	1.87	6.25	1.84	3.29 (9) ***
• Gender[2]	.62	-	.41	-	17.53 (1) ***
• % of employment[3]	2.80	.66	2.91	.58	711.31 (3) ***
• Irregular shifts[4]	.77	.42	.72	.45	108.64 (1) ***
• Number training days[5]	2.47	1.22	2.44	1.15	23.34 (3) ***
• Number operating rooms[6]	2.43	.94	2.32	1.00	1.18 (3) ***

Significant association at level $^{***}P < 0.001$.

[1]Age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10); [2] Gender: men (0), women (1); [3] % of employment (%): <50 (1), 50-75 (2), 75-100 (3), >100 (4); [4] Irregular shifts: yes (1), no (0); [5]Trainings days per five year (days): 0-5 (1), 6-10 (2), 11-15 (3), more than 15 (4); [6] Number operating rooms: 1-5 (1), 6-10 (2), 11-15 (3), 16 or more (4).

Discussion

To our knowledge, this study is the first of its kind evaluating and comparing the perceptions of job requirements, job environment, personal competence and (organisational) standards amongst nurse anaesthetists with and those without a nursing background. Perceptions about work context factors, psychosomatic symptoms, burnout, sickness absence, general health and job satisfaction were similar between the two groups, and no statistically significant difference was found.

Our study did not measure the competence of the two groups in terms of health outcomes of patients or observed performance. However, several other studies have demonstrated a clear relationship between the performance of the professional and their perceptions of well-being, burnout, and job satisfaction. In 1981, Grey-Toft and Anderson already demonstrated that patient management was related to job satisfaction and stress.[15] Others reported that incompetent employees were associated with higher stress levels, a higher incidence of health complaints related to stress.[5,16]

Table 2. Mann-Whitney test controlled for demographic factors between the two groups of nurse anaesthetists.

	Without nursing background (*n* = 334)	With nursing background (n = 548)	
	median	median	*U*
Work context factors:			
• career planning/reward	2.14	2.14	86824.00 ns
• relation supervisor	2.83	2.67	90452.00 ns
• task contents	2.88	2.88	87728.50 ns
• social environment	2.80	2.80	89940.00 ns
Job satisfaction	3.00	2.70	86996.50 ns
Health:			
• Burnout	2.75	2.69	87219.50 ns
• Psychosomatic symptoms	2.00	2.00	88234.00 ns
• Absenteeism	.00	.00	88378.50 ns
• General health	4.00	4.00	89907.00 ns
Work climate	4.17	4.08	86229.50 ns
Turnover intention	.00	.00	89702.00 ns

ns = not significant

Since our results provided evidence that burnout scores, psychosomatic symptoms scores, and absenteeism showed no statistically significant differences between nurse anaesthetists with and those without a nursing background, this suggests an equal perception on the part of both groups of competence to perform their jobs.[17]

Consequences of stress are minimized by emotional intelligence skills that equip the employee with more adaptive coping strategies.[18] Emotional intelligence skills - perceiving, understanding and expressing emotions - are often considered among the main competencies of nursing, and have an important place in nursing education. Yet in our study, the group of nurse anaesthetists without a nursing background, the ones who had never been exposed to the emphasis on emotional intelligence in nursing school, handled stress as well as the group that had level 4 or 5 nursing degrees. This may emphasise the opinion, expressed in 1932 by Agatha Hodgins, the first president of the American Association of Nurse Anaesthetists, that the provision of anaesthesia related more closely to surgery and less to nursing.[19]

Hackman & Oldham developed the Job Characteristics model (JC-model) that relates the presence of certain job characteristics to an employee's well-being and high level of job satisfaction.[4] According to this model, core job characteristics (skill variety, task identity, task significance, autonomy and job feedback) are essential for developing high levels of job satisfaction and employee well-being. The model states that job satisfaction reflects a person having sufficient knowledge and skills to perform the job without developing stress. Our study showed no evidence of different levels of job satisfaction between nurse anaesthetists with and those without nursing backgrounds. According to Hackman & Oldham's theory, this would mean that both groups had the same perceptions on their knowledge and skills to adequately perform their jobs.

According to Kristof-Brown et al. performance is related to Person-Organisation (PO) and Person-Group fit.[3] This study measured several factors about organisational fit (climate) and found no statistically significant differences between the groups (nurse anaesthetists with and those without nursing backgrounds), which showed equal perceptions about PO-fit, and performance of the two groups.

In Dutch hospitals, nurse anaesthetists perform the job in an identical way whether they have a nursing background or not. Arbous et al. concluded that Dutch anaesthetic practice, based on a team of physician anaesthesiologists and non-physician anaesthetists, results in a quality of care and safety comparable to international standards, and that the presence of a Dutch nurse anaesthetist, whatever background, significantly decreases the risk of perioperative morbidity and mortality.[20] Neither Dutch law, the Dutch Society of Anaesthesiology, the management of Dutch hospitals, or Dutch anaesthesiologists

differentiate between nurse anaesthetists with and those without nursing backgrounds in allocating tasks, and consider members of both groups as having a similar level of competence.

This study has several limitations: 1) The results of our study shows that nurse anaesthetists with and those without nursing backgrounds according to their perceptions perform at a similar level; however, the actual performance of each group was not measured; 2) The mean age in the nurse anaesthetists group without nursing backgrounds was significantly lower compared to the nurse anaesthetists group with nursing backgrounds, because they started their studies, and, subsequently their careers as nurse anaesthetists, earlier. There were proportionately more women in the group of nurse anaesthetists without a nursing background; that may explain the higher incidence of part-time work (% of employment) in this group; 3) When measuring PE-fit in a multi dimensional manner, it is possible that one aspect of the environment spills over into other aspects, resulting in a stronger or weaker PE-fit effect. Further research consisting of a blind study of performance outcomes of individuals in the workplace, self-evaluations about feelings of self-esteem and self-efficacy, and PO-fit for values and goals would provide this information; and 4) Unfortunately, we could not retrieve the reasons of the non-responders for not participating the study.

In conclusion, this study found no statistically significant differences in perceptions between nurse anaesthetists with and those without nursing backgrounds, suggesting that competency-based training programs for non-physician anaesthesia professionals are more important for their future performance than a background in nursing. The Dutch healthcare system does not distinguish between the two differently trained groups of nurse anaesthetists (with and without nursing backgrounds) when allocating tasks and work assignments. Therefore both channels of educational preparation of Dutch nurse anaesthetists appear to produce individuals who function similarly as professionals. These findings may prove significant in solving the shortages in nursing personnel, and the problems in the recruitment of more anaesthesia professionals. As well, they may have a major impact on the initiatives to further harmonize anaesthesia practice worldwide.

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It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts

Sherlock Holmes (1891)

Published as:

Meeusen V[1], Brown-Mahoney C[2], Van Dam K[3], Van Zundert A[1], Knape H[4]. Discriminating work context factors in the working environment of Dutch nurse anaesthetists. Acta Anaesthesiol Belg 2008;59:233-240.

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Chapter 5

Discriminating work context factors in the working environment of Dutch nurse anaesthetists

Abstract

Background. With an ever increasing number of patients and more demanding health care system it is important to keep nurse anaesthetists as mentally and physically fit as possible. In the context of human resource shortage in that profession, it is important to know which work context factors are important for maintaining a healthy balance between the nurse anaesthetist and his/her work environment.

Aim. Hence, this study aimed at determining which work context factors of nurse anaesthetists are most relevant for a healthy work environment.

Methods. A questionnaire survey, containing work related items, was distributed among all nurse anaesthetists working in Dutch hospitals. All together 882 questionnaires (response rate 44%) were completed and analyzed by means of a factor analysis in order to discriminate between relevant and irrelevant work context factors.

Results. Four discriminating work context factors (career/rewards, relation with supervisor, task contents and social environment) were found to be relevant, explaining 48% of the variance in work context. Although not depending on the type of hospital nurse anaesthetists were working in, all four identified work context factors were related to job resources. Supervisors (head nurse anaesthetists) interpret these work context factors differently from nurse anaesthetists, which can result in dissatisfaction of the latter group. Nurse anaesthetists participate more in sub-functions and activities in larger peripheral and academic anaesthesia departments.

Conclusions. Smaller anaesthesia departments require nurse anaesthetists to be more flexible and be able to perform several different tasks within the clinical anaesthesia. The influence of these identified relevant context factors on burnout incidence, job satisfaction and job turnover still needs to be evaluated.

Key words: Work context; nurse anaesthetists; health, resources.

Introduction

Owing to improvement in surgical and anaesthetic safety, anaesthesia can be provided to virtually everyone nowadays, including the very young, the very old and the very sick patient. At the same time that anaesthesia is increasingly safer for patients, it is becoming potentially more hazardous for its practitioners. Each anaesthetic procedure can result in unexpected morbidity or mortality, and a malpractice claim can arise from a bad outcome despite optimal care. All these demands and working conditions are responsible for a certain work context which can result in stress and less job satisfaction.[1-5]

Hence, there is a need to identify the work context factors of importance for nurse anaesthetists. Identifying the job demands (job aspects referring to physical and/or mental effort) is crucial for hospitals in order to use their resources effectively and prevent negative outcomes, such as lowered health, dissatisfaction and job turnover. In addition, the availability of job resources (job aspects that are functional in achieving goals and stimulate personal growth, learning and development) can buffer the effect of these demands.[6-9] Anaesthesiologists and nurse anaesthetists share many occupational stressors with other service professionals, but they also experience unique work environment factors that set them apart: proximity to suffering and death, the emotional and physical needs of patients, and pressures to perform consistently and optimally under changing conditions and expectations.

A nurse anaesthetist works as a team member closely together with operating nurses and surgeons and is supervised by an anaesthesiologist. A national job profile of Dutch nurse anaesthetist, many guidelines from the anaesthesia profession itself and legal restrictions result in a profession in which tasks, responsibilities and functional roles are virtually the same in every hospital, with some small discrepancies at certain tasks. Different studies have shown that burnout prevention strategies are more effective at the occupational level rather than at the individual level.[10,11]

In practice, we need to know which work context factors are important for nurse anaesthetists. Therefore, the first objective of the present study was to determine which work context factors were of importance in the working environment of Dutch nurse anaesthetists. Secondly, we examined how supervisors (head nurse anaesthetists) judged the work context factors of nurse anaesthetists. The third objective of this study was to determine whether work context factors were related to the profession itself or to the type of hospital nurse anaesthetists were working in.

Methods

All nurse anaesthetists (sample 1) working in Dutch hospitals and private clinics were asked to fill out an on-line multiple choice questionnaire containing demographic and work context items. In January 2007, at the annual Dutch national congress of nurse anaesthetists, the start of the study was announced and every participant to the congress received an invitation to fill out the online questionnaire. In addition, a personal letter was sent to every member of the NVAM asking for participation in the study. Finally, directors of private clinics and employment agencies, specialized in nurse anaesthetists, received a letter asking for participation in the study. The on-line questionnaire was closed on April 2007. From September till November 2007, all supervisors (head nurse anaesthetists) (sample 2) were asked to fill out the same questionnaire about work context so that we were able to compare the supervisor's view with those of the nurse anaesthetists.

Characteristics such as age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10); gender: men (0), women (1); the numbers of years practicing anaesthesia since certification was obtained (years of certification): <1 (1), 1-5 (2), 6-10 (3), 11-15 (4), 16-20 (5), > 20 (6); in which type of hospital they work (academic hospital): yes (1), no (0); and the number of operating rooms in their department: 1-5 (1), 6-10 (2), 11-15 (3), 16 or more (4), were recorded. We also asked for type and number of functions, sub-functions and activities a nurse anaesthetist was participating in. Functions were categorized as recovery nurse, acute pain service nurse, chronic pain service nurse and preoperative screening nurse. Sub-functions were defined as responsibility for training of juniors, participation to quality control/management, resuscitation or trauma team membership, or other. Activities were categorized as an employee participating in or responsible for store room, medication, medical equipment, patient and personnel planning, coaching of students, chairing a meeting, specific projects or others. All these items were referred to as background characteristics.

Our study of the individual perception of work by nurse anaesthetists was based on motivational models introduced by Maslow, Herzberg, Hackman and Oldham, and Karasek. Those authors are the founders of most modern motivation and/or work context questionnaires. As this study was the first one dealing with work context factors of nurse anaesthetists, we used the most complete questionnaire. Modern motivation or work context questionnaires consist of the following factors: autonomy, social relations, competence and environmental conditions.[12-16] None of these questionnaires examines all four work context

factors. As a reaction to this problem the TOMO (TOetsingslijst Mens & Organisatie)[b] was, on behalf of TNO (Toegepast Natuurwetenschappelijk Onderzoek)[c], developed by Orden and Gaillard,[17] who integrated all four factors into one observational list to evaluate psychosocial relations in the working environment[d]. This validated observation list is considered one of the most complete and objective lists and is used by the Dutch and Belgian governments.[18,19] We adjusted the TOMO into a questionnaire, containing 51 items, suitable for nurse anaesthetists. For every item we used a five-point Likert scale with 1 = far too few, 2 = too few, 3= enough, 4= too much and 5= far too much.

Correlations between the above defined background characteristics of nurse anaesthetists (sample 1) and the work context factors were analyzed using a two-tailed bivariate ANOVA. The validated TOMO observation list was transformed into a 51-item TOMO questionnaire which was analysed using factor analysis (SPSS 16.0 system Inc. Chicago, USA). Principal components analysis with varimax rotation (eigenvalues > 1) was used to find the underlying factors. The responses of nurse anaesthetists regarding the work context factors were compared to those of their supervisors using independent t-test. When needed, we checked that distributions were approaching normality. A two-tailed $P<0.05$ was considered statistically significant.

Results

Out of 2000 Dutch nurse anaesthetists, 923 filled out the questionnaire, although 41 failed to complete it entirely and were excluded from further analysis. As a result, the analyses were based on the responses of 882 (44.1%) nurse anaesthetists (sample 1; 431 females and 451 men). The majority of the nurse anaesthetists (89.2 %) were between 25 and 54 years old, with a peak between 45-49 years (21.2%). Most of the respondents (68.7%) were considered experienced and worked for more than 5 years as a nurse anaesthetist. Out of 111 Dutch nurse anaesthesia departments, 69 (62%) head nurse supervisors (sample 2) responded and filled out the questionnaire completely**.**

Subsequent analyses were conducted for the TOMO questionnaire until an analysis in which 26 out of 51-items participated, provided a meaningful four-factor structure with factor 1 ‘career/rewards’ (7 items, α = .82) explaining 14% of the variance; factor 2

[b] TOMO: literally translated from Dutch: checklist people & organization.
[c] The TOMO was developed at TNO (www.tno.nl), the official Dutch Independent Scientific Institute that performs applied scientific research.
[d] Questionnaires used for developing the TOMO: ARBIE, IMA module 12, Checklists Manual Work Stress by Kompier and Mercelissen (1990), WEBA, NOVA-WEBA, WEBO, VBBA, VAG, VOS-D, BASAM.

'relation with supervisor' (6 items, α = .84) explaining 13% of the variance; factor 3 'task contents' (8 items, α = .76) explaining 12% of the variance; and factor 4 'social environment' (α = .69) explaining 9% of the variance. Together, the four factors explained 48% of the variance (see Appendix 1 for more information about these items). Table 1 shows the correlations between the work context scales and the background characteristics.

As indicated in Table 2, no significant difference was found between the opinions of nurse anaesthetists and those of their supervisors regarding career possibilities and rewards. Differences in view were seen between nurse anaesthetists and their supervisors for work context factor 3 'task contents' ($P < 0.05$), factor 4 'social environment' ($P < 0.001$), and factor 2 'relation with supervisor' ($P < 0.001$). Because it is crucial to know the status of the different job demands and job resources, we checked the actual status of the four factors in more detail and evaluated the scores for every item at the level of the nurse anaesthetist and the supervisor (Table 3).

Table 2. Independent t-test comparing work context factors (F1 to F4) between nurse anaesthetists (sample 1) and supervisors (sample 2).

	Sample 1 (n = 882)		Sample 2 (n = 69)				
Work context factors	M	SD	M	SD	df	t	*P*
F1: Career/rewards	2.20	0.48	2.27	0.38	85.20	1.51	
F2: Relation with supervisor	2.63	0.46	2.97	0.31	92.58	8.43	***
F3: Task contents	2.78	0.34	2.89	0.29	934	2.46	*
F4: Social environment	2.72	0.36	2.92	0.40	949	4.35	***

$^{*}P < 0.05$, $^{***}P < 0.001$

Although work context factor 1 'career/reward' did not differ significantly between nurse anaesthetist and supervisors, at the item level there was a significant difference. Nurse anaesthetists were significantly less satisfied with their financial rewards than what was believed by their supervisors (salary $t(949) = -6.02$ $P < 0.001$ and financial rewards $t(949) = -2.85$ $P < 0.01$). In contrast, supervisors interpreted the possibilities to design the career of the nurse anaesthetists less positive than nurse anaesthetists did. Nurse anaesthetists were less positive than their supervisors about the support and appreciation they get from their supervisors (appreciation supervisor $t(84.65) = -4.06$ $P < 0.001$, support supervisor $t(79.09) = -5.56$ $P < 0.001$) (Table 3).

Table 1. Correlations among variables (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Age	5.71	1.98	1.00											
2.	Gender	0.49	0,50	-.28**	1.00										
3.	Years of certification	3.80	1.78	.82**	-.23**	1.00									
4.	Academic hospital	0.13	0.34	-.01	.03	-.070*	1.00								
5.	Number operating rooms	2.36	0.98	-.08*	.03	-.104**	.54**	1.00							
6.	Number functions	0.59	0.49	.04	-.08*	.047	-.32**	-.25**	1.00						
7.	Number sub-functions	0.53	0.50	.09*	-.10**	.048	.15**	.06	-.06	1.00					
8.	Number activities	0.92	0.28	.14**	-.06	.158**	-.06	-.02	.11**	.18**	1.00				
9.	Career planning/reward	2.20	0.48	.05	.02	.038	-.03	.02	.02	-.03	-.04	1.00			
10.	Relation with supervisor	2.63	0.46	.01	-.02	.018	-.03	.00	.00	.02	.03	.53**	1.00		
11.	Task contents	2.78	0,34	.04	.01	.008	-.02	-.00	-.02	-.01	.02	.48**	.46**	1.00	
12.	Social environment	2.72	0.36	.03	-.11**	.03	.04	.03	.14**	.01	.01	.34**	.38**	.33**	1.00

n = 882, significant correlation at level $^{*}P < 0.05$, $^{**}P < 0.01$.

Table 3. Independent T-test between the two groups for the work context items. Group 1 = nurse anaesthetists, group 2 = supervisors.

	Group 1 (n = 882)		Group 2 (n = 69)			
Factor 1 items	M	SD	M	SD	df	t
salary	2.21	.66	2.71	.67	949	-6.02***
extra reward	1.89	.71	2.14	.62	(949	-2.85**
appreciation	2.29	.67	2.30	.60	949	-.11
training possibilities	2.28	.73	2.39	.69	949	-1.27
career possibilities	2.13	.71	2.00	.64	81.66	1.65
possibilities for development	2.23	.67	2.14	.58	83.11	1.22
design career	2.34	.62	2.20	.56	81.56	2.01*
Factor 2 items	M	SD	M	SD	df	t
possibilities for participation discussion of progress	2.83	.57	3.00	.45	85.48	-3.00**
possibilities for discussing during discussion of progress	2.88	.50	3.00	.42	83.62	-2.32*
information about department policy	2.32	.67	2.67	.63	949	-4.22***
appreciation supervisor	2.57	.65	2.84	.53	84.65	-4.06***
support supervisors	2.51	.67	2.97	.66	79.09	-5.55***
take into account one's opinion	2.66	.61	3.33	.53	82.53	-9.94***
Factor 3 items	M	SD	M	SD	df	t
variation	2.69	.63	2.80	.58	949	-1.40
problem solving	2.88	.58	2.96	.60	949	-1.11
one's duties	2.83	.60	2.86	.52	949	-.38
complete whole	2.73	.57	2.68	.58	949	.62
own way	2.78	.48	3.01	.55	949	-3.88***
own responsibilities	2.93	.53	2.94	.57	949	-.24
gained knowledge	2.70	.54	2.91	.45	84.74	-3.70***
gained skills	2.73	.53	2.94	.42	86.38	-3.90***

Factor 4 items	M	SD	M	SD	df	t
freedom of movement	2.6474	.58290	2.9130	.65841	949	-3.61**
contact colleagues	2.6565	.57660	2.8406	.60932	949	-2.54
informal contacts	2.7007	.54635	2.8841	.67598	949	-2.64**
give room	2.7619	.49285	2.8261	.59301	949	-1.03
taking a break	2.8333	.46986	3.1159	.47080	949	-4.81***

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$

We also studied whether the work context factors were hospital or profession-related. No significant relationship was found between the type of hospital (academic vs. non-academic hospitals) or the size of hospital (number of operating rooms)(Table 1). The type of hospital (academic vs. non-academic) was significantly and positively related to the number of sub-functions (r =.15, $P < 0.01$) and significantly and negatively to the number of functions (r = -.32, $P < 0.01$) (Table 1). The number of operating rooms in the department and the first work context factor 'career/rewards' were significantly correlated (at $P < 0.05$) (Table 4). The mean Likert scale value related to this first work context factor was 2.18 for hospitals with one to five operating rooms, and 2.21 for hospitals with more than 10 operating rooms.

Table 4. ANOVA interaction of independent variables with work context factors.

	Career/rewards		Relation with supervisor		Task contents		Social environment	
	df	F	df	F	df	F	df	F
Age	19	1.79*	19	0.91	31	0.79	13	0.78
Gender	19	0.60	19	0.71	31	1.40	13	2.15**
Certificate	19	1.51	19	1.20	31	0.84	13	0.84
Academic hospital	19	0.95	19	0.69	31	1.03	13	0.47
Number operating rooms	19	1.64*	19	1.23	31	0.99	13	1.37
Number activities	19	0.58	19	0.49	31	1.06	13	0.80
Number functions	19	1.25	19	0.38	31	0.75	13	2.11*
Number sub-function	19	0.79	19	0.66	31	0.90	13	0.50

$n = 882$, *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$

Discussion

This is the first study that focuses on work context factors for nurse anaesthetists. The four work context factors of importance for Dutch nurse anaesthetists identified in this study are in accordance with and support the results obtained in several other studies investigating the work context factors of other professions.[20-25] According to these studies, five work context factors are considered important:[8,18,20,21,25] a) job demands; b) decision latitude or job control (using acquired knowledge and skills allowing to make a decision); c) social support (most important factor to increase employees' resilience); d) physical demands and physical/environmental risk factors; and e) job insecurity (on the labour market requirements for particular skills and possibilities in future career development). Most of these factors are confirmed in our study and applicable for nurse anaesthetists: career possibilities and rewards (comparable with resource 'job insecurity'), the relation with supervisor (comparable with resource 'social support'), task contents (comparable with 'decision latitude') and social environment (corresponding to decision latitude and social support). The work context factors in this study are all considered as job resources, job demands were not mentioned. This is in contrast with several studies mentioning demands emerging from anaesthesiologists and nurse anaesthetists: fatigue, unpredictability of work, fear of litigation, competence pressure, the need for sustained vigilance, erratic opportunities for nutrition, hydration and bathroom breaks, and isolation from anaesthesia colleagues.[27-30]

Nurse anaesthetists can also experience their work as an assisting function because it is regulated and limited by several guidelines and laws and because they are always supervised by an anaesthesiologist. Nurse anaesthetists have therefore only a limited influence on the job demands and are consequently more focused on job resources. Maybe this explains why, in this study, job demands were not considered as a work context factor by the respondents.

The importance of 'relation with supervisor' (work context factor 2) can be explained by the feelings of loneliness and helplessness in difficult clinical situations because it includes support and appreciation by the supervisor.[26]

Differences between nurse anaesthetists and supervisor (head nurse anaesthetists) were found for the three work context factors, except factor 1 'career/rewards'. We argue that 'career and rewards' contain mostly concrete facts, and therefore they are less likely to be impacted by individual perceptions and are more likely to be scored similarly. The other factors are less concrete; asking more about perceptions and feelings. By analyzing the four factors at each item level, we found significant differences between nurse anaesthetist and

supervisor (Table 3). Maybe the most important mismatch was found between the items about support (work context factor 2). Nurse anaesthetists and supervisors clearly perceive these important constructs differently. Almost every theoretical model about motivation, work load, and burnout confirms the importance of support by the supervisor for a healthy work environment. Nurse anaesthetists feel less appreciated, less supported, and believe their opinion does not count to a far greater extent than what their supervisors think. These differences may result in nurse anaesthetists and supervisors having very different goals and needs. A mismatch in the importance of these work context factors between nurse anaesthetists and supervisors can lead to less job satisfaction among nurse anaesthetists, higher levels of burnout, a greater likelihood of job turnover, and failing leadership.

No significant correlation was found between the four work context factors and the size or type of the anaesthesia department, although the first work context factor (career/rewards) was significantly different in the number of operating rooms (Table 4). This could be related to staff shortage and corresponding financial bonus system. We examined whether the number of functions, sub-functions and activities were related to size and type of hospital. Career and rewards (factor 1) were not related to the number of functions or sub-functions in anaesthesia departments. Functions, sub-functions, and activities can be seen as a horizontal function differentiation or career planning and create possibilities for a non-financial reward system. However, we did not collect information that allowed us to determine this relationship.

The number of sub-functions, e.g. resuscitation or trauma team memberships, or supervision of the nurse anaesthetist students, is larger in academic hospitals. Unfortunately, we did not evaluate the number of these students per hospital, and hence were not able to determine the number of students a supervisor had to take care of. The number of functions differs significantly according to social environment, and is negatively correlated to the size and type of hospital (academic vs. non-academic). The variable ‘social environment’ contains items such as the quality and amount of contacts a nurse anaesthetist has with others. If the nurse anaesthetist participates in more sub-functions, more social interactions are available. The relationship between the number of functions, the number of operating rooms, and type of hospital can be explained by the organizational limitations of smaller hospitals. In smaller anaesthesia departments, supervisors want their nurse anaesthetists to be able to perform several different tasks so that the flexibility of the department improves.

Self-reports and questionnaires are subject to a number of biases. Nurse anaesthetists create their own work approach and environment depending on personality traits. As described by De Croon,[31] employees who suffer from strain are more likely to

show job turnover. This self selection process allows comparatively healthy nurse anaesthetists to remain in the job, whereas those who changed jobs (and occupation) are less healthy. This bias effect is called the 'healthy worker survivor effect', which can mean that our population experiences a higher level of resources. Whether these findings in the Dutch system of nurse anaesthetists are applicable to other countries, still has to be defined. Further studies are necessary to examine the exact meaning and influences of different interpretations of work context by using multilevel models, isomorphic models or by a 360 degree feedback system.[32]

In conclusion, in this study we found four work context factors (career/rewards, relation with supervisor, task contents and social environment), which are all job resources, that explain 48% of variance in work context, which Dutch nurse anaesthetists consider important in their job. It is crucial to find the right job resources to effectively buffer specific negative or stressful job demands. These four work context factors serve as the essential buffers for job demands among Dutch nurse anaesthetists. The size and type of the anaesthesia department did not show to have an impact. Supervisors differed from nurse anaesthetists in their perception of the work context factors 'relation with supervisor', 'task contents' and 'social environment'. As supervisors often make decisions about the overall work context of nurse anaesthetists, it is likely that this discrepancy results in lower job satisfaction in nurse anaesthetists.

Knowing which work context factors are important, further studies are necessary to determine the influence of these four work context factors on burnout, job satisfaction and job turnover. Only then, it will be possible to develop an effective policy for a healthy work environment of nurse anaesthetists.

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Appendix 1: Items of the four work context factors

Work context factor 1: Career/rewards
1. the level of the salary for the function of nurse-anaesthetist
2. extra bonus salary if extra functions/tasks are performed
3. appreciation for me in the hospital
4. opportunities for education/training
5. career possibilities
6. possibilities for development
7. possibilities to influence my career
Work context factor 2: Relation with supervisor
1. possibilities for participation discussion of progress
2. possibilities to propose an item during the discussion of progress
3. information about the department's policy
4. appreciation by my supervisor
5. support at work by my supervisor
6. my supervisor takes into account my opinion
Work context factor 3: Task contents
1. enough variation in my job during the day
2. opportunities to solve my own problems
3. my work includes preparative, executional, organisational and supportive tasks
4. my work is well-defined
5. execute my job in my own way
6. own responsibilities in my job
7. implementation of gained knowledge in practice
8. implementation of gained skills in practice
Work context factor 4: Social environment
1. freedom of movement during my work
2. contacts with my colleagues during my working day
3. possibilities to have informal contacts with others
4. give room to do my job
5. possibilities to take a break during the day

If the ability to leave a living memory rather than a bibliography, is the test of greatness, then personality is the most attribute of a great nurse anaesthetist

Published as:

Meeusen V[1], Brown-Mahoney C[2], Van Dam K[3], Van Zundert A[1], Knape H[4]. Personality dimensions and their relationship to job satisfaction amongst Dutch nurse anaesthetists. J Nurs Manag 2010;18: 573–581.

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Chapter 6

Personality dimensions and their relationship to job satisfaction amongst Dutch nurse anaesthetists

Abstract

Background. The shortage of nurses, and those voluntarily leaving their jobs, continues to be a problem affecting the delivery of healthcare all over the world, including anaesthesia. If it is found that nurse anaesthetists with certain personality types have high levels of job satisfaction, the information may be helpful for the retention of nurse anaesthetists.

Aim. This study investigates the relationship between personality dimensions and job satisfaction.

Methods. A questionnaire was distributed amongst Dutch nurse anaesthetists. Factor and multiple regression analyses were performed to reveal personality dimensions and their impact on job satisfaction.

Results. 923 questionnaires were completed and analyzed (46% response rate). Two personality dimensions - ‘easy going’ and ‘orderly’ - explained 3.5% of the variance in job satisfaction.

Conclusions. Personality dimensions as measured with the MBTI are only minimally relevant in predicting job satisfaction amongst Dutch nurse anaesthetists. Before using personality traits as a selection tool for retaining employees, it is important to understand the relationship of particular personalities to job satisfaction; it is also important to know which combination of personality traits is likely to create a highly cohesive work group.

Key words: personality; Myers Briggs Type Indicator; job satisfaction; nurse anaesthetists.

Introduction

The shortage of nurses, and nurses voluntarily leaving their jobs, has been a major problem in recent years, affecting the delivery of healthcare all over the world.[1-3] Indeed, there is a major risk of a shortage of professionals, especially in anaesthesia.[4] Studies on voluntary turnover emphasize the importance of job satisfaction for the decision to leave one's job.[5] Prior research amongst nurses has identified a strong relationship between job satisfaction and job turnover.[6-11] That is, low levels of job satisfaction amongst nurses are associated with a higher chance of considering other job opportunities. Shimizutani et al.[12] for example, observed a 20% intention-to-leave rate among nurses, on average, but also noticed that nurses with higher levels of job satisfaction had higher intentions to stay in their jobs. Generational differences, personnel shortages, and an ever aging and aligning population have caused employers and employees to pause and think about the various factors that impact job satisfaction.

In the literature, many different factors have been proposed as precursors of job satisfaction. Most of these factors under study relate to aspects of the work situation. Because the nursing profession is generally characterized as an emotionally and physically demanding work setting, most researchers have focused on nurses' working conditions, showing that different aspects of this work situation relate to nurses' job satisfaction.[13,14] For example, Van der Heijden et al.[11] found that head nurses' leadership quality, and colleagues' social support were important predictors of nurses' job satisfaction and turnover intention. Similarly, Lambert et al.[15] observed how work environment factors, such as role conflict, task variety, and autonomy, were important in shaping job satisfaction.

Recent research however suggests that individual characteristics, such as nurses' personality traits, can also be considered precursors of job satisfaction. This research has provided strong evidence that job satisfaction is, in part, dispositionally based.[16] Several explanations have been offered for this relationship. According to Weiss & Cropanzano,[17] personality influences the experience of emotionally significance events, which in turn influences job satisfaction. Depending on their personality traits, people create their own work ethic and environment, and influence their job satisfaction through cognitive, affective and behavioural processes.

The cognitive process entails that individuals cognitively interpret characteristics of their jobs differently according to their personality.[16] For instance, positively disposed individuals rate job characteristics as more enriched and are more satisfied with their jobs, whereas individuals with negative self-evaluations focus on negative aspects and are less

satisfied with their jobs.[17,18] The impact of nurses' perceptions of their environment for job satisfaction and turnover has been demonstrated in different studies.[19,20]

The affective process entails that personality dimensions influence variances in job satisfaction through their effects on mood and subjective wellbeing. Using a longitudinal design, Staw et al.[21] measured affective dispositions from as early as adolescence in order to predict job attitudes later in life. The results showed that dispositional measures significantly predicted job attitudes, such as job satisfaction, over a time span of nearly fifty years.

The behavioural process entails that employees with specific personality traits, such as conscientiousness, extraversion, or emotional stability, are happier at work because they are more likely to achieve satisfying results.[22,23] Meta-analytic research (e.g., Barrick & Mount)[24] has shown how several personality dimensions are systematically related to job performance. Studying the relationship between personality and student success amongst the US army graduate program for nurse anaesthetists, Hulse et al.[25] found that nurse anaesthetist students with a more external locus of control and lower anxiety trait were more likely to succeed. Combinations of personality dimensions can also influence job satisfaction via work group cohesion and collabouration.[26]

Another approach to the relationship between personality and job satisfaction comes from the stress and burnout literature. Job turnover is often found amongst those who experience elevated stress levels or career burnout.[27] The relationship between personality and burnout is well established.[12,28] This process can be explained by the fact that one's personal approach to work is significant in developing work stress. Effective coping styles are important to handle work stress and employee's wellbeing.[29] Delahaij et al.[30] for instance found that military cadets who were high on hardiness showed more problem focused coping strategies, reported higher wellbeing, and performed better in an acute stress situation compared to cadets low on this trait.

Although personality is generally considered stable over time, several age differences have been noticed.[31] Older and younger employees, on average, appear to differ, in certain personality dimensions, and these age variations may be reflected in work behaviour. For example, older employees tend to outperform younger ones in roles requiring good interpersonal relationships and dependable attention to detail and deadlines.[31,32] Similarly, older employees have been found to be somewhat less extroverted and less open to new experiences.[31,33] Older employees also appear to be more conscientious than younger employees. They are more modest, conventional, careful in interactions, sympathetic and helpful. Lower mean scores have been observed for

sociability, outgoingness, desire for social contact, abstract thinking, career achievement motivation and preference for variety.[33,34]

To summarize, because nurses' job satisfaction can be considered an important predictor of their considerations to stay in their job it is crucial to obtain more information about the factors that affect nurses' satisfaction with their job. Whereas most research has considered work characteristics as predictors of job satisfaction, only a few studies have inquired into the importance of individual characteristics, i.e. personality traits. Moreover, as far as we know, there are no studies that have examined the relationship between the personality of nurses and their satisfaction with the job. Insight in this relationship contributes to both literature and practice. Accordingly, the goal of the present study was to investigate the relationship between personality and job satisfaction amongst nurse anaesthetists. We hypothesized that specific personality dimensions amongst Dutch nurse anaesthetists would predict higher levels of job satisfaction; furthermore, we explored whether personality dimensions were age-related.

The present study contributes to the literature in several ways. First, this study contributes to the job satisfaction literature by providing information about the dispositional basis of job satisfaction. Only when this relationship is firmly established, the different explanations (e.g., cognitive, emotional, and behavioural) can be investigated. Second, this study contributes to the literature on work attitudes of nurses, and, more specifically, the literature on the work attitudes of nurse anaesthetists. As far as we know, this is the first study examining the relationship between personality dimensions and job satisfaction amongst nurse anaesthetists. Information about this relationship has practical relevance. If it is found that nurse anaesthetists with certain personality types have high levels of job satisfaction, the information may be helpful in retaining them in the job. Similarly, the relationship between personality and job satisfaction can be interesting because it emphasizes the importance of using of personality scales when selecting new nursing staff.

Methods

Procedure

We performed a cross-sectional study amongst nurse anaesthetists working in both Dutch hospitals and private clinics, examining personality dimensions and job satisfaction. The study was approved by the Medical-Ethical Committee of the Catharina Hospital, Eindhoven, The Netherlands.

The study was initiated in January 2007, at the annual congress of Dutch nurse anaesthetists. Every participant of the congress received an invitation to fill out the online questionnaire. Also, a personal letter was sent to every member of the NVAM inviting them to participate in the study. Directors of private clinics and employment agencies specializing in nurse anaesthetists also received requests to promote participation in the study. The online questionnaire was closed three months later (April 2007).

Out of 2,000 Dutch nurse anaesthetists,[4] 923 filled out the questionnaire (response rate of 46%); however, 41 failed to complete it entirely and were excluded from further study. This study concentrated on the responses of the 882 nurse anaesthetists (431 female and 451 male). The majority of the nurse anaesthetists were between 25 and 54 years old (89.2%), with the largest group (21.2%) being between 45 and 49 years old. More than two-thirds of the respondents (68.7%) were considered experienced as they had been working for more than 5 years as nurse anaesthetists.

Measures

We used the following demographic working variables in our study: 'age' and 'gender' were included because of their perceived relationship to personality; 'type of hospital' and 'presence of anaesthesiology residents' were included as control variable.

Job Satisfaction. Job satisfaction was measured with three items, referring to satisfaction with the job, organisation, and department's atmosphere respectively. Responses could provided on a four-point scale (1 = totally disagree, 2 = disagree, 3 = agree and 4 = totally agree). Previous studies support the use of global measures of job satisfaction in cross-sectional surveys that assess the cognitive component of satisfaction.[14,35]

Principal components analysis with Varimax rotation (eigenvalues > 1) revealed one dimension, explaining 64% of the variance. The Cronbach's alpha of this scale ($\alpha = .72$) is comparable to the reliabilities of similar scales in other studies.[14,35]

Personality Dimensions. We used the Myers-Briggs Type Indicator (MBTI) questionnaire because it contains multiform factors for personality testing, necessary in this homogenous population of nurse anaesthetists.[36] The MBTI was first developed in 1958, based on Jung's theory of psychological types. It is a framework that describes the different ways people prefer to use their perceptions and judgment. First, the framework distinguishes people in the way they see their own environment: a) introverts who prefer their internal world of thoughts, feelings, fantasies and dreams; and b) extroverts who prefer the external world of things, people and activities. Second, there are four basic ways of dealing with one's

environment: 1) sensing: perception of information; 2) thinking: evaluating information rationally; 3) intuiting: perception outside the usual conscious processes; and 4) feeling: evaluating information by emotional response. Although everyone uses all four ways, the framework assumes that one way is superior: it is the preferred and best developed way for dealing with the environment. An individual can be described in terms of each of his/her four MBTI preferences, or combinations of two or three of the preferences.[37,38] The present study used 56 of the original 95 items but contained all four types, conform Boeree,[39] scoring the results according a five-point response scale (1 = a lot, 2 = a fair amount, 3 = few, 4 = very few, 5 = absent).

Confirmation of the questionnaire's structure by factor analysis was essential, because the validation results of MBTI are somewhat controversial. McCrea & Costa argued that the MBTI questionnaire is not a valid instrument to measure the four personality dimensions.[37] Thompson & Borrello strongly supported the MBTI instrument's construct validity, although their study population was rather limited with 359 participants and 95 items.[40] For statistical power, the number of participants should be five to ten times the number of items used in the questionnaire.[38,41] Our study featured 882 participants and 56 questionnaire items about personality, which is sufficient for statistical power.

Data Analysis

The structure of the 56-item's MBTI questionnaire was analysed using dimension analysis. The Bartlett's test of Sphericity (approx. Chi-Square = 13379.89, df = 1540, $P < 0.000$) and KMO (=.87) showed scores which made further factor analysis necessary. Principal components analysis with Oblimin rotation (eigenvalues > 1) was used to find the underlying dimensions. Four personality dimensions, based on a total of 24 items, were obtained: 1) 'easy going' ($\alpha = .75$) explaining 20.5% of the variance; 2) 'orderly' ($\alpha = .67$) explaining 9.5% of the variance; 3) 'compassionate' ($\alpha = .74$) explaining 7.6% of the variance; and 4) 'receptive' ($\alpha = .69$) explaining 7.3% of the variance. Because these four dimensions did not correspond to the dimensions of the MBTI, we labelled them in accordance with the overall 'meaning' of the items of each dimension. The four personality dimensions explained 45% of the variance in personality (see Appendix I).

The data were analyzed with SPSS (SPSS 16.0 system, SPSS Inc, Chicago, Ill, USA) to compute correlations and descriptive information, $P < 0.05$ was considered statistically significant. Hierarchical regression analysis was used to establish the relationships between personality variables and job satisfaction, while controlling for background variables.

Results

Personality dimension ‘orderly’ was seen most frequently amongst nurse anaesthetists (M = 4.03, SD = .47), ‘receptive’ was second (M = 3.95, SD = .48), ‘easy going’ third (M = 3.92, SD = .55) and ‘compassionate’ was the least present (M = 3.55, SD = .56). Job satisfaction had a mean score of 2.79 (SD = .55), ranging from 1 to 4. Age was negatively related to personality dimension ‘easy going’ (r = -.17, $P < 0.01$), but did not correlate with job satisfaction. Amongst females, the personality dimension ‘compassionate’ was more present (r = .20, $P < 0.01$). Only personality dimension ‘orderly’ was negatively related to ‘working in academic hospitals’ (r = -.09, $P < 0.01$). Personality dimension ‘receptive’ was negatively correlated with the other three personality dimensions ‘easy going’, ‘orderly’ and ‘compassionate’ (resp. r = -.23, r = -.18 and r = -.18, all $P < 0.01$). The different personality dimensions were only modestly related to each other. The personality dimensions ‘easy going’ (r = .18, $P < 0.01$) and ‘orderly’ (r = .11, $P < 0.01$) correlated significantly and positively with job satisfaction. Table 1 displays the descriptive statistics and correlations for the variables in the study.

We performed a hierarchical multiple regression analysis (Table 2) to determine the relationships between personality dimensions and job satisfaction. In Step 1, the demographic characteristics of the participants were included in the analysis to examine their possible effect on job satisfaction. Two demographic variables, academic hospital and anaesthesiology residents, were significantly related to job satisfaction, explaining 1.8% of for the variance in job satisfaction; they were therefore included in the regression model (Table 2).

Age and gender were not related to job satisfaction, and were excluded from further analysis. In Step 2, the personality dimensions were included in the analysis. Demographic variables ‘academic hospital’ ($\beta = -.10$, $P < 0.01$) and ‘anaesthesiology residents’ ($\beta = .15$, $P < 0.001$) explained 1.8% of the variance in job satisfaction in Step 1. Personality dimensions, ‘easy going’ ($\beta = .17$, $P < 0.001$) and ‘orderly’ ($\beta = .09$, $P < 0.05$) were positively related to job satisfaction, explaining 3.5% of the variance in Step 2.

Table 2. Hierarchical regression results with job satisfaction as outcome variable.

Variable	Model 1 β	Model 2 β
Academic hospital	-.10**	-.09*
Anaesthesiology residents	.15***	.14***
'Easy going'		.17***
'Orderly'		.09**
'Compassionate'		.02
'Receptive'		.02
Adjusted R^2	1.8	5.5
F(df/df)	9.25*** (2/879)	9.56***(6/875)

n = 882, *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

Table 1. Correlations amongst variables (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	Age	5.7	1.97	1.00								
2.	Gender	.49	.50	-.28**	1.00							
3.	Academic hospital	.13	.37	-.01	.03	1.00						
4.	Anaesthesiology residents	.46	.50	-.12**	.05	.40**	1.00					
5.	P1: ‘easy going’	3.92	.55	-.17**	.04	-.03	.02	1.00				
6.	P2: ‘orderly’	4.03	.47	.02	-.00	-.09**	-.01	.13**	1.00			
7.	P3: ‘compassionate’	3.55	.56	.04	.20**	-.03	-.03	.20**	.04	1.00		
8.	P4: ‘receptive’	3.95	.48	-.01	.03	.05	.02	-.23**	-.18**	-.18**	1.00	
9.	Job satisfaction	2.79	.55	-.01	.01	-.04	.11**	.18**	.11**	-.01	.00	1.00

n = 882, significant correlation at level $^{*}P < 0.05$, $^{**}P < 0.01$.

Variables: age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10); gender: men (0), women (1); type of hospital (academic hospital): yes (1), no (0); working with anaesthesiology residents: yes (1), no (0). Personality dimensions: P1 = ‘easy going’; P2 = ‘orderly’; P3 = ‘compassionate’; P4 = ‘receptive’.

Discussion

This study examines the relationship between personality dimensions and job satisfaction amongst nurse anaesthetists, demonstrating that the personality dimensions 'easy going' and 'orderly' explained 3.5% of the variance in job satisfaction amongst Dutch nurse anaesthetists. Although the relationship between personality and job satisfaction in the present study was not as strong as in other studies, our findings still indicate the existence of a dispositional base of job satisfaction.[16] Using other personality instruments (positive and negative affectivity by Connolly & Viswesvaran[22] and Big Five by Watson et al.,[23] a 10%-25% relationship between personality dimensions and job satisfaction has been found. This difference in variance can be explained by the fact that we used the MBTI questionnaire.

Table 3. Comparison between the dimensions in this study, the Big Five model and the MBTI.

Dimensions this study	Dimensions Big Five Model	Dimensions MBTI
Easy going	Extraversion	Extraversion-introversion
Orderly	Conscientiousness	Judgement-perception
Compassionate	Agreeableness	Thinking-feeling
Receptive	Openness to experience	Sensing-intuiting

The MBTI is the most frequently used questionnaire for measuring personality for career counseling and management education, and is often used as a predictor of job performance. However, factor analysis of the MBTI questionnaire in this study resulted in different personality dimensions than those used originally. The popularity of this instrument, despite the lack of validity, warrants continuing reevaluation. Based on the results of this study, caution is advised in regard to using the MBTI as a selection device.

We found four personality factors, not in accordance with the MBTI model, but comparable to four of the dimensions of the Big Five Model (Table 3). This was in accordance to McCrea & Costa who found similar results and suggested to label the personality dimensions in accordance with the Big Five dimensions.[37] Jackson et al.[38] examined several models of underlying responses to the MBTI, and found some support for the four-factor structure according to the original Jungian structure, but these results were no better than with the Big Five model. The Big Five dimension structure describes the five most salient aspects of personality: 1) neurotic individuals have an essentially negative nature and experience more negative life events than other individuals; 2) extroverted individuals are predisposed to experience positive emotions; 3) the trait of being open to

experiences is found in individuals who feel both the good and the bad more intensely; 4) agreeable individuals strive for a situation where they get along with each other in a pleasant and satisfying relationship; and 5) conscientious individuals have a strong tendency to general work involvement.[16,37,42] According to other studies, the MBTI dimensions are comparable to the Big Five, but the Big Five dimension 'neuroticism' is not covered by the MBTI.[34,37]

Our findings, regarding the personality dimensions influencing job satisfaction, are conform to other studies,[16,43] which have found that conscientious and extroverted employees, comparable to resp. 'orderly' and 'easy going" in this study, are more satisfied with their jobs. We did not find a β-correlation between job satisfaction and our dimensions 'compassionate' and 'receptive'. However, McManus et al.[43] found the highest job satisfaction amongst people with higher levels of the Big Five dimension 'agreeableness'.

In our study, in accordance with findings from other studies,[33,36] the personality dimension 'compassionate' was significantly different between males and females. Independent of gender, the personality dimension 'easy going' was negatively related to age, and had the highest predictive value for job satisfaction in this study. Age itself was not related to job satisfaction. Although it is statistically significant, the relationship between age and being 'easy going' is not strong according to this study; however, it has been found to be so in other studies.[31] Perhaps at a an older age, with the accumulation of life events and a degree of freedom from social constraints, people are able to act in certain ways and, therefore, may vary in their personality styles.

Several studies have investigated personality dimensions amongst nurses, other than anaesthesia nurses, and obtained controversial results. Bean & Holcombe used the MBTI to explore personality types amongst oncology nurses.[44] Although the number of respondents was rather limited (40 nurses), these authors found that more than 65% of the nurses were introverts. Gambles et al.[32] used the 16PF (Primary Factor) personality inventory amongst palliative care nurses, and found high scores for extroversion. Both studies scored high on the dimension introvert – extrovert, which shows the importance of this personality dimension amongst nurses. The dimension introvert – extrovert is comparable to the dimension 'easy going' in this study (Table 3). Although in this study the four personality dimensions were almost equally divided amongst the nurse anaesthetists, the personality dimension 'easy going' predicted the highest levels of job satisfaction by far.

The mean value of job satisfaction was comparable to other studies amongst anaesthesia personnel. Lindfors et al.[45] studied job satisfaction amongst Finnish

anaesthesiologists and found a mean value of 2.80 (range 1 - 4) and Michinov et al.[46] found a mean value of 3.38 (range 1 – 5) amongst French anaesthesia teams.

In this study, we did not analyse the distribution of the different personality dimensions across each anaesthesia department. Perhaps a specific combination of particular personality dimensions is essential for the creation of an optimal work climate and a high level of job satisfaction.[47] Further studies are necessary to explore this possibility. Without knowing the validity of this interaction, using personality dimensions to promote higher levels of job satisfaction in the workforce is questionable.

Our study has several limitations. First, the response rate (46%) was low compared to a clinical trial, and one can question if the perceptions reported, reflect those of the total population. However, this response rate is comparable to the 38%-53% response rates found in other anonymous multi-site surveys of hospital-based nursing personnel.[48] We tried to discover possible reasons for our response rate by asking the supervisors of anaesthesia departments; the reasons given were: no computer available, not interested, questions were too personal, and lacking time. Second, due to the cross sectional self-report design, we could not draw conclusions about causality. Third, personality is measured with self-reports, which are subject to a number of biases. Fourth, transient mood states can interfere with outcome measures.[17,49] Further research with different personality models is necessary to gain information about the relationship between job satisfaction, personality dimensions and age amongst nurse anaesthetists, and to identify a valid instrument for selection purposes.

In conclusion, in this study, the personality dimensions ‘compassionate’, ‘easy going’, ‘orderly’, and ‘receptive’ were different compared to the MBTI. Two of the four personality dimensions, ‘easy going’ and ‘orderly’, were significant predictors of job satisfaction amongst Dutch nurse anaesthetists. The negative correlation between age and the personality dimension ‘easy going’ showed the expected evolution in this personality dimension in older nurse anaesthetists. The MBTI questionnaire may not have been sufficient to explain the variation in job satisfaction. Therefore, the use of the MBTI for effective selection of Dutch nurse anaesthetists is questionable. Possibly, the Big Five dimensions are more appropriate. Further research is necessary to determine which personality dimensions are preferable in a group of nurse anaesthetists to promote high levels of job satisfaction and performance in an anaesthesia department.

Implications for nursing management

Employees are the human capital of any organization. Understanding the factors responsible for job satisfaction is key for developing effective human resources policies. Job satisfaction is not only important for a nurse's life satisfaction,[16] but it also creates a healthy workplace environment, improves performance and leads to less frequent job turnover and lower organizational costs.[2,50] Indeed, job satisfaction is also related to work group cohesion and collabouration,[26] which in turn can be influenced by the combination of personality dimensions within the team. Therefore job satisfaction can be considered as one of the most important goals for both the employee and the organization.

This study showed that personality dimensions measured with the MBTI are only minimally effective in predicting job satisfaction amongst nurse anaesthetists. Furthermore, it is important to know which combination of personality dimensions is likely to create a highly cohesive work group. Before using personality dimensions as a selection tool to retain employees, it is important to understand the relationship of particular personalities to job satisfaction. When using questionnaires as selection instruments, it is important to be aware of the advantages and the pitfalls.

Acknowledgment

We are indebted to Prof. C. Kumar, Consultant Anaesthetist, The James Cook University Hospital, Middlesbrough, U.K., and Ms. J. DuBroy, producer, director, writer, Roy Productions INC., Toronto, Canada, for their help in the preparation of this manuscript.

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Appendix I: Myer-Briggs Type Indicator items after factor analysis.

Personality 1 'Easy going'	I have many friends and acquaintances.
	I am a sociable person.
	I take a leisurely approach to life.
	I am very flexible.
	I am easy to get to know.
	I am a spontaneous person.
Personality 2 'Orderly'	I like to keep to a schedule.
	I like to plan things carefully.
	I am always punctual.
	I am down to earth.
	Justice is more important than mercy.
	I am neat and orderly.
Personality 3 'Compassionate'	It is better to go with the heart than with the brain.
	I strive for harmony amongst people.
	I often go by hunches.
	I prefer to deal with feelings rather than logic.
	I like to deal with ideas and feelings
	Compassion is my highest ideal.
Personality 4 'Receptive'	I tend to notice what is going on beneath the surface.
	I am a curious person.
	I like reflecting on life.
	I enjoy novelty and variety.
	I like to figure out why things happen.
	Inspiration is very important to me.

All growth depends upon activity. There is no development physically or intellectually without effort, and effort means work.

Calvin Coolidge (1872-1933)

Accepted for publication:

Meeusen V[1], Van Dam K[2], Brown-Mahoney C[3], Van Zundert A[1], Knape H[4]. Work climate related to job satisfaction among Dutch nurse anaesthetists. AANA J 2011;79.

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Chapter 7

Work climate related to job satisfaction among Dutch nurse anaesthetists

Abstract

Background. Finding ways to retain nurse anaesthetists in the profession in order to meet the increasing demands of the health care system is of paramount importance.

Aim. The present study investigates the relationship between work climate and job satisfaction among Dutch nurse anaesthetists.

Methods. A questionnaire was distributed to Dutch nurse anaesthetists to assess their perceptions of their work climates, and their levels of job satisfaction. Multiple regression analyses were performed to obtain the predictive value of work climate for job satisfaction.

Results. All of the work climate characteristics had statistically significant correlations to job satisfaction, and explained 20% of the variance in job satisfaction.

Conclusions. To achieve a higher level of job satisfaction among nurse anaesthetists, it is necessary to improve some essential work climate characteristics, such as: 1) making the nurse anaesthetist feel an important part of the organisation's mission statement; 2) discussing progress at work; 3) giving recognition for delivered work; 4) encouraging development; and 5) providing sufficient opportunities to learn and to grow.

Key words: work climate, job satisfaction, nurse anaesthetist

Introduction

The job of a Dutch nurse anaesthetist is comparable to that of a nurse anaesthetist or a registered nurse anaesthetist (RNA) in many countries. Dutch nurse anaesthetists work in anaesthesia departments under the direct and indirect supervision of an anaesthesiologist. An anaesthesiologist is always present in the vicinity of the operating theatre or in direct phone contact, readily available for immediate help if required. However, although nurse anaesthetists never perform inductions of anaesthesia solely, they do perform maintenance of and emergence from anaesthesia by themselves. They stay with their patients for the entire procedure, constantly monitoring important body functions and independently modifying the anesthetic agents when required to ensure maximum patient safety and comfort.

The role of the nurse anaesthetist is becoming increasingly important in the Dutch healthcare system. Kluger et al.[1] recently demonstrated that a well-educated nurse anaesthetist on the care team is essential for good outcomes. It follows that finding ways to retain trained nurse anaesthetists in the profession is vital for the overall success of the system. One way of achieving this goal is by the anaesthesia team pursuing a positive work climate, one that stimulates job satisfaction amongst nurse anaesthetists. Whether or not nurse anaesthetists enjoy their jobs is greatly influenced by a combination of the characteristics of the environment and the job, and personality variables.[2]

Several different definitions are used for "work or organisational climate".[3,4] Work climate can be seen as the underlying principles, values, and norms of an organisation.[5] Work climate in this study includes the perceptions of Dutch nurse anaesthetists of the internal work environment, situations and circumstances in the anaesthesia department, with specific focus on achieving maximal potential. Recent studies have found a relationship between a positive work climate and responsibility, job demands, social relations, the quality of communication, and the organisational identity and engagement.[4,6]

In practice, it is important to create the right work climate by providing the essential job resources that effectively buffer the negative aspects of the job and stimulate the nurse anaesthetist's motivation.[7-9] Job resources refer to the physical, organisational and social aspects of the job that help in achieving work goals, reducing job demands, and stimulating personal growth, learning and development.[8] Motivating nurse anaesthetists to the utmost is about realizing their full potential,[3] and the work climate can be seen as an indication of how well the organisation is realizing its full potential.[4]

The attractiveness of the work climate is evaluated by how nurse anaesthetists perceive their environments, and their personalities.[4,5,10,11] Any working person prefers

environmental characteristics (e.g. opportunity for personal control, skill use, interpersonal contact, variety, a valued social position) that are desirable to him/her.[12] The extent to which people's perceptions of their environment and the organisational standards matches their preferences is responsible for their job satisfaction.[13]

Several environmental factors are associated with subjective well-being, such as: a) the opportunity for personal control (also referred to as decision latitude or self-determination), b) the opportunity to use one's skills, c) externally generated goals, d) variety, e) environmental clarity (opposite of role ambiguity); f) the opportunity for interpersonal contact; and g) a valued social position.[3,12] Negative subjective perceptions of these objective work stressors have a negative influence on health[5,14] and job satisfaction.[10,15,16]

Over the past decade, a considerable amount of work has been published about stress and job satisfaction among anaesthesiologists, but less attention has been paid to the processes influencing job satisfaction among nurse anaesthetists. As with other service professionals, nurse anaesthetists share many occupational stressors, but they also have environmental work factors that set them apart: the proximity to suffering and death, the emotional and physical needs of patients, and pressures to perform consistently and optimally under changing conditions and expectations.

Any anaesthetic technique can result in morbidity or mortality, and a malpractice claim can be the result of a bad outcome despite the provision of optimal care. Nurse anaesthetists have to deal with fatigue, unpredictable work variables, threats of litigation, pressures regarding competency, the need for sustained vigilance, and isolation from their anaesthesia colleagues.[17-19] Feelings of loneliness and helplessness in difficult clinical situations are important factors that have been shown to increase stress in anaesthesiologists.[20] Furthermore, the work environment for nurse anaesthetists has some unique and stressful ergonomic factors, which include noise pollution (alarms, ventilators, suction apparatus, telephones and intercoms), long working hours due to unpredictable surgical procedures, radiation, exposure to infection, uncomfortable chairs, poorly designed work spaces (the lack of direct daylight, the visual challenges caused by darkness, and the use of lasers and monitors).[17,19]

Over the last 20 years, the Gallup Institute, an American organisation, performed two major studies examining the difference between employees who are successful and those who fail after the optimization of personnel management.[21] The Gallup researchers developed a questionnaire to examine the match between employees and their work by studying important work climate factors. According to the Gallup Institute, work climate can be measured by twelve different factors:[21] "…what emerged are the 12 elements of

work life that define the unwritten social contract between employee and employer. Through their answers to the dozen most important questions and their daily actions that affected performance, the workers were saying, 'If you do these things for us, we will do what the company needs of us'."

These "twelve elements" are in accordance with motivational models such as the "Two Factor Theory" of Herzberg,[22] the "Job Characteristics Model",[23] and the "Revised Causal Model of Job Satisfaction".[2] These models emphasize the importance of autonomy, use of skills and knowledge, and social interactions which also can be recognized in the "12 Elements" of the Gallup Institute. The Gallup Institute studies proved that a positive work climate can result in highly engaged teams, with an average 18% more productivity and 12% more profitability than disengaged teams.[21] The negative relationship between burnout (opposite of engagement)[24] and job satisfaction is well-known from other studies.[25,26]

The primary objective of the present study was to investigate the relationship between work climate and job satisfaction among Dutch nurse anaesthetists from data gathered through an online questionnaire which included the twelve Gallup Institute elements. We also set out to determine which work climate characteristics relate to job satisfaction.

Methods

Design and sample

After approval by the Medical Ethical Committee of the Catharina Hospital, the study was launched at the annual Dutch national congress of nurse anaesthetists in January 2007. Every participant of the congress received an invitation to fill out the online questionnaire, which sought socio-demographic information, and also included the twelve work climate elements of the Gallup Institute questionnaire. In addition, to promote and expand the study as well as to include those who did not attend the congress, individual letters of invitation were sent to every member of the NVAM. As well, information was published in the Dutch Journal of Nurse Anaesthetists, and all the chairs of the anaesthesia departments of all Dutch hospitals were informed. The online questionnaire was closed three months after the launch, in April 2007.

Socio-demographic information was recorded: age, gender, percentage of fulltime employment worked, number of years practicing anaesthesia since certification, number of training days per five year time period, type of hospital, presence of anesthesiology residents,, and sickness absence and perceived general health.

Sickness absence & perceived general health. The self-reported incidence of sickness absenteeism during the previous year was analysed by coding the answers as: 0 days (0), 1-6 days (1), 7-14 days (2), 15-28 days (3), 1-2 months (4), 3-7 months (5) and more than 7 months (6). Every nurse anaesthetist scored his/her own perceived general health on a five-point scale (1 = very bad and 5 = very good). The self-rating of health has also been used in other studies.[26,27]

Job satisfaction. Job satisfaction was measured as satisfaction with the job, satisfaction with the organisation and satisfaction with the department's atmosphere, and each aspect was rated on a four-point scale. Previous studies support the usefulness of using global measures of job satisfaction in single-shot surveys that assess the cognitive component of satisfaction.[26,28]

Work climate. The Gallup Institute questionnaire was originally developed after a meta-analysis of 105,680 employees working in 2,528 organisational units, of which 531 units were in the healthcare sector (but not specifically in anaesthesia departments). Regression analyses were conducted to determine the predictive value of work climate for job satisfaction (Cronbach's alpha = .90), and for productivity (Cronbach's alpha = .90). Work climate was found to predict 66.96% of the variation in job satisfaction, and 83.72% of the variation in productivity. The questionnaire contains 12 items (Appendix I); 1: expectations; 2: instruments & tools; 3: best in; 4: recognition; 5: appreciation; 6: encourage development; 7: opinion; 8: mission statement; 9: quality work; 10: best friend; 11: progress; and 12: learning & growing. In this study, these items were rated on a seven-point Likert scale, ranging from never (1) to always (7), and subsequently totalled (range 12-84).

Data analysis

Hierarchical multiple regression and partial correlation analyses (SPSS 16.0 system, SPSS Inc, Chicago, Ill, USA) were performed to obtain predictors for job satisfaction. $P < .05$ was considered statistically significant. The reliability of the two variables -- work climate ($\alpha = .84$) and job satisfaction ($\alpha = .72$) -- was analysed.

Results

Out of 2,000 Dutch nurse anaesthetists, 923 returned the questionnaire (46% response rate). However, 41 failed to complete it entirely and were excluded from further study, leaving 882 questionnaires (431 women and 451 men). The majority of the nurse anaesthetists (89.2%) were between 25 and 54 years old, with a peak in the age range of 45-49 years (21.2%). Most of the respondents (68.7%) were considered experienced because they had worked for more than 5 years as nurse anaesthetists.

'Perceived general health' had a significant correlation ($r = .20$, $P < 0.01$) with work climate and job satisfaction ($r = .17$, $P < 0.01$). There was no relationship between sickness absenteeism and work climate, or between sickness absenteeism and job satisfaction. Sickness absence was frequently seen on a short-term basis. More than 50% of the participants had no sickness absenteeism during the immediately preceding year; 34.7% experienced 1 to 6 days, 5.9% experienced 7 to 14 days, 3.2% experienced 15 to 28 days, 0.9% experienced 1 to 2 months, 1.2% experienced 3 to 7 months, and 0.7% experienced more than 7 months in the previous year. The demographic items '% of employment' ($r = .12$, $P < 0.01$) and 'training days' ($r = .17$, $P < 0.01$) had the strongest correlation with work climate (Table 1).

Predictors for job satisfaction

A hierarchical multiple regression analysis was performed between the demographics 'sickness absence' and 'perceived general health' to test the predictors of job satisfaction. In Step 1 of the regression analysis, demographic items were included; in Step 2, sickness absence and perceived general health were included; and finally, in Step 3, variables of the work climate were included (Table 2). Demographic variables explained 2% of the variance in job satisfaction in Step 1. In Step 2, 5% of the variance is explained by sickness absence and perceived general health. Finally, 20% of the variance in job satisfaction is explained by work climate (Step 3). Our hypothesis was confirmed: work climate is positively related to job satisfaction ($\beta = .48$, $P < 0.001$) (Table 2).

To determine which work climate characteristic had the highest correlation for job satisfaction, a partial correlation controlled for '% of employment', 'training days', 'sickness absence' and 'perceived general health' was performed (Table 3). All work climate characteristics showed statistically significant correlations with job satisfaction.

Table 2. Hierarchical regression results with job satisfaction as outcome variable.

Variable	Step 1 β	Step 2 β	Step 3 β
Academic Hospital	-.10**	-.10**	-.07*
Anesthesiology Residents	.15***	.15***	.12***
Sickness Absence		.01	.01
General Health		.17***	.08*
Work Climate			.48***
Adjusted R^2	.02	.05	.27
F	9.10***	11.52***	64.71***
(df/df)	(2/873)	(4/871)	(5/870)

n = 882, significant level $^{*}P < 0.05$. $^{**}P < 0.01$. $^{***}P < 0.001$.

Table 1. Mean, standard deviations and correlations among variables (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Age	5.71	1.98	1.00										
2.	Gender	0.49	0.50	-.28**	1.00									
3.	% of employment	2.87	0.62	-.00	-.33**	1.00								
4.	Years since certification	3.80	1.78	.80**	-.22**	-.06	1.00							
5.	Training days	2.45	1.18	-.16**	-.09**	.17**	-.22**	1.00						
6.	Academic hospital	0.13	0.34	-.02	.03	-.04	-.07*	.04	1.00					
7.	Anesthesiology residents	0.46	0.50	-.12**	.05	.03	-.11**	.03	.40**	1.00				
8.	Sickness absence	0.70	0.04	.06	.04	-.04	.02	-.03	-.02	-.04	1.00			
9.	General health	4.11	0.68	-.08*	-.02	.05	-.06	.04	.01	-.01	-.05	1.00		
10.	Work climate	4.14	0.85	-.07*	-.02	.12**	-.08*	.17**	-.04	.05	-.03	.20**	1.00	
11.	Job satisfaction	2.79	0.55	-.01	.01	.01	-.01	.06	-.04	.11**	-.01	.17**	.50**	1.00

n = 882, significant correlation at level $^{*}P < 0.05$. $^{**}P < 0.01$

Age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10); Gender: men (0), women (1); % of Employment: < 50 (1), 50-75 (2), 75-100 (3), > 100 (4); Certification (years): < 1 (1), 1-5 (2), 6-10 (3), 11-15 (4), 16-20 (5), > 20 (6); Trainings Days Per Five Years (days): 0-5 (1), 6-10 (2), 11-15 (3), more than 15 (4); Academic Hospital: yes (1), no (0); Anesthesiology Residents: yes (1), no (0); and Job Satisfaction: 1 = totally disagree, 2 = disagree, 3 = agree and 4 = totally agree.

Table 3 Mean, standard deviations and correlations controlled for 'training days', '% of employment', 'general health', and ' sickness absenteeism' among work climate variables and job satisfaction (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.	Expectations	5.81	1.05	1.00												
2.	Instruments & Tools	5.22	1.02	.36***	1.00											
3.	Best in	4.62	1.05	.35***	.51***	1.00										
4.	Recognition	3.38	1.37	.12***	.28***	.37***	1.00									
5.	Appreciation	4.17	1.53	.22***	.31***	.37***	.49***	1.00								
6.	Encourage Development	3.59	1.52	.10**	.23***	.30***	.52***	.60***	1.00							
7.	Opinion	4.10	1.40	.21***	.29***	.34***	.42***	.63***	.58***	1.00						
8.	Mission Statement	3.37	1.41	.11**	.26***	.31***	.41***	.45***	.48***	.50***	1.00					
9.	Quality Work	4.63	1.24	.24***	.26***	.33***	.25***	.31***	.30***	.32***	.29***	1.00				
10.	Best Friend	3.94	1.75	.10**	.13***	.16***	.14***	.13***	.10**	.13***	.14***	.18***	1.00			
11.	Progress	3.28	1.75	-.01	.09*	.14***	.36***	.33***	.46***	.31***	.28***	.20***	.24***	1.00		
12.	Learning & Growing	3.57	1.46	.09**	.31***	.31***	.47***	.42***	.64***	.42***	.43***	.34***	.13***	.49***	1.00	
13.	Job Satisfaction Total	2.79	.55	.14***	.31***	.36***	.36***	.37***	.38***	.37***	.32***	.29***	.11**	.18***	.37***	1.00

n = 882, significant correlation at level $^{*}P < 0.05$, $^{**}P < 0$ .01, $^{***}P < 0$ .001.

Discussion

This study demonstrated a positive relationship between work climate and job satisfaction among Dutch nurse anaesthetists. The importance of a positive work climate has been demonstrated previously in studies showing that work climate has a high correlation with performance,[15,16] as well as job turnover (intention).[6,10,11,29]

Higher levels of job satisfaction can be achieved when work climate characteristics that have a high correlation for job satisfaction are frequently present (mean work climate value $\geq$ 4). In this study, five work climate characteristics ('recognition', 'encourage development', 'mission statement', 'progress' and 'learning & growing') showed a relatively high correlation with job satisfaction, but a mean work climate value below four. By focusing on these five characteristics, there is potential to increase the job satisfaction among Dutch nurse anaesthetists.

In our study, the work climate characteristic "receiving frequent recognition or praise for delivered work" had a mean value of 3.38. Other studies found "lack of recognition" a contributory factor for low levels of job satisfaction.[17,30,31] In our study, a lack of recognition, work climate characteristic number 4 (Appendix I), can be due to several reasons, some of which may be very specific but not strictly exclusive to Dutch nurse anaesthetists: 1) the general public is not very familiar with the nurse anaesthetist profession; 2) nurse anaesthetists have little interaction with other healthcare professionals because they perform their duties within the compound of an operating theatre complex which is not accessible to many care providers; and 3) there is lack of legal back-up and recognition.

The inclusion of the work of nurse anaesthetists in the organisation's mission statement is known to give them the feeling that their role is important.[21,32] However, this work climate characteristic had only a mean value of 3.37 in our study. Our questionnaire did not include questions about acknowledging the work of nurse anaesthetists in the hospital's mission statements. A low mean score either indicates that there is limited communication within the organisation, or there are few nurse anaesthetists and their work is not recognized as being important enough to be included in the organisation's mission statement. Several studies stress the importance of the organisation's support,[30,31] supportive leadership and teamwork,[4] and feelings of belongingness and identity,[4] for maintaining a positive work climate.

The work climate characteristic "possibilities to discuss progress at work" had a mean value of 3.28, and can be compared to feedback. This could be indicative of the fact that nurse anaesthetists perform their work somewhat solo, and cannot oversee the total

patient care process in the hospital. Feedback about their performance is possible via the anaesthesiologist, and by audit results and postoperative care data, e.g. pain, nausea and complication levels. In the Dutch system, this feedback has limitations because an anaesthesiologist is not always physically present in the room during the maintenance of anaesthesia, and postoperative indicators are not always available. In the "Job Characteristics model", Hackman and Oldham[23] described the essence of structuring the work in order to achieve high internal motivation, high job satisfaction and high work effectiveness. A core job characteristic necessary to reach this stage is, for example, feedback from the job that provides nurse anaesthetists with information about the actual results of their work activities. Feedback functions also as one of the core resources for handling stress.[33] Further research is required to determine which kind of feedback is required and is of specific value to a nurse anaesthetist.

Work stress models like the Demand & Control model of Karasek (1979),[34] and the extended version Demand & Resources model described by Demerouti,[35] have expressed the importance of decision latitude, which has to do with using one's acquired knowledge and skills, and with being allowed to make a decision. Eisenberger et al.,[36] via their General Interest Theory (GIT), related the importance to work climate of decision latitude using skills and knowledge. They stated that intrinsic motivation is increased if a work climate is created which contains tasks (content and context) that are relevant for the needs, wants and desires of the employee. A lack of decision latitude will void this internal motivation which is often measured as job satisfaction.[32]

The low mean scores of the characteristics "encourage development" and "opportunities to learn and to grow" (resp. 3.59 and 3.57) can possibly be explained by the limited career opportunities. This is especially the case if a Dutch nurse anaesthetist has no nursing degree. The latter is not an absolute requirement in The Netherlands, as it is possible to go directly from senior high school to a 3-year bachelor course to become a nurse anaesthetist. However, the only alternate career opportunities for these nurse anaesthetists are in management, education and business sales.

Any limitation of future career development, often referred to as job insecurity, is one of the stress-related risks.[8,9,35] Many studies support the relationship between job satisfaction and job development,[30,31,37] decision latitude and the challenging aspects of the job.[10,16] These work climate characteristics are comparable to some job resources (to stimulate personal growth, learning, and development),[8,9] which are crucial for increasing job satisfaction.[20,34,38,39] Further studies are necessary to determine the relationship between work climate, job resources and demands.

Some studies have found a significant difference between the work climate of physicians and nurses working in a Quality Certificate Accredited (QCA) hospital.[5,11,40] Nurse anaesthetists working in QCA hospitals evaluated their work climate more often in positive terms. In our study, "quality" is one of the work climate characteristics that determine job satisfaction. Our questionnaire did not contain questions to establish a relationship between work climate and accreditation of hospitals.

The work climate characteristic "instruments & tools", including information, materials and environmental space, played a significant role in job satisfaction. According to others, safety and information in particular play key roles in anaesthesia. Providing the necessary information will decrease the number of (medical) errors, and consequently increase the safety climate.[41] The sharing of information between nurse anaesthetists and anaesthesiologists increases job satisfaction and team effectiveness.[4,41,42] However, the relationship between safety and job satisfaction is not fully established. As stress models show, an increase in safety results in a decrease of stress.[8] This would mean that safety acts as a stress factor and not as a resource that buffers stress by increasing job satisfaction. Further study is necessary to determine the relationship and causality between safety climate (e.g. information), job satisfaction and stress.

A small but significant negative correlation was found between age and work climate, but there was no correlation with gender. Other studies about work climate do not show relationships to age or gender.[28] In this study, several control variables -- sickness absence, perceived general health, type of hospital and presence of anesthesiology residents -- were used. Several studies found that companies with a more positive work climate had reduced absenteeism.[21,43] This was not confirmed in our study, although perceived general health was significantly positively related to work climate and job satisfaction.

Well known is the relationship between stress (and thus health) and the work environment. Kristof et al.[44] introduced the term "Fit for the Job", which was defined as a match of perceptions of work environment, personal competence, well being and standards (organisational). Different types of Person-Environment fits were described, including a fit between person and job, organisation and group. PE fit did influence job satisfaction, organisational commitment, turnover intention, well-being and performance. Maybe this explains the role of sickness absenteeism and perceived general health on the relationship of work climate and job satisfaction.

This study has several limitations: 1) Our study has a cross-sectional self-report design. Therefore conclusions about causality cannot be drawn, and levels of work climate and job satisfaction cannot be explained; 2) Work climate was measured through self-

reports, which are subject to a number of biases; 3) Transient mood states and personality traits can interfere with outcome measures because they interact with perceptions of one's own work approach and environment;[13,45] 4) Nurse anaesthetists who suffer from strain or burnout are likely to produce reduced turnover.[6,46] This self-selection process allows comparatively satisfied nurse anaesthetists to remain in the job, whereas those who changed jobs (and occupations) were less satisfied. This bias effect is called the 'survivor effect'; 5) The role of these variables on the relationship between work climate and job satisfaction was no part of this study. Nevertheless, it would be interesting to explore the possible interaction on the relationship between work climate and job satisfaction; 6) The response rate of this study (46%) was low compared to a clinical trial, and one can debate whether the perceptions reported in this study reflect those of the total population. However, this response rate is comparable to the 38-53% response rates found in other anonymous multisite surveys of hospital-based nursing personnel.[11] Possible reasons for nurse anaesthetists not responding were conveyed by the supervisors of the anaesthesia departments, and included the following: not interested, questions too personal, and no time.

In conclusion, this study measured the relationship between work climate and job satisfaction among Dutch nurse anaesthetists. The work climate questionnaire was focused on perceiving the maximal job satisfaction and productivity of nurse anaesthetists. As such, work climate can be seen as an indicator for how well the organisation is realizing the full potential of its employees.

Many of our work climate characteristics are analogous with those job resources that play an important role in preventing burnout and increasing job satisfaction. For an organisation to strive for a higher level of job satisfaction among its nurse anaesthetists, it is necessary to influence the essential work climate characteristics. Support from supervisors (head nurse anaesthetists) can be helpful in creating a positive work climate, and ultimately a higher level of job satisfaction, by adjusting negative perceptions.

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Various studies have shown that no single criterion of class, gender or wealth is as important as the number of social relationships a person has for happiness

Published as:

Meeusen V[1], Van Dam K[2], Brown-Mahoney C[3], Van Zundert A[1], Knape H[4]. Burnout, psychosomatic symptoms and job satisfaction among Dutch nurse anaesthetists. Acta Anaesthesiol. Scand 2010;54:616-621.

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Chapter 8

Burnout, psychosomatic symptoms and job satisfaction among Dutch nurse anaesthetists: a survey

Abstract

Background. To meet the increasing demand for healthcare providers, it is crucial to recruit and retain more nurse anaesthetists (NAs). The majority of NAs in the Netherlands are more than 45 years old, and retaining them in their jobs is very important.

Aim. This study investigates the relationships between burnout, physical health and job satisfaction among Dutch NAs.

Methods. Two thousand NAs working in Dutch hospitals were invited to participate in this online questionnaire. We tested the relationships between burnout, psychosomatic symptoms, sickness absence, perceived general health and job satisfaction.

Results. Nine hundred and twenty-three questionnaires were completed and analyzed (46% response rate). Burnout and psychosomatic symptoms were negatively associated with job satisfaction, and predicted 27% of job satisfaction. Perceived general health was positively and sickness absence was negatively related to job satisfaction. Older NAs had a higher incidence of burnout than their younger counterparts.

Conclusions. The results confirmed the importance of a healthy psychosocial work environment for promoting job satisfaction. To prevent burnout, further research is necessary to determine the factors causing stress. These findings may also apply to anaesthesiologists who share many tasks and work in close cooperation with NAs.

Introduction

An increasing shortage of anaesthesia professionals is expected in Europe in the next decade. This is due to a high retirement rate and to increasing demands from an aging population. It is therefore important to focus on job satisfaction in anaesthesia to be able to retain experienced anaesthesia personnel.

The role of the nurse anaesthetist (NA) can be stressful because they are repeatedly confronted with changing patient needs, medical problems and suffering, while dealing with demands from surgeons, supervising anaesthesiologists and their hierarchical supervisors.[1,2]

Burnout often occurs among younger (age < 30 years) and less experienced employees, possibly due to 'reality shock' or 'early career burnout', caused by a lack of job experience or by facing the harsh realities.[3] Burnout is a work related psychological syndrome in response to chronic job stress, characterized by feelings of emptiness, fatigue, exhaustion, physical symptoms and an increased incidence of sickness absence.[4-7]. Longstanding stress at work can adversely affect physical and mental health, and is associated with e.g. muscular strains and injuries,[8] cardiovascular diseases,[8-11] and drug or alcohol abuse culminating in suicide.[12,13] Although causality is not yet found, higher mortality rates[14] and suicidality or suicide rates among anaesthesiologists[12,13,15] were reported in several studies, whereas others found equal mortality rates.[16-18]

In this study, we examined stress related symptoms and job satisfaction in NAs working in Dutch hospitals. We hypothesized that burnout and psychosomatic symptoms are positively related to each other but negatively related to job satisfaction. Second, we hypothesized that sickness absence was negatively related to job satisfaction, while perceived general health was positively related to job satisfaction. The third hypothesis in this study was that younger or recently qualified NAs had higher levels of burnout compared to their older and more experienced colleagues.

Methods

After Medical Ethical Committee approval (Catharina Hospital, Eindhoven, The Netherlands) the study was launched in January 2007, at the annual National Congress of Dutch Nurse Anaesthetists Society (NVAM). All congress participants received an invitation to complete the online questionnaire anonymously. During that same week, NVAM members received an invitation to participate in the study. Written information was

also sent to the head nurses of all Dutch hospitals employing NAs, asking them to encourage participation of the study.

Instruments

In the questionnaire, we acquired information about the following: job satisfaction, psychosomatic symptoms, burnout, sickness absence and perceived general health. We recorded demographic information such as age, gender, numbers of years practising anaesthesia since certification, percentage of employment (full-part-time), and if they are working in academic hospital (type of hospital), and with anaesthesia residents.

Burnout was measured using the Dutch version of the MBI (Maslach Burnout Inventory), developed in 1986,[19] which is judged to be a very reliable tool.[4,5,20] The questionnaire consisted of 16 items, with 3 subscales measuring the dimensions emotional exhaustion (feelings of being overextended and depleted), depersonalisation (indifferent attitude towards one's service or care) and professional accomplishment.[4,5] Items were work-related, and rated on a 7-point Likert scale ranging from 'never' (1) to 'always' (7). The burnout dimension 'accomplishment' was measured on a positive scale, and was reversed for statistical analyses. Global burnout resulted in the enumeration of the three subscales.[20]

Psychosomatic symptoms were measured with the 'Permanent Onderzoek LeefSituatie' (Permanent study of living conditions) (POLS) questionnaire, developed in 1997 and used by the Dutch government for longitudinal studies. Participants were asked about seven symptoms: gloom, anxiety, headache, fatigue, sleeplessness, back pain, and joint/muscle pain (yes=1 and no=0). They also were asked about their incidence of sickness absence during the previous year, and to rate their perceived general health on a 5-point scale: (1=very bad through 5=very good). Self-rated health has also been used in other studies.[1,21]

In this study we measure the overall attitude towards job satisfaction which can be described as a global feeling about the job.[22] Job satisfaction was measured three ways -- satisfaction with the job, the organization and the department's atmosphere -- on a 4-point scale (1=totally disagree, 2=disagree, 3=agree and 4=totally agree). Previous studies support the usefulness of global measurements in single-shot surveys.[1,23]

Statistical analysis

The reliability of the measurement model was analysed using factor analysis (SPSS 16.0 system, SPSS Inc, Chicago, Ill, USA). Principal Axis factoring with oblimin rotation (eigenvalues > 1) resulted in the following six factors: exhaustion (α = 0.86), accomplishment (α = 0.77), depersonalization (α = 0.67); physical symptoms (α = 0.60), mental symptoms (α = 0.63); and satisfaction factor (α = 0.72), in combination explaining 43.4% of the variance of the model. The variable global burnout had an alpha score of 0.86. We performed a hierarchical multiple regression analysis to determine the predictive value of global burnout and psychosomatic symptoms for job satisfaction. Results with a significance level ≤ 0.05 were deemed significant.

Results

Demographic information

Out of 2,000 Dutch NAs working in The Netherlands, 923 filled out the questionnaire (46% response rate). Forty-one failed to complete it entirely and were excluded from further study. Analysis was done on the 882 completed responses (male:female = 451:431). Characteristics of the participants are shown in Table 1. Three items -- percentage of employment, whether they worked in an academic hospital, and the presence of anaesthesia residents -- were not related to burnout, psychosomatic symptoms or job satisfaction.

Table 1. Characteristics of participants.

Age years (%)	Certification years (%)	Sickness absence days / months (%)	Psychosomatic symptoms N (%)
< 20 (0.5)	< 1 (12.4)	None (53.4)	0 (27.4)
20-24 (4.1)	1-5 (18.9)	1-6 days (34.7)	1 (18.7)
25-29 (13.5)	6-10 (12.5)	7-14 days (5.9)	2 (19.8)
30-34 (12.1)	11-15 (15.5)	15-28 days (3.2)	3 (13.7)
35-39 (13.7)	16-20 (14.1)	1-2 months (0.9)	4 (11.7)
40-44 (15.0)	> 20 (26.6)	2-7 months (1.2)	> 5 (7.7)
45-49 (21.2)		< 7 months (0.7)	
50-54 (13.7)			
55-59 (5.4)			
> 60 (0.8)			

Hypothesis one was confirmed: global burnout (r = -.50, $P < 0.01$), physical (r = -.11, $P < 0.01$) and mental health (r = -.28, $P < 0.01$) symptoms, were negatively associated with job satisfaction. Global burnout, and physical and mental health symptoms associated positively with each other (Table 2).

The presumed negative relationship (hypothesis two) between sickness absence and job satisfaction (r = -.21, $P < 0.01$), and the positive relationship between perceived general health and job satisfaction (r =.17, $P < 0.01$), could be confirmed (Table 2). This study showed two or more psychosomatic symptoms in more than 50% of the NAs (Table 1). The total number of psychosomatic symptoms was higher among females, who had a significantly higher incidence of headache (38.1% vs. 22.6%, $P < 0.001$), fatigue (55.2% vs. 44.1%, $P < 0.01$), backache (43.2% vs. 28.4%, $P < 0.001$) and muscular pain (39.9% vs. 30.6%, $P < 0.05$).

Confirmation of hypothesis three, that the incidence of burnout was higher among younger or recently-qualified NAs could not be found. A significantly positive relationship was demonstrated between age and burnout (r =.07, $P < 0.05$), which was due to depersonalization (r =.16, $P < 0.01$) and exhaustion (r =.10, $P < 0.01$). Physical and mental health symptoms were not age-related. In the hierarchical regression analysis predictive value of global burnout, physical and mental symptoms for job satisfaction with sequential adjustment for potential confounders and mediators were analyzed (Table 3). The type of hospital, and the presence of anaesthesia residents in the hospital, predicted 2% of the variance in job satisfaction (resp. $\beta = -.10$ and $\beta = .15$) in model 1. The number of years since certification or the status of being a student did not show any predictive value for job satisfaction. In model 2, 7% of the variance was predicted by sickness absence and perceived general health. Finally in model 3, 27% of the variance in job satisfaction was predicted by global burnout. Mental and physical symptoms played no role in predicting job satisfaction. In model 3 sickness absence lost its significance almost completely and perceived general health totally.

Table 3. Hierarchical multiple regression analysis to determine the predictive value of global burnout and psychosomatic symptoms for job satisfaction.

Variable	model 1 β	model 2 β	model 3 β
Academic hospital	-.10**	-.11**	-.09**
Anaesthesia residents	.15***	.14***	.12***
Sickness absence		-.17***	-.07*
Perceived general health		.13***	-.03
Physical symptoms			.01
Mental symptoms			-.04
Global burnout			-.47***
Adjusted R^2	.02	.07	.27
F(df/df)	9.25 (2/879)	17.83 (4/877)	47.10 (7/874)

n = 882, $^{*}P < 0.05$. $^{**}P < 0.01$. $^{***}P < 0.001$. Values in the tables are standardized beta values (β).

Each model includes the variables from the preceding model so that the final model, model 3, includes all the variables listed in this table. Model 1 predicted 2% of the variance in job satisfaction in model 1. Model 2 predicted 7% of the variance, and finally, in model 3, 27% of the variance in job satisfaction was predicted by global burnout.

Table 2. Mutual associations of the different variables among 882 participants. Mean, standard deviations and correlation coefficients (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	Age[1]	5.71	1.98	1.00											
2.	Gender[2]	.49	.50	-.28**	1.00										
3.	Certification[3]	3.80	1.78	.80**	-.22**	1.00									
4.	Sickness absence[4]	1.70	1.04	.05	.02	.02	1.00								
5.	Perceived general health	4.11	.68	-.08*	-.02	-.06	-.26**	1.00							
6.	Exhaustion	2.21	.81	.10**	.01	.10**	.29**	-.37**	1.00						
7.	Depersonalization	2.69	.95	.16**	-.08*	.21**	.19**	-.19**	.59**	1.00					
8.	Accomplishment	3.36	.85	-.06	.12**	-.06	.17**	-.28**	.40**	.34**	1.00				
9.	Global burnout	2.76	.68	.07*	.03	.09**	.27**	-.36**	.84**	.77**	.76**	1.00			
10.	Physical symptoms	.37	.42	-.03	.15**	-.05	.10**	-.19**	.27**	.12**	.11**	.21**	1.00		
11.	Mental symptoms	.24	.21	-.04	.10**	-.02	.24**	-.34**	.54**	.29**	.32**	.49**	.33**	1.00	
12.	Job satisfaction	2.79	.55	-.01	.01	-.01	-.21**	.17**	-.38**	-.43**	-.39**	-.50**	-.11**	-.28**	1.00

n = 882, significant correlation at level $^{*}P < 0.05$. $^{**}P < 0.01$.

[1] Age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10); [2] Gender: male (0), female (1); [3] Certification: numbers of years practising anaesthesia since certification: < 1 (1), 1-5 (2), 6-10 (3), 11-15 (4), 16-20 (5), > 20 (6); [4] Sickness absence during the previous year: 0 days (0), 1-6 days (1), 7-14 days (2), 15-28 days (3), 1-2 months (4), 2-7 months (5) and more than 7 months (6).

Discussion

The main findings of the study were that (a) burnout and psychosomatic symptoms were negatively associated with job satisfaction; (b) burnout predicted 27% of job satisfaction among Dutch NAs; (c) perceived general health was positively and sickness absence was negatively related to job satisfaction; (d) older NAs had a higher incidence of burnout than their younger counterparts.

The relationship in our study, between global burnout and psychosomatic symptoms, and their negative association with job satisfaction, corresponded to the results among other health care providers,[1,21,24] although some authors could not confirm this.[25,26] The negative association between burnout and job satisfaction in our study (β = -0.47) clearly matched with previously published studies, ranging from β = -0.40 to -0.52.[3,24,26] We also found a very strong association between global burnout and the burnout dimension 'exhaustion' which is considered the 'essence' of burnout.[1,4-7]

This study shows mainly short term sickness absence, which is considered as a type of coping behaviour used in situations where a longer recovery period is needed as e.g. in cases of stress.[9,27-29] Due to these higher level of stress, NAs may be less effective at work and consequently experience decreased job satisfaction.[3] Several studies contend that the level of job satisfaction is a predictor for long term sickness absence.[30,31]

We found two or more psychosomatic symptoms in more than 50% of the NAs, which is substantially higher than among employees in the general public (8%-10%). This corresponds to the results of Meretoja who found severe side-effects (e.g. cardiovascular diseases, metabolic disorders) among anaesthesiologist when working night shifts.[32] The higher incidence of psychosomatic symptoms in females in our study conforms to data from others,[27,33] and can be explained by the combination of outside employment and family responsibilities among females,[21,33] and their higher sensitivity to internal, physical sensations.[33]

The relationship between age and stress levels varies widely, from no relationship[33,34] to higher stress levels in young physicians and nurses.[25,35-37] We could not find signs of a 'reality shock'. This may be due to the low number of student participants (8.8%), although the number of recently certified NAs was sufficient to draw conclusions (certification < 5 yrs = 31.3%; < 1 yr = 13.8%). In our study, age related significantly to exhaustion and depersonalization. It is possible that older employees experience insufficient recovery time, inducing emotional exhaustion.[6,7] Interesting is the finding that this exhaustion did not correlate to the percentage of employment or sickness absence. This could mean that only the duration of the working day is important. We did not evaluate this

relationship. The relation between age and depersonalization can possibly be explained by the limited career options for Dutch NAs. After spending many years as NAs, employees may feel the job lacks variety and opportunities for personal growth.[31,38] Although Dutch NAs always work under (indirect) supervision of an anaesthesiologist, the supplemental presence of and cooperation with anaesthesia residents was positively associated with job satisfaction, as it likely increases the opportunities for postgraduate training and professionally discussion.

Although causality may be different (e.g. decision latitude, hierarchical and social relations, roles),[39] the associations found in this study correlate to the findings among anaesthesiologists.[12,21,24,25,34,35,40-42] Among anaesthesiologists high stress levels were related to low social support, on-call related stress (sleep deprivation and physical fatigue),[12,15,32,34,35] and the lack of autonomy (work pace and participation).[24] Lindfors et al.[21] found job control as a mean factor for job satisfaction, although for women mental health and for men organizational justice also were correlated to job satisfaction.

This study had several limitations. First, since it had a cross-sectional self-report design, we cannot draw conclusions about causality and levels of burnout and physical and mental health problems. Self reports are subject to bias: transient mood states and personality traits can interfere with outcome measures,[43,44] because they interact with one's perceptions. Employees who suffer from strain or burnout are likely to have higher rates of job turnover.[3,6] This self-selection process allows comparatively healthy employees to remain in jobs. The response rate of this study (46%) was low compared to a clinical trial, and one can debate whether the perceptions reported in this study reflect those of the total population. However, this response rate is comparable to the 38%-53% response rates found in other anonymous multisite surveys of hospital-based nursing personnel;[45] We attempted to discover the possible reasons for the low response rate by asking the supervisors of anaesthesia departments, and the following reasons were given: no computer available, not interested, questions were too personal and no time.

In conclusion, the association between job satisfaction and burnout and psychosocial symptoms among Dutch NAs has been identified in this study. Burnout even predicted job satisfaction by 27%. Our results confirm the importance of a healthy psychosocial work environment for promoting higher levels of job satisfaction. A high degree of job satisfaction is an important drive for NAs to participate in the health care job market, which is very important against the background of existing and increasing shortage of personnel. These findings may also apply to anaesthesiologists who share many tasks and work in close cooperation with NA. Further research is essential to determine the specific interaction between sickness absence, perceived general health and job satisfaction

that might shed light on the causes of burnout, and how they relate to job satisfaction among NAs.

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Appendix I: Work climate questionnaire according to the twelve elements of the Gallup Institute.

Rate the following questions between 1(never) and 7 (always)		**1**	**2**	**3**	**4**	**5**	**6**	**7**
1.	I know what my chief expects from me at work.	☐	☐	☐	☐	☐	☐	☐
2.	I have all the tools and materials to do my job optimally.	☐	☐	☐	☐	☐	☐	☐
3.	I can do that which I'm best at in my daily job.	☐	☐	☐	☐	☐	☐	☐
4.	I received recognition or praise for delivered work during the last week.	☐	☐	☐	☐	☐	☐	☐
5.	My chief appreciates me as a person	☐	☐	☐	☐	☐	☐	☐
6.	My development is encouraged.	☐	☐	☐	☐	☐	☐	☐
7.	My opinion does count at work.	☐	☐	☐	☐	☐	☐	☐
8.	The hospital's mission statement gives me the feeling that my job is important.	☐	☐	☐	☐	☐	☐	☐
9.	My colleagues are eager to deliver quality at work.	☐	☐	☐	☐	☐	☐	☐
10.	I have a "best friend" at work.	☐	☐	☐	☐	☐	☐	☐
11.	I talked to someone during the last 6 months regarding my progression at work.	☐	☐	☐	☐	☐	☐	☐
12.	My work provides me with sufficient opportunities to learn and grow.	☐	☐	☐	☐	☐	☐	☐

It does require maturity to realize that models are to be used, not to be believed

Henry Theil (1924-2000)

Published as:

Meeusen V[1], Van Dam K[2], Brown-Mahoney C[3], Van Zundert A[1], Knape H[4]. Understanding nurse anaesthetists' intention to leave their job: how burnout and job satisfaction mediate the impact of personality and workplace characteristics. Health Care Manage Rev 2011;36:1.

First prize Best Free Paper Communication Award, World Congres of Nurse Anaesthetists (WCNA), The Hague June, 2010. Meeusen V. Specific predictors for job turnover intention.

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Chapter 9

Understanding nurse anaesthetists' intention to leave their job: how burnout and job satisfaction mediate the impact of personality and workplace characteristics

Abstract

Background. The retention of nurse anaesthetists is of paramount importance, particularly in view of the fact that the health care workforce is shrinking. Although many health care providers find their work satisfying, they often consider leaving their jobs due to the stress. Are there ways to improve this situation?

Aim. This study investigated how work environment characteristics and personality dimensions relate to burnout and job satisfaction, and ultimately to turnover intention, amongst Dutch nurse anaesthetists.

Methods. An online self-reporting questionnaire survey was performed among Dutch nurse anaesthetists. The questionnaire included scales to assess personality dimensions, work climate, work context factors, burnout, job satisfaction and turnover intention. The research model stated that personality dimensions, work climate and work context factors, mediated by burnout and job satisfaction, predict turnover intention. Structural equation modeling (SEM) was used to test the research model.

Results. Nine hundred and twenty-three questionnaires were completed (46% response rate). Burnout mediated the relationship between personality dimensions and turnover intention; job satisfaction mediated the relationship of work climate and work context factors to turnover intention.

Conclusion. To retain nursing staff and maintain adequate staff strength, it is important to improve job satisfaction by creating a positive work climate and work context, and to prevent burnout by selecting the most suitable employees through personality assessment.

Key words: nurse anaesthetists, burnout, job satisfaction, job turnover intention.

Introduction

Understanding the causes of nurse anaesthetists turnover is especially important in the light of a tight labour market. Most Western countries experience a serious lack of (specialized) nurses that participate at the labour market. In the Netherlands, hospitals are confronted with significant shortages of staff nurse anaesthetists, which has led to increased dependence on employing agency nurse anaesthetists who are much more costly. As the Dutch government notes, the shortage of nurse anaesthetist is becoming worse and radical measures are necessary to solve this problem. Reducing the rate at which nurses voluntarily leave their workplace can be one of the successful solutions on short term notice and might continue to be effective in the long run.

There is evidence that nurse turnover is related to high levels of job dissatisfaction and job-related burnout.[1] Previous investigations of nurses' work environment indicates that burdensome workloads, insufficient social support, and an aversive work climate are some of the factors that have been found to lower nurses' satisfaction with the work situation.[2] Associated with this decrease in job satisfaction is a correspondent increase in perceived levels of stress and burnout,[3] which may contribute to nurses' turnover intention.

In addition to work environment characteristics as predictors of job satisfaction, burnout, and turnover intention, there is also evidence that individual characteristics may contribute to these work outcomes. Several personality traits have been related to job satisfaction and burnout.[4,5] Because the work situation of nurse anaesthetists is complex, both workplace attributes and personal characteristics are likely to affect job satisfaction and burnout levels. Few studies have focused on the combined influence of work-related and personal characteristics on nurses' turnover intention. Moreover, because very little research on the group of nurse anaesthetists' specifically is done, our current understanding of why nurse anaesthetists leave their job is still limited.

The purpose of the present study was to examine the processes underlying nurse anaesthetists' intentions to leave their job. More specific, it was our goal to examine characteristics of the daily work environment and personality dimensions as potential antecedents of these nurses' turnover intentions, and investigate whether job satisfaction and burnout mediate the relationships of these characteristics with nurse anaesthetists' turnover intention. A better understanding of nurses' turnover intentions contributes to theoretical insights concerning the combined impact of personal and work-related characteristics. Additionally, a greater understanding of the process underlying nurse anaesthetists' intentions to leave their job is essential if hospitals are to meet patient needs in the future. Based on this knowledge, interventions, such as workplace transformations

and selection procedures, may be developed aimed at increasing job satisfaction and decreasing burnout-levels. Figure 10 presents the theoretical model tested in this investigation.

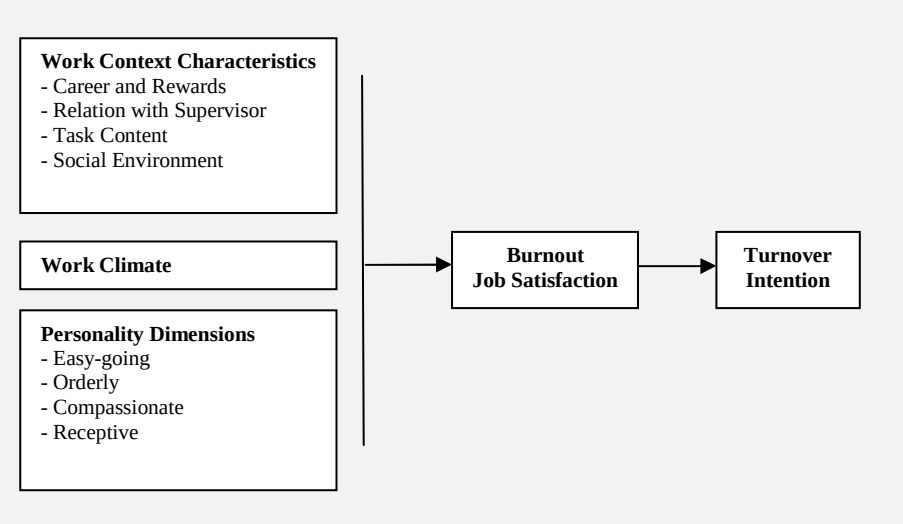

Figure 1: Research model used in this study.

Conceptual framework

Job satisfaction, burnout and turnover intention

Nursing turnover is usually associated with a range of negative outcomes, such as increased costs owing to hiring and training new nurses, decreased patient care, empty beds, and increased workload for those who remain on the job.[1] Turnover has been conceptualized as the result of an individual's decision making process. Based on an evaluation of organizational and work-related features and perceived alternatives, the individual will develop an intention to leave the job or organization before actually leaving the work situation.[6] Since turnover intention has been found to be a strong antecedent of actual turnover behaviour, studying the precursors of nurse anaesthetists' turnover intention will inevitably provide information about these nurses' reasons for leaving their job.[7]

Extant evidence indicates that turnover intention is related to job satisfaction.[6] Job (dis)satisfaction is usually defined as a negative or positive judgment regarding one's job situation.[8] Job satisfaction is one of the most important and well-researched work attitudes

in organizational behaviour because it has the potential to affect a wide range of organizational behaviours and outcomes including turnover and turnover intention.[9] Similarly, a meta-analytic study of nurse turnover has shown that nurses' satisfaction with their work situation was related to their intention to leave the job.[10]

Burnout is considered another precursor of nurses' intention to leave their job. Burnout is a state of persistent exhaustion which is characterized by emotional exhaustion (a feeling of being 'empty' or 'worn out'), disengagement from work, and reduced competence.[11] Burnout is generally considered to develop in response to chronic, and - often interpersonal - stressors at work. Whereas a severe burnout is usually associated with an inability to work owing to physical and psychological complaints, employees at work might be experiencing burnout symptoms to a lesser degree. We argue that employees who feel exhausted might consider leaving their work situation in order to disengage from work. Although the relationship between burnout and turnover intentions has not been explored in any great depth, some studies have provided empirical evidence for its existence. A meta-analytic study by Lee and Ashforth showed that emotional exhaustion and work engagement were positively related to turnover intention.[12] Concerning the nursing profession, Firth and Britton observed that burnout was related to increased absenteeism and turnover among British nursing staff.[13] Similarly, Williams et al. noticed a positive relationship between physicians' intentions to leave direct patient care and a measure for mental health which included burnout. Based on theoretical and empirical evidence, the following hypotheses are proposed:

H_1: Job satisfaction is negatively related to job turnover intention.

H_2: Burnout is positively related to job turnover intention.

Work Context Characteristics

Job satisfaction and burnout, in turn, are considered to result from work context characteristics. Previous studies have demonstrated that nurses' job satisfaction is predicted by a large array of work place characteristics which fall into a limited number of categories.[2,15] A first category of predictors relates to characteristics of the job, with autonomy, participation, challenge, and job responsibilities as examples of characteristics that are generally positively related to job satisfaction, and routinization, role ambiguity, and role conflict as characteristics that are usually negatively related to job satisfaction. A second category of predictors pertains to the social work environment, such as co-worker support, communication, and friendships among co-workers. A third category refers to the supervisor, and includes supervisor support, leadership quality, and the relationship with the supervisor. Finally, a last category includes career related characteristics, such as career

and development opportunities, and pay. When these characteristics are perceived as more attractive, nurses will be more satisfied with their job, and less inclined to consider leaving their job.

These work characteristics have also been related to burnout. Job characteristics that require excessive effort or include emotional demands are associated with the build up of negative load effects, and have been found to result in burnout symptoms. Nurses' interpersonal work context is similarly important for nurses' health because it helps them to cope with demanding work conditions, including patient suffering, communicating with the patient's family, on-call shifts, and responsibility for patient's well-being.[16] In this environment, the relationship with one's supervisor is crucial as well. Previous studies have indeed observed how social support and the supervisor-nurse relationship are negatively related to burnout.[17] Finally, inadequate rewards, both financial and social, are associated with feelings of inefficacy, and may result in burnout., which occurs when people are not receiving salary or benefits commensurate with their achievements, or when one's hard work is ignored and not appreciated.[5,16] Based on these arguments, we hypnotized the following:

H_3: Task content is negatively related to burnout (H_{3a}) and positively related to job satisfaction (H_{3b}).

H_4: Social work context is negatively related to burnout (H_{4a}) and positively related to job satisfaction (H_{4b}).

H_5: Supervisor relationship is negatively related to burnout (H_{5a}) and positively related to job satisfaction (H_{5b}).

H_6: Reward is negatively related to burnout (H_{6a}) and positively related to job satisfaction (H_{6b}).

Work Climate

In addition to work characteristics, nurses' work climate was considered important. Although work climate has been defined in different ways, a number of studies have related nurses' work climate to their perceptions regarding the larger work environment.[1,17] In this study, work climate refers to the perceptions of nurse anaesthetists of how well the organization is realizing their full potential.[18] Already in the 1970s, the opportunity for growth came forward as an important determinant of employee job satisfaction.[19,20] Jobs with a high motivating potential often offered the opportunities for learning and using one's potentials. Hackman and Oldham observed how a positive work climate was related to job satisfaction, health and retention.[20] More recently, empirical research has confirmed the

importance of using employee potential, showing that work climate is strongly related to burnout and job satisfaction.[17] Consequently, the following hypothesis was developed:

H_7: Work climate is negatively related to burnout (H_{7a}) and positively related to job satisfaction (H_{7b}).

Personality

Work attitudes and behaviours are partly determined by relatively stable aspects of an individual's personality.[21] Personality, the enduring ways a person has of thinking, feeling and behaving, is an important determinant of how people perceive and react to their jobs.[9] Depending on their personality, employees may have a tendency to focus on positive or negative aspects of themselves and their environment, interpret stimuli more positively or negatively, experience less or more distress even in the absence of stressors, or distort information they receive more positively or negatively.[8]

The relationships of personality with job satisfaction, burnout and turnover intention have been examined in several studies. Liou for example found personality to be one of the predictors of turnover intention.[22] Several personality dimensions, such as negative affectivity,[23] neuroticism and introversion, and external locus of control,[21] are associated with lower levels of job satisfaction. Personality dimensions can influence job satisfaction by shaping one's interpretation of the environment, one's mood and subjective well-being.[23] Similarly, objective work stressors can have a negative influence on health when one's subjective perception of the environment elicits a stress reaction.[24] Significant differences in stress levels were related to personality dimensions. Personality dimensions such as Type A Behaviour, negative affectivity, and 'neuroticism' are all associated with a higher risk of burnout.[5,25,26] Four personality dimensions originating from the MBTI and comparable to four of the Big Five dimensions are used in this study: 'easy-going', 'orderly', 'compassionate', and 'receptive'. In the present study it was expected that nurses having one of these four dimensions would experience more job satisfaction and less burnout symptoms:

H_8: Personality (easy-going, orderly, compassionate, and receptive) is negatively related to burnout (H_{8a}) and positively related to job satisfaction (H_{8b}).

Methods

Sample and procedure

After approval by the Medical Ethical Committee of the Catharina Hospital in Eindhoven, The Netherlands, the study was launched at the annual Dutch national congress of nurse anaesthetists in January 2007. Every participant of the congress received an invitation to fill out the online questionnaire. In addition, a personal letter was sent to every member of the NVAM inviting participation in the study. All nurse anaesthetists working in Dutch hospitals and private clinics were asked to fill out the on-line multiple choice questionnaire covering the following items: work context, work climate, job satisfaction, burnout and personality dimensions. Data collection was ended three months later, in April 2007.

Measures

For the purpose of comparison with other studies, the following control variables were used: age, gender, percentage of employment (part-time or fulltime), irregular shift work (e.g. nights), the presence or absence of anaesthesiology residents, working in an academic hospital, the number of operating rooms in the department, the number of years practicing anaesthesia since certification, and the number of training days per five years.

Turnover Intention. Turnover intention was measured by asking whether respondents intended to leave their job (0 = no; 1 = yes) within the next two years.

Burnout. To measure burnout, the Maslach Burnout Inventory (MBI) was used.[27] The MBI has a stable factor structure within human service occupations across cultures, and is known to be a very reliable instrument.[28] We used the Dutch version, the MBI-DV (Maslach Burnout Inventory Dutch Version) which was validated by Schaufeli et al.[28] The questionnaire consisted of 16 items; answers could be made on a seven-point Likert scale ranging from ‘never’ (1) to ‘always’ (7). The internal reliability estimate (Cronbach’s alpha) of this scale was 86.

Job Satisfaction. Job satisfaction (α = .72) was measured with three items, referring to nurses’ satisfaction with the job, unit, and organization. A four-point response scale (1 = ‘totally disagree’, 2 = ‘disagree’, 3 = ‘agree’ and 4 = ‘totally agree’) was used.

Work Context Characteristics. For measuring work context characteristics, the TOMO (TOetsingslijst Mens and Organisatie) was used, developed by Van Orden and Gaillard.[29] The TOMO is specifically created for the Dutch market, and is considered one of the most complete and objective lists to evaluate aspects of the work environment. We adjusted the wording of the TOMO slightly, to make the questionnaire suitable for Dutch nurse anaesthetists. The questionnaire consisted of 26 items, and measures four work context characteristics: (i) task content (8 items, $\alpha = .76$) refers to the task responsibilities and skills that are part of the task; (ii) social environment (5 items, $\alpha = .69$) refers to interactions with and support of colleagues; (iii) supervisor relationship (6 items, $\alpha = .84$) relates to the participation and support of the supervisor; (iv) rewards relates to financial social rewards and development opportunities (7 items, $\alpha = .82$). Sample items included "possibilities to influence my career", "appreciation by my supervisor', "opportunities to solve my own problems" and "opportunities for informal contacts with others". Responses could be made on a five-point Likert scale ranging from 'never' (1) to 'always' (7).

Work Climate. Work climate was measured with a 12 item scale ($\alpha = .84$) developed by the Gallup Institute.[18] These items represent twelve factors which are derived from traditional motivational models such as the "Two Factor Theory" of Herzberg,[19] the "Job Characteristics Model",[20] and the "Revised Causal Model of Job Satisfaction".[15] Responses could be made on a seven-point Likert scale ranging from 'never' (1) to 'always' (7).

Personality. The Myers Briggs Type Indicator (MBTI) was used to measure the four personality dimensions,[30] with six items for each dimension. Easy going referred to spontaneous and social behaviour in contact with others ($\alpha = .75$); Orderly referred to planning and organizing work ($\alpha = .69$); Compassionate referred to feelings and harmony ($\alpha = .71$); and Receptive referred to an open and questioning posture ($\alpha = .72$). Responses could be made on a five point scale ranging from 'a lot' (1), 'a fair amount' (2), 'few' (3), 'very few' (4) to 'absent' (5).

Statistical Analyses

A structural equation analysis was performed to test all relationships simultaneously, and to provide a statistical test of the overall fit of the model. Multiple fit indices were used to assess the adequacy of the estimated model: the Tucker-Lewis index (TLI), the comparative-fit-index (CFI), and the root mean squared error of approximation (RMSEA). It is generally suggested that the TLI and CFI should exceed .90 or even .95 for the model to be considered a good fit. Similarly, a value of .60 or less for the RMSEA reflects a good

fit. These analyses were performed with the AMOS 6.0 software package; $P < 0.05$ was considered statistically significant.

Results

Out of 2,000 Dutch nurse anaesthetists, 923 answered the questionnaire (response rate of 46%), although 41 failed to complete it entirely and were excluded from further study. This study concentrates on the responses of 882 nurse anaesthetists (431 female and 451 male) who answered the questionnaire completely. The majority of the nurse anaesthetists were between the ages of 25 and 54 years (89.2%), with a peak in the age range of 45-49 years (21.2%). Forty-two percent of the sample had the intention to leave the job within the next two years.

Model Fit and Hypotheses Tests

Preliminary analyses showed that one of the control variables, age, was significantly related to turnover intention. Therefore, age was included in the analysis. Table 1 presents the means, standard deviations, intercorrelations, and reliabilities of the study variables. The hypothesised model showed a good fit: χ^2 (df = 12, N = 882) =30.39, $p < .01$; χ^2 / df = 2.53; CFI = .994; TLI = .960; RMSEA = .042 [RI = .023 - .060]. The standardised regression coefficients are presented in Table 2.

Burnout (β = .24, $P < 0.001$) and job satisfaction (β = -.28, $P < 0.001$) showed significant relationships with turnover intention. Therefore, Hypotheses 1 and 2 were supported. In turn, burnout was related to only one of the four work context characteristics, namely 'social environment' (β = -.18, $P < 0.001$). Therefore, Hypothesis 4a was supported, whereas Hypotheses 3a, 5a, and 6a were not supported. Burnout was significantly related to work climate (β = -.36, $P < 0.001$). As such, Hypothesis 7a was confirmed. Burnout was additionally related to three personality dimensions: 'easy going' (β = -.30, $P < 0.001$); 'compassion' (β = .13, $P < 0.001$); and 'receptive' (β = -.14, $P < 0.001$), which largely supports Hypothesis 8a. Together, these variables explained 40% of the variance in burnout.

Job satisfaction was significantly related to all four work context variables: 'task content' (β = .07, $P < 0.05$); 'social environment' (β = .13, $P < 0.001$); 'supervisor relationship' β = .30, $P < 0.001$); and, 'rewards' (β = .08, $P < 0.05$). Accordingly, Hypotheses 3b, 4b, 5b, and 6b were supported. Job satisfaction was also positively related to work climate (β = .19, $P < 0.001$), confirming Hypothesis 7b. Because job satisfaction

was related to only the personality factor 'easy going'(β = .08, $P < 0.05$), we considered Hypothesis 8b not supported. Together, the predictors explained 38% of the variance in job satisfaction. No direct relationship between turnover intention and work context, work climate, or personality was found. To determine the mediating effect of burnout and job satisfaction, Sobel tests were performed. Z-values for the mediating effect of burnout were all > -1.10, $P < 0.05$, and for job satisfaction were all > 0.86, $P < 0.05$. Therefore, the indirect effect of work context, work climate and personality on job turnover through the mediator variables burnout and job satisfaction was significant.

Table 2. Estimated regression coefficients (β) from the structural model.

	Dependent Variables					
Predictor	Burnout		Satisfaction		Turnover Intention	
W1 Task Content	-.04		.07	*		
W2 Social Environment	-.18	***	.13	***		
W3 Relation with supervisor	-.03		.30	***		
W4 Career / Rewards	-.03		.08	*		
Work Climate	-.36	***	.19	***		
P1 Easy-going	-.30	***	.08	*		
P2 Orderly	-.08		.04			
P3 Compassionate	.13	***	-.03			
P4 Receptive	-.14	***	-.03			
Burnout					.24	***
Job Satisfaction					-.28	***
Age					-.12	***
R^2	.40	***	.38	***	.21	***

n = 882, $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$. [χ^2 (df = 12, N = 882) = 30.39, $p < .01$; χ^2 / df = 2.53; CFI = .994; TLI = .960; RMSEA = .042 [RI = .023 - .060]).

Table 1. Correlations amongst variables (bivariate, two-tailed).

		M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.	Age	5.71	1.98	1.00												
2.	W1 Task Contents	3.55	.56	.04	1.00											
3.	W2 Social Environment	3.95	.48	.03	.33**	1.00										
4.	W3 Relation with Supervisor	4.03	.47	.01	.46**	38**	1.00									
5.	W4 Career / Reward	3.92	.55	.05	.48**	.34**	53**	1.00								
6.	Work Climate	4.14	.85	-.07*	.48**	.32**	.60**	.46**	1.00							
7.	P1 Easy-going	2.20	.48	-.15**	.10**	.08*	.11**	.04	.31**	1.00						
8.	P2 Orderly	2.63	.46	.03	.08*	.07*	.05	.01	.16**	.17**	1.00					
9.	P3 Compassionate	2.78	,34	.04	.02	-.00	-.01	-.02	.11**	.41**	.15**	1.00				
10.	P4 Receptive	2.72	.36	-.01	-.03	.04	.00	-.11**	.12**	.34**	.21**	.34**	1.00			
11.	Burnout	2.76	.68	.07*	-.32**	-.35**	-.39**	-.27**	-.55**	-.36**	-.18**	-.07*	-.21**	1.00		
12.	Satisfaction	2.79	.55	-.01	.39**	.36**	.55**	.40**	.50**	.18**	.10**	.02	.02	-.50**	1.00	
13.	Turnover Intention (0 = yes, 1 = no)	.42	.49	-.10**	-.28**	-.21**	-.26**	-.26**	-.29**	-.09**	-.07*	-.01	.06	.37**	-.40**	1.00

n = 882, Significant correlation at level $^{*}P < 0.05$, $^{**}P < 0.01$. Age (years): < 20 (1), 20-24 (2), 25-29 (3), 30-34 (4), 35-39 (5), 40-44 (6), 45-49 (7), 50-54 (8), 55-59 (9), > 60 (10). W1 – W4: work context factors 1 to 4, P1 – P4: personality factors 1 to 4. Turnover Intention: 0 = yes, 1 = no.

Discussion

The most important findings of this study are that nurses' turnover intentions were predicted by burnout symptoms and job satisfaction, which in turn were predicted by personality dimensions (in case of burnout), work climate (in case of personality and job satisfaction) and work context characteristics (in case of job satisfaction). Many studies have investigated the reasons for turnover intention but as far as we could find, this was the first study examining the process responsible for turnover (intention) amongst nurse anaesthetists. Based on this knowledge, hospitals can influence and prevent turnover by selecting employees with specific personality traits, creating a positive work climate, and improving important work context characteristics.

We found a high percentage (42%) of turnover intention which conforms to the findings of Ma et al.[31] and Chan et al.,[32] who found 42.5% and 39% respectively, but is much higher than reported in the study of Shimizutani et al.,[26] who found that only 20% of the nurses had an intention to leave. Additionally, the nurse's age was significant related to turnover intention. The role played by age in respect to job turnover is varied; several studies have found a relationship between age and job turnover similar to this study,[32] but the opposite (no relationship) has also been found in other studies.[33] The reasons for the older nurse anaesthetists' lower levels of turnover intention were not evaluated, but may be explained by their need for job security and resistance to change. Further research is necessary to determine the exact reasons for low turnover rate among older nurse anaesthetists.

Zeytinoglu et al. studied the intention to leave the profession in relation to work characteristics amongst Canadian nurses, showing, similar to our study, that the intention to leave the profession had a strong direct relationship to stress.[33] However, to the contrary of our study, others found a direct relationship between turnover intention amongst nurses and organizational characteristics.[1,34]

The work context characteristic 'social environment' also had an indirect effect on turnover intention via burnout. However, others found a direct relationship between social support, especially from colleagues, and turnover intention.[35,36] Our findings can be explained by the limited contact nurse anaesthetist have with their direct colleagues during work. According to Buunk, the importance of social environment in the development of burnout is explained by: 1) nurses facing uncertainty and emotional exhaustion feel a need for social comparison and affiliation; and 2) nurses prefer information about, and contact with others who are more experienced and more competent.[37] Especially in the highly stressful operating room environment these issues may be of importance.

According to Magee-Gullatte and Jirasakhiran, the leadership of strong nurse managers is the key to staff retention, which confirms the importance of our work context characteristic 'relation with supervisor'.[38]

A positive relationship between the work context characteristic 'rewards' and job satisfaction existed. Others confirmed the importance of pay as a factor for job satisfaction amongst nurses.[31,32] According to Boyle and Miller, the strength of the relationship between pay and job satisfaction depends on the importance of income.[34] Perhaps this explains why they found different correlations for pay and gender, since the male often is responsible for the main income. Coomber and Barriball did a review on intention to leave, and found that salary was not a statistically significant indicator for turnover.[39] He suggested that salary may not be the primary factor in retention when other work aspects are enjoyable, which is in accordance with our study.

Hwang and Chang stressed the importance of a positive work climate to prevent turnover intention.[36] In this study, work climate was the only independent variable that had a high impact on burnout as well as job satisfaction in predicting turnover intention. Others also showed the importance of having the possibility to use your potentials (measuring empowerment) and its positive relationship to job satisfaction and negative relationship to burnout.[35]

Three out of four personality dimensions ('easy going', 'compassionate' and 'receptive') were significantly related to burnout. Several studies investigated the personality dimensions amongst nurses and obtained controversial results. Gambles et al.[40] (2003) showed a higher incidence of extroversion amongst oncology nurses but, also amongst oncology nurses, Bean and Holcombe[41] showed a higher incidence of introversion. However, none of these studies examined the relationship to burnout. The relationship between personality dimensions and burnout can be explained by the different coping strategies which are used to buffer stress factors.[5] Considering the above, this would mean that nurse anaesthetists with the more pronounced personality dimensions 'compassionate' and 'receptive', have less effective coping strategies in their role as nurse anaesthetist, whereas nurse anaesthetists with more pronounced personality dimension 'easy going', have a more effective coping style. Personality dimension 'easy going' was also related to job satisfaction. Maybe nurse anaesthetists with this personality dimension are happier at work because they interpret their work environment more positively. Further examination is necessary to determine the relationship between personality dimensions and the interpretation of the work environment.

Limitations of this study include: 1) although turnover intention is one of the best predictors of actual turnover, we had no longitudinal data on actual turnover; 2) The overall

response rate was only 46%, it falls within the 38%-53% response rate found in other anonymous multisite surveys of hospital-based nursing personnel.[1] Unfortunately we could not retrieve the reasons from the non-responders for having not participated in the study.

In conclusion, to retain nurse anaesthetists and maintain the strength of the nursing staff, especially in a tight labour market, it is important for health care organizations to adopt measures to prevent burnout and improve job satisfaction by targeting recruitment strategies, and create a positive working climate and environment. In hospitals, where humans are the main capital of the organization, creating a culture of retention is one key strategy for reducing staff turnover and replacement costs. The management should stimulate the autonomy of the nurse anaesthetist by creating an environment in which growth and career opportunities are clearly delineated in terms of skills, behaviour, knowledge, percentage of employment, and financial rewards. Appropriate within the organization, task contents should be in line with the needs and desires of nurse anaesthetists. Also the creation of a social environment in which informal contacts are possible, as well as freedom of movement during work and breaks, will reinforce job satisfaction and may prevent burnout. In order to select nurse anaesthetists, one should focus on the level of the personality dimension 'easy going', which should be present to an appropriate degree.

Acknowledgement

We thank the International Federation of Nurse Anesthetists (IFNA) for receiving the award of Best Free Paper Communication during the 9th World Congress of Nurse Anesthetists, The Hague, The Netherlands, June 7 2010.

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How to remember, what we remember and why we remember form the most personal maps of our individuality

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Published as:

Meeusen V[1], Van Dam K[2], Brown-Mahoney C[3], Van Zundert A[1], Knape H[4]. The influence of emotions on events and job satisfaction amongst Dutch nurse anaesthetists. Int Nurs Rev 2010;57:85-91.

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Chapter 10

The influence of emotions on events and job satisfaction amongst Dutch nurse anaesthetists

Abstract

Background. An aging population, combined with a shortage of health care professionals, can result in a decrease in the capacity of health care systems. Therefore, it is important to explore possible solutions for this problem. By finding methods to increase job satisfaction, it may be possible to retain employees within their profession. In this study we examined events, their influence on emotions and, consequently, the effect of these emotions on job satisfaction. We attempted to answer the question: Which events and emotions influence job satisfaction?

Methods. We collected data on events and emotions, and their effects on job satisfaction, amongst Dutch nurse anaesthetists. Participants (n = 314) were asked to complete two questionnaires about events, emotions and job satisfaction at two different times during an average working day.

Results. One hundred thirty-two nurse anaesthetists from 24 Dutch hospitals participated. Both positive and negative events were significant in the development of positive and negative emotions at the end of the working day. Positive emotions at the end of the working day contributed significantly to job satisfaction. Negative emotions did not have a significant effect on job satisfaction.

Conclusions. The mediating role of positive emotions in relation to positive and negative events should be taken into account in managing job satisfaction amongst Dutch nurse anaesthetists. Further research is necessary to determine whether the relationship between events and emotions provides a foundation for developing a more positive working atmosphere, and to explore how hospitals can trigger positive emotions to increase job satisfaction.

Keywords: emotions, events, job satisfaction, Dutch nurse anaesthetists.

Introduction

Job satisfaction is related to personality, the characteristics of the job, and situational and genetic determinants.[1] Negative working conditions have an impact on both the work environment and the person, and eventually on life satisfaction.[2,3] Poor job satisfaction can result in lower productivity, and higher rates of absenteeism and job turnover.[4]

Job satisfaction is described as an attitude with two components: an affective and a cognitive component. The cognitive component of job satisfaction refers to attitudes towards the job (judgment, belief, comparison),[5] and is represented by the evaluation of a set of abstract and/or concrete features (e.g. pay levels, job characteristics, career mobility). These concrete features are evaluated by employees who measure their perceptions against standards like values and needs. The degree of similarity between their perceptions and their standards is reflected in their level of cognitive job satisfaction.[6]

Little research has been done on the emotional aspects of job satisfaction; therefore, job satisfaction is often not measured appropriately (by taking into consideration both cognitive and affective components). This creates a scientific problem.[6,7] The affective component of job satisfaction relates to feelings and emotions.[5] It is broad and encompasses 'mood states' and 'emotions', both of which have positive and negative consequences for job satisfaction.[8]

Job satisfaction fluctuates throughout the working day, and these fluctuations are in part driven by moods and emotions.[7,9-11] Mood states are longer lasting but less intense than emotions, and have no causal object, while emotions are intense and short-lived, and have a clear cause. Emotions are triggered by actual events in the workplace, and therefore should be more readily recalled than vague and diffuse moods experienced while at work but not necessarily due to the job. Not every emotion has the same impact. The emotional process begins with an event which is evaluated for importance; the level of importance influences the intensity of the emotional reaction, and the relevance to well-being in simple positive or negative terms.[12] This explains why the same event can engender different emotions in different people.

Emotional regulation is integral to mental health and well-being.[13] By stimulating emotions that are positively related to job satisfaction, and reducing the incidence of emotions that are negatively related to satisfaction, it is possible to improve the work environment. A high frequency of net positive emotions gives a higher level of job satisfaction than intense, but less frequent, positive emotions.[11] Positive as well as negative emotions produce certain job behaviours, but the performance implications of negative

emotions are more pronounced.[6] Efforts to improve moods and emotions pay off in better work attitudes.[11,14]

Uncertainty can decrease job satisfaction. According to the *'uncertainty reduction theory'* of Lester, uncertainty can be reduced by providing information.[15] Safety and communication are very important, especially in anaesthesia. When information is shared within the anaesthesiology team, job satisfaction will increase.[16] In situations where information is lacking (negative event), nurse anaesthetists may resort to coping strategies, or may experience stress.[17] This may influence the relationship between events, emotions and job satisfaction.

In anaesthesia, at the start of any given day, a number of facts about the upcoming procedures are not yet fully known. Based on practical experience, and to prepare themselves for the working day, nurse anaesthetists can formulate expectations about some of the uncertainties. Expectations, especially when they are wrong, can influence behaviour: e.g. an event which ultimately is less negative than expected, results in fewer negative emotions.[18] It is possible that the mismatch of expectations and ensuing events influences the outcome of the effect of emotions on job satisfaction.

In this study we examined events, their influence on emotions, and consequently their effect on job satisfaction. We hypothesized that events influence job satisfaction, which is mediated by emotions. We also studied the possible influence of 'uncertainties' (in terms of expectations) on this process. If we can understand this process and know the effect of particular events, anaesthesia departments will be able to influence job satisfaction.[19]

Methods

Procedure

The study was approved by the Medical Ethics Committee of the Catharina Hospital, Eindhoven, The Netherlands. In March 2008, the supervisors of 24 anaesthesia departments in Dutch hospitals agreed to participate, and asked their nurse anaesthetists to voluntarily participate in this survey. The return of the survey questionnaire form was considered to be consent.

We collected data on events and emotions, and their effects on job satisfaction. Demographic information (age, gender, student/certified, number of years of practice since certification), and the day of the week they participated, were recorded and used as a control variable.

Participants received, at the beginning of the working day, the first questionnaire about emotions and expectations. The second questionnaire asked about emotions, positive and negative events, expectations and job satisfaction, and was filled in at the end of the working day, before leaving for home. The questionnaires were anonymous; both were returned in a sealed envelope by the participant. Only fully-completed questionnaires were subsequently processed.

Instruments

We measured job satisfaction at the end of the working day, using a five-point scale (1 = very dissatisfied; 5 = very satisfied), by asking, 'How satisfied are you about this working day'?

Four different 'expectations' about the operation procedures were included: 1) the cooperation of the team members on a five-point scale (1 = very negative; 5 = very positive); 2) the number of operations; 3) the complexity of the surgical procedure on a four-point scale (1 = very low; 4 = very high); and 4) the American Society of Anesthesiology (ASA) category (I-IV) of the patients. At the end of the working day, the level of 'uncertainty' related to expectations was determined by asking the participants to review their opinions of these four items on a five-point scale (1 = much less; 5 = much more).

Emotions were measured with the Dutch version of the Job-related Affective Well-Being Scale (JAWS).[20,21] The scale measures two dimensions (valency: positive and negative emotions, and intensity: high or low), with a total of 12 items, and a Cronbach's alpha of 0.89 for both positive emotions and negative emotions. We expanded the questionnaire with two positive items ('proud' and 'cheerful') and two negative items ('frustrated' and 'annoyed'). These four emotions were included because other studies showed their effect on job satisfaction.[22] The emotions queried were: 'inspired', 'proud', 'energetic', 'enthusiastic', 'cheerful', 'at ease', 'contented' and 'relaxed' for positive, and the negative emotions: 'angry', 'worried', 'tired', 'frustrated', 'discouraged', 'sober', 'irritated' and 'annoyed'.

We asked about the positive and negative events that triggered emotions during the working day. For this variable, we used open-ended questions, and asked for the type and intensity of the emotion correlating with the event. Intensity was measured using a five-point Lickert scale (1 = very week; 5 = very strong).

Statistical analysis

Positive and negative events were categorized, and mean values, standard deviations and regression analyses, with job satisfaction as an outcome variable, were performed with SPSS 16.0 system (SPSS Inc, Chicago, Ill, USA). Before performing the regression analysis, we tested the influence of demographic variables and 'uncertainties' on the outcome variables. Cronbach's alpha of the positive emotions scale was 0.86 at the beginning of the working day, and 0.89 at the end of the working day. For the negative emotions, it was 0.83 and 0.84 respectively.

Results

In total, 314 Dutch nurse anaesthetists from 24 Dutch academic and non-academic hospitals received questionnaires, and 135 questionnaires were returned (response rate of 42%). Three questionnaires were incomplete, and were excluded for further analysis. Nineteen respondents did not identify any events, so they were excluded from analysis using the variable 'events'.

The mean age of the participants was 39.6 ± 9.6 years (61 males and 71 females), with a mean working experience as a nurse anaesthetist of 12.8 ± 9.4 years. The questionnaires were completed on different days of the week, at the discretion of the nurse anaesthetist: 15% on Monday, 24% on Tuesday, 28% on Wednesday, 25% on Thursday and 8% on Friday. We found no correlation between demographics, age ($P = 0.32$), gender ($P = 0.34$), student ($P = 0.50$), certified ($P = 0.63$), nursing degree ($P = 0.45$), or the choice of the day of the week ($P = 0.98$), and job satisfaction, so these data were not included in further analyses.

One hundred eighty-three positive and 129 negative events were reported, and divided into different categories (Appendix 2). Most of the events were about teamwork/social relations; for example, good teamwork between nurse anaesthetists and operating room nurses (positive); or waiting for colleagues (negative).

Two of the eight positive emotions, 'proud' and 'satisfied', were increased at the end of a working day, while five of the eight negative emotions were increased. At the beginning of the working day, nurse anaesthetists scored almost 3 times more positive emotions than negative emotions. Although most positive emotions were decreased and the negative emotions were increased at the end of the working day, positive emotions were still reported twice as often as negative emotions (Table 1).

Table 1. Mean and standard deviations of intensity of positive and negative emotions amongst Dutch nurse anaesthetists at the beginning and end of their working day. $n = 113$, $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

	Start of the day (pre)		End of the day (post)			
	M	SD	M	SD	df	t
Positive emotions						
• Energetic	3.33	.99	2.69	.99	131	8.11***
• Enthusiastic	3.45	.95	3.07	1.00	131	4.53***
• Cheerful	3.56	.97	3.28	1.01	131	3.44**
• Proud	2.64	1.07	2.83	1.09	131	-2.12*
• At ease	4.12	.88	3.91	.99	131	2.82**
• Inspired	2.89	.99	2.77	1.00	131	1.55
• Satisfied	3.12	1.04	3.38	1.02	131	-2.72**
• Relaxed	3.65	.99	3.45	1.01	131	2.35*
Negative emotions						
• Angry	1.05	.23	1.27	.64	131	-3.98***
• Worried	1.26	.55	1.22	.54	131	.73
• Tired	1.79	.87	2.53	1.04	131	-7.60***
• Frustrated	1.20	.54	1.45	.79	131	-3.15**
• Discouraged	1.20	.53	1.23	.55	131	-.58
• Depressed	1.19	.58	1.22	.57	131	-.56
• Irritated	1.29	.61	1.53	.86	131	-2.96**
• Aversion	1.15	.40	1.24	.61	131	-2.54*

To test the hypotheses ‘events influence job satisfaction which is mediated by emotions’, we performed several regression analyses. We analyzed the influence of the events on emotions: first, positive emotions as the outcome variable; second, negative emotions as the outcome variable. Both positive and negative events were significant for engendering positive and negative emotions at the end of the working day. Nurse anaesthetists who were involved in more positive events experienced more positive emotions ($\beta = .26$, $P < 0.001$) and fewer negative emotions ($\beta = -.28$, $P < 0.001$) at the end of their working day. Nurse anaesthetists who were involved in more negative events during the day experienced more negative emotions ($\beta = .33$, $P < 0.001$) and fewer positive emotions ($\beta = -.29$, $P < 0.001$) at the end of their working day. Furthermore, people experiencing positive emotions at the beginning of their working day experienced more

positive emotions at the end of the day (β = .73, $P < 0.001$), whereas negative emotions at the beginning of the working day had no influence on the positive emotions at the end of the day. People experiencing negative emotions at the beginning of their working day experienced more negative emotions at the end of the day (β = .27, $P < 0.01$), whereas positive emotions at the beginning of the working day had no influence on the negative emotions at the end of the day.

The regression analysis with job satisfaction as the outcome variable was conducted to analyze the mediating effect of emotions on job satisfaction (Table 2). First we tested the uncertainty items ('expectations') for their influence on job satisfaction. None of the expectations were significantly related to job satisfaction, and therefore were not included in the regressions.

Table 2. Regression analysis with job satisfaction as outcome variable.

	Model 1 β	Model 2 B	Model 3 β
Pre positive emotions	.32**	.30**	-.21***
Pre negative emotions	-.07	-.03	-.01
Positive events		.08	-.12
Negative events		-.24*	-.01
Post positive emotions			.68***
Post negative emotions			-.09
F(df)	7.45 (2)	5.42 (4)	9.06 (6)
R^2	.12	.17	.34

$n = 113$, $^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

Positive emotions at the end of the working day contributed significantly to job satisfaction (β = .68, $P < 0.001$). Negative emotions did not figure significantly in job satisfaction, meaning that negative emotions do not appear to mediate the effects of events on job satisfaction. The mediating effect of positive emotions on job satisfaction at the end of the working day, by positive as well as negative events, was confirmed in this study (Figure 1). Our hypothesis was only confirmed for the mediating effect of positive emotions; the direct effect of positive or negative events on job satisfaction was not confirmed.

Discussion

This study examined the relationship between events, emotions and job satisfaction amongst Dutch nurse anaesthetists, and the influence of several 'uncertainties' on this process. We found a mediating effect of positive emotions on positive and negative events and job satisfaction. We could not find a direct relationship between events and job satisfaction. Our results confirmed the *Affective Events Theory* of Weis and Cropanzano,[6] which states that events lead to emotions which in turn can influence job satisfaction. Wegge[23] and Kafetsios & Zampetakis[24] also found a positive relationship between positive emotions and job satisfaction but, in contrast to our findings, Kafetsios & Zampetakis were also able to confirm a negative relationship between negative emotions and job satisfaction.[24] Many others have also found that emotions have a direct influence on behaviour and attitudes towards work.[7,9,11]

Although the emotion 'proud' was significantly increased at the end of the working day, the intensity of 'proud' was rather low, even at the end of the working day. Feeling proud of one's job is essential for the intrinsic motivation of the nurse anaesthetist; it has to do with self-esteem, which is a primary factor that affects how well an individual functions in his/her work.[25,26] Kluger et al.[27] examined stress and satisfaction in anaesthesiologists in Australia, and found 'being proud', being able to provide services of a high standard, a satisfying aspect of the anaesthesiologist's job. 'Proud' also refers to recognition and respect, which are important factors for job satisfaction,[27-29] and trigger positive emotions.[6,11] Another factor which can be significant in feeling proud is receiving feedback. Feedback is important for increasing job satisfaction,[30] and can involve support and communication -- this latter concept being one of the positive events in this study. The negative emotion 'tired' had by far the highest intensity (M = 2.53) at the end of the working day, although all negative emotions scored rather low in intensity. This corresponded to the relatively strong decrease of the positive emotion 'energetic' (20% reduction in intensity).

The events (positive and negative) experienced by the nurse anaesthetists of this study, social environment, teamwork and social relations, corresponded to those found in other studies.[31,32] Few recent studies in anaesthesia have shown the importance of communication in relation to job satisfaction.[28,29,33,34] The Basch & Fisher event categories 'action management' and 'acknowledgement' were only mentioned occasionally, which may be due to the special working environment.[31]

Several factors associated with cognitive job satisfaction amongst nurses corresponded to the events found in our study: e.g. role of communications, organizational

support, and development.[35-37] The events mentioned in this study are also found in several studies of stress amongst nurses in general. Although, we could not find any study about events, emotions and job satisfaction amongst nurses, others have found that emotional support is very important in preventing stress amongst nurses.[16,38,39] Unfortunately, in our study we did not measure stress; however, the negative relationship between stress and job satisfaction is well-established.

Although 'uncertainty' can be seen as a negative event, it did not play a role in influencing emotions or job satisfaction. The expectations of the nurse anaesthetists were consistent with their final assessment of the day (difference scores were minimal). Consequently we could not relate a mismatch of expectations to the outcome of emotions on job satisfaction.

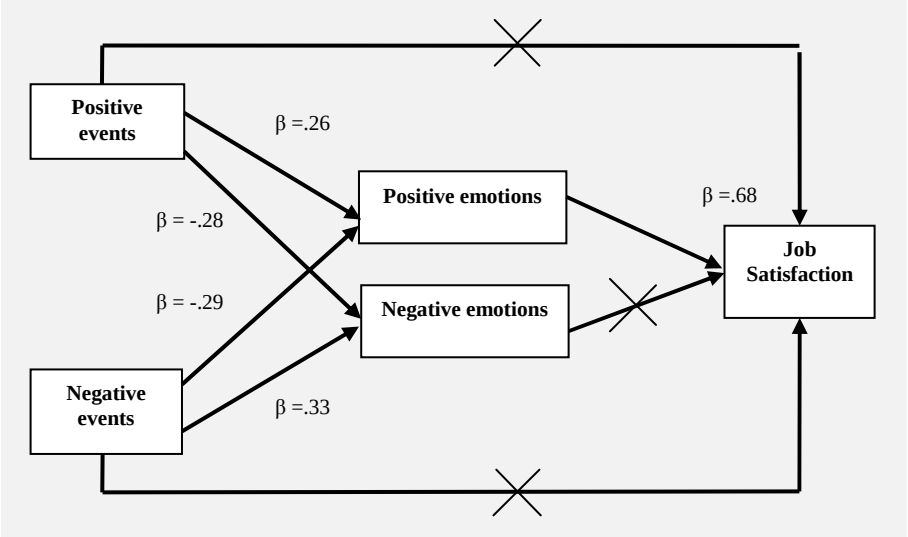

Figure 1. Schematic overview of model used in study, and results of regression analyses with emotions and job satisfaction as outcome variables.

The limitations of this study include the small number of participants (n = 132), and the fact that some respondents (n = 19) did not fill in the questionnaire completely. As a result, we could not establish a relationship between certain events and their emotions. Bennett & Lowe studied the relationship between emotions and events amongst British nurses, and found that five events triggered most emotions (particularly 'frustration' and

'anger'): 1) time pressure at work; 2) conflicting work and home demands; 3) difficulties with patients in terms of clinical and interpersonal issues; 4) conflict with other health professionals; and 5) coping with mistakes at work.[40] Further research about the relationship between events and emotions is essential to discover ways of stimulating the incidence of positive emotions and, eventually, job satisfaction. A more appropriate study method might be interviewing and observing participants instead of using a questionnaire. It would be interesting to learn if our results amongst Dutch nurse anaesthetists also apply to other professionals (e.g. nurses in general), and in other countries.

We conclude that positive and negative events have a positive impact on job satisfaction in nurse anaesthetists, if they are mediated by positive emotions. 'Expectations' at the beginning of the working day do not affect this process. To increase job satisfaction, it is important to increase positive emotions. Further studies that examine the relationship between events and emotions are required to provide a foundation for developing a more positive working atmosphere. Further studies are also required to determine which events and positive emotions have the strongest impact on job satisfaction. The mediating role of positive emotions on the relationship between events and job satisfaction should be taken into account in managing job satisfaction amongst nurse anaesthetists.

Acknowledgement

We thank Ms. Anke Van Den Boom, Department of Work & Organizational Psychology, Tilburg University, Tilburg, The Netherlands, for her help in collecting the data.

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Appendix 1: Job-related affective well-being scale

	Not at all				Very much
I feel angry	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel worried	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel inspired	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel tired	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel proud	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel frustrated	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel discouraged	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel energetic	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel enthusiastic	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel cheerful	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel sober	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel at ease	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel irritated	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel contented	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel relaxed	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
I feel aversion	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Appendix 2: Categories of positive and negative events.

Positive events	n	Negative events	n
Social environment	43	Social environment	41
Teamwork / social relations	39	Planning (program and personnel)	41
Task content	34	Teamwork / social relations	31
Planning (program and personnel)	22	Equipment	9
Teach & learn	14	Patient contact	1
Patient contact	9	Teach & learn	1
Briefings; communication	6		
Acknowledgement	6		
Environmental conditions	5		
Equipment	1		
Others	4	Others	5
Total	183	Total	129

Motivation is the art of getting people to do what you want them to do because they want to do it

Dwight D. Eisenhouwer (1890-1969)

Chapter 11

General discussion and practical implications

Introduction

An increasing shortage of both physician anaesthesia and non-physician anaesthesia professionals is expected to jeopardize health care provision in Europe in the next decade. In this respect, it is essential to manage personnel, finding ways to retain trained nurse anesthetists within the profession, in spite of a tight labour market, and increased production and quality requirements. To understand the process of job turnover among nurse anaesthetists, we studied the influences of job satisfaction, burnout, work climate and context, and personality dimensions.

In the first study (Chapter 5), we evaluated the work environment of nurse anaesthetists for job satisfaction, burnout, psychosomatic symptoms, work context and climate, sickness absenteeism, perceived general health, and personality dimensions. We tried to identify the most important work context factors, and to determine if they were related to the hospital or the profession. We also questioned whether the supervisors of these nurses interpreted the importance of those factors in a similar way.

Knowing that emotions can influence the perceptions one has of the job, we studied the personality dimensions of each nurse anaesthetist, and searched for a relationship with job satisfaction. Furthermore, we questioned a possible relationship between personality dimensions and age (Chapter 6).

In the work climate analyses, we focused on the question of whether nurse anaesthetists felt their full potentials were used in an optimal way, and tried to elaborate on which work climate aspects had the strongest relationship to job satisfaction (Chapter 7).

Burnout, psychosomatic symptoms, sickness absenteeism, and perceived general health are often related, and influence job satisfaction. In this study, we evaluated all the possible relationships between these variables. Furthermore we were interested in whether the phenomenon of ‘early career shock’ (high burnout levels among just-certified nurses) existed among nurse anaesthetists (Chapter 8).

After exploring each variable, we tested the study model, explored whether these variables had a direct relationship on job turnover, and questioned whether job satisfaction and burnout functioned as mediators for the other variables (Chapter 9).

Because of the unique position of Dutch nurse anaesthetists, we wanted to know whether a nursing background is essential to achieve higher job satisfaction, and looked for differences between nurse anaesthetists with and those without nursing backgrounds (Chapter 4).

To explore job satisfaction appropriately, we undertook a third study about affective job satisfaction among nurse anaesthetists. We questioned the relationship

between emotions, workplace events, and job satisfaction. The influence of expectations on this relationship was also investigated (Chapter 10).

Results of this thesis

To appreciate the position of the Dutch nurse anaesthetist in a larger context, we first studied the history of nurse anaesthetists worldwide (Chapter 2). In the United States, anaesthesia was a nurse's job from the very beginning, and both nurse anaesthetists and anaesthesiologists had to fight for their positions in a world dominated by surgeons. This fight continues right up to the present. In the United Kingdom, anaesthesia has been administered only by physicians since the beginning; by law, nurses are not permitted to administer medication. The Commonwealth countries followed this practice. In the majority of European countries, nurses administered anaesthesia under the direct supervision of the surgeon. After World War II, anaesthesia became much more complex, and anaesthesiologists took over the supervisory job of the surgeon. Since then, nurse anaesthetists have been working under the direct and indirect supervision of the anaesthesiologist.

The position of the European non-physician anaesthesia team members was evaluated in Chapter 3. We compared the responsibilities and tasks performed by the team members reporting to the anaesthesiologist. Although the prerequisite of being a nurse is not essential in The Netherlands, Dutch nurse anaesthetists perform the same tasks and responsibilities as other nurse anaesthetists working in Europe. This is in line with the recognition of Dutch nurse anaesthetists by the International Federation of Nurse Anaesthetists (IFNA).

Further analysis of the differences between Dutch nurse anaesthetists with and without nursing degrees showed no differences in job perception. This equivalent job perception suggests that both groups are equally competent to perform their jobs (Chapter 4).

In Chapters 4-8, we explored the different variables (work climate and context, personality dimensions, burnout, and job satisfaction), and their mutual relationships, in depth. In Chapter 9, the study model was examined in regard to the relationship between the above-mentioned variables and job turnover. Our findings demonstrated that job turnover was only indirectly related, by the mediating effects of burnout and job satisfaction, to work context, work climate, and personality dimensions. A direct relationship could not be demonstrated.

We found four important work context characteristics (‘career and reward’, ‘relation with supervisor’, ‘task contents’, and ‘social environment’), which all had an indirect effect on job turnover via job satisfaction. Only the work context characteristic ‘social environment’ had an indirect effect on turnover intention via burnout. The findings that work context characteristics were not related to the size and type of the hospital suggest that work context is profession-related rather than hospital-related. Interestingly, we found that supervisors differed from nurse anaesthetists in their perception of the work context factors ‘relation with supervisor’, ‘task contents’, and ‘social environment’ (Chapter 5).

Three out of four personality dimensions (‘easy going’, ‘compassionate’, and ‘receptive’) were related to job turnover via the mediating effect of burnout. The personality dimension ‘easy going’ was also related to job turnover, via the mediating effect of job satisfaction. When we analyzed the direct effect of the four personality dimensions on job satisfaction, two dimensions - ‘easy going’ and ‘orderly’ - predicted a significant variance in job satisfaction. Only the personality dimension ‘easy going’ was negatively related to age, which may suggest that the other three dimensions are stable over time (Chapter 6).

Work climate was the only variable that had a high impact on burnout, as well as on job satisfaction, in predicting turnover intention. Work climate was an important predictor for job satisfaction. The analyses of the separate work climate items all showed a high correlation with job satisfaction (Chapter 7).

The strong negative relationship between burnout and job satisfaction in this study conforms to others. Psychosomatic symptoms were positively related to burnout, and negatively related to job satisfaction. Also, sickness absenteeism was negatively related to job satisfaction, whereas perceived general health was positively associated with job satisfaction. In contrast to others, we did not find ‘early career shock’ among recently certified nurse anaesthetists. To the contrary, burnout was positively related to age (Chapter 8).

Positive and negative events influenced affective job satisfaction only if they were mediated by positive emotions. Expectations about ‘uncertainties’ at the beginning of the day did not have any effect on this process (Chapter 10).

Table 1. Correlations between different variables for Dutch hospitals.

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Burnout	1.00										
2.	Job satisfaction	-.67**	1.00									
3.	P1 ‘easy going’	-.43**	.14	1.00								
4.	P2 ‘orderly’	-.15	.10	.24*	1.00							
5.	P3 ‘compassionate	-.19	.11	.44**	.12	1.00						
6.	P4 ‘receptive’	-.12	-.11	.27*	.33**	.19	1.00					
7.	Work climate	-.72**	.64**	.33**	.06	.04	.09	1.00				
8.	Career and rewards	-.44**	.55**	.01	-.01	-.01	-.03	.50**	1.00			
9.	Relation supervisor	-.52**	.71**	.15	-.03	.02	.02	.75**	.51**	1.00		
10.	Task contents	-.49**	.56**	.18	.01	.20	-.08	.59**	.50**	.56**	1.00	
11.	Social environment	-.22	.30**	-.11	-.08	-.14	-.17	.23	.30*	.25*	.37**	1.00

*$P < 0.05$, **$P < 0.01$. Mean and Standard Deviation are the sum of the individual score per hospital. Only the hospitals with 10 participants or more are included.

Results of studied hospitals

Although this thesis mainly focused on the individual nurse anaesthetist, the results obtained from the different hospitals in The Netherlands are important and practical for use by hospital management. High burnout levels in the anaesthesia department had strong negative correlations with the personality dimension ‘easy going’, ‘work climate’, ‘career and rewards’, ‘relation with supervisor’, and ‘task contents’. High levels of job satisfaction in the anaesthesia department had a strong positive correlation with ‘work climate’, ‘career and rewards’, ‘relation with supervisor’, and ‘task contents’ (Table 1).

Therefore, work climate and work context factors are important variables to determine burnout and job satisfaction on an individual level, as well as on an organisational level.

The role of the personality dimension ‘easy going’ is interesting. Anaesthesia departments who employ nurse anaesthetists with a higher incidence of the personality dimension ‘easy going’ are confronted with lower burnout levels and enjoy a more positive work climate. This suggests that the presence of individuals with a specific combination of personality traits is essential for an optimal work environment resulting in low burnout levels.

Results reflected against motivation theories

When this survey was conducted (2007), The Netherlands and many other European countries were enjoying a relatively stable economic and social period, with hardly any shortages of nurse anaesthetists in the operating theatres. The use of nurse anaesthetist agencies was still very limited in frequency and duration.

Since the economic crisis in 2008, the situation has changed substantially, with a major impact on health care systems balancing increasing demands and less funding. Several reasons for the change can be identified: a) an increasing shortage of nurse anaesthetists caused by the limited recruitment of new nurse anaesthetists; b) an increased demand for health care caused by an older population; and c) an increase in the types of surgery and the capacity in Dutch hospitals. During the last few years, production (number of operations) per hour has increased dramatically, and production has become the core business of peripheral hospitals.

This high demand for nurse anaesthetists resulted in salary increases (bonuses), especially for those working for an agency. Investments in motivational factors, such as career development, time for social relations, and team building, which could cost money

or time, were minimized. Nurse anaesthetists were paid to work harder and longer hours, with no incentive based on performance. This was a strictly economic approach to the performance/production problem, and a good example of the 'Principal-Agent Theory' (supervisor vs. employee).

In economics, human behaviour is divided into activities people do because they like to do so (intrinsic motivation), and activities people do because they are rewarded for them with money or other goods (extrinsic motivation). Economists think that, by far, the most effective motivator is money; 'everything has its price'. This strong relationship between reward and performance is reflected in the 'Principal-Agent Theory'. The principal (read: supervisor) uses rewards in order to raise the performance of the agent (read: nurse anaesthetist). According to this theory, intrinsic motivation is left out and considered of no importance. Only extrinsic motivation is believed to be relevant.

Psychologists, on the other hand, emphasize the behavioural motives coming from within the person. According to this psychological approach, external intervention (increased rewards) would not reinforce internal motivation because it does not appreciate the nurse anaesthetist's involvement and competence, but only the ability of the nurse anaesthetist to cope with production needs. The higher salaries were granted regardless of the competency and performance of the individual, which felt even more controlling. With this uniform approach - all nurse anaesthetists are treated in an identical way, and competence and commitment are not recognized by the supervisor - intrinsic motivation is devalued.

In contrast, rewards that are part of a normal contractual relationship do not negate intrinsic motivation. An example of this is the annual raise in salary during the first ten years of employment as a nurse anaesthetist. External interventions (rewards) compliment intrinsic motivation if the individuals concerned perceive them as supportive and as acknowledgements of performance.[1] Self-esteem is boosted, and the person feels that he has been given more freedom to act, thus increasing self-determination.[1, 2]

Health care demands will increase even more in the future. Until now, organisations have only focused on and stimulated extrinsic motivation, even though intrinsic motivation also leads to a positive effect on performance. To solve the future shortage of personnel, we should now increase internal motivation to increase performance. Strong performance, induced by intrinsic motivation, has several advantages[3]: people are mentally and physically healthier; have higher learning capacities; need less supervision; and solve cognitively difficult tasks better. For a high level of intrinsic motivation, workers' needs to feel competent and autonomous must be satisfied.[4, 5]

This is confirmed by the findings of our study, which demonstrated the importance of a positive work climate, one that promotes personal growth and the fulfillment of potential, and offers the possibility of having a career. This choice and the opportunity for self-direction enhance intrinsic motivation, because they create a greater sense of autonomy and self-determination.[6-8] Also, the nature of the work, the environment, and the relation with the supervisor increase intrinsic motivation if they are satisfying, and relevant and consistent with needs, wants, or desires.[7]

The findings about emotions and their relationship to job satisfaction should help us to create a more positive work environment. Essential to using this information is the relationship between emotions and events. We need to know which events stimulate and which event stifle positive emotions. Although we do not know the intensity of the effect, we know the direction of the effect, and therefore should focus on positive emotions. In our study, the emotions 'proud' and 'inspired' are conducive to improvement; both are strongly related to a person's self-esteem. If feelings of self-esteem are undermined, the person feels less intrinsically motivated.[3]

Future developments

To retain nurse anaesthetists for the profession and maintain the strength of the nursing staff, especially in a tight labour market, it is important for health care organisations to adopt measures to prevent burnout and improve job satisfaction, by targeting recruitment strategies and creating a positive working climate and environment. Generational differences, personnel shortages, and an ever-ageing and aligning population have caused employers and employees to stop and think about the various factors that have an impact on job satisfaction and burnout, and ultimately job turnover intention. This thesis offers several strategies which can be implemented to optimise the work environment of nurse anaesthetists, thus keeping them motivated and committed to their jobs.

Career development, financial rewards, and fulfilling your potential are essential factors for an optimal work environment. Most anaesthesia departments still offer very limited financial and growth possibilities. The hospital organisation shows little flexibility; managers are focused on an optimal work process and healthy and productive nurse anaesthetists. The manager controls the career opportunities; the organisation controls the financial rewards; and the nurse anaesthetist is nonessential for his own development.

We should stimulate the autonomy of the nurse anaesthetist by creating an environment in which growth and career opportunities are clearly delineated in terms of

skills, behaviour, knowledge, percentage of employment, and financial rewards. A nurse anaesthetist who functions at an average level receives a basic salary without a standard annual growth incentive. A nurse anaesthetist who chooses to do extra tasks/work, or more complex cases, delivers something extra to the department and receives an additional financial reward. Performance is measured in an objective manner on a structural basis. The organisation should set the criteria and constraints; the nurse anaesthetist should be in control of his own financial and career growth.

The differences in the interpretation of work context characteristics between nurse anaesthetists and supervisors are a real concern, because this discrepancy may result in lower job satisfaction among nurse anaesthetists. In almost every hospital, a biannual motivation questionnaire is sent out to all employees. Although the questionnaire is often validated, the results are of limited value. First, the number of participants in a specific group is often very limited (5-15 participants), resulting in insufficient statistical power. Second, only the item scores are used as a result, and associations between job satisfaction and burnout are not measured; this may be misinterpreted by management. The use of correlation scores in relation to the mean values of the variables will offer a higher validated result, which reflects the reality of the actual work environment more.

Internationally, nurse anaesthetists are first trained as nurses, and after some years of practical experience in the nursing job, they are eligible to train as nurse anaesthetists. Often this process takes more than 6 years. In The Netherlands, the training of nurse anaesthetists is 3 years, and includes nursing skills and competencies. This thesis demonstrated no differences in job perception between nurse anaesthetists with and without nursing backgrounds. Though perceptions of a job are related to performance,[9] studies measuring the actual job performance of both groups are essential to prove this.

Although the absence of the requirement for a nursing background is to enable the fast training process of Dutch nurse anaesthetists, until now these health care workers have not been recognized as qualified nurses, and therefore were very limited in their career opportunities. This thesis demonstrates the importance of career opportunities and using the full potential of nurse anaesthetists. Fortunately, some Dutch educational institutes are now offering a four-year training program, including the same training in nursing skills and competencies, resulting in both a nursing degree and a nurse anaesthetist degree, both at the bachelor level. Thus, career opportunities are no longer limited. Also, Dutch nurse anaesthetists have comparable anaesthesia training at an international level, which expands the possibilities of working abroad.

To solve the shortage, explosive growth in the numbers of nurse anaesthetists is essential. According to calculations done by Van de Windt et al., 3100-3550 new nurse

anaesthetists are necessary before 2025 to maintain an adequate level of health care service.[10] In recent years, on average 80-100 new nurse anaesthetists entered the profession annually. To train the necessary number of nurse anaesthetists within the next 15 years will be almost impossible.

Even if every Dutch hospital trains the maximum number of nurse anaesthetists, only 150 will be certified annually. This is far short of the number required; certifications need to increase to the level of 210-235 nurses every year. Perhaps Dutch hospitals should collaborate with hospitals abroad that do not have nurse anaesthetists. By using foreign hospitals as practical electives, the training of nurse anaesthetists can be done partially abroad. In so doing, Dutch hospitals will have more capacity to train nurses, and at the same time, foreign hospitals will become acquainted with the role of the nurse anaesthetist, which may help to address their own problems of shortages in the anaesthesia department.

Future studies

Although a questionnaire about work environment was used in the first study of this thesis, we did not include any variables about personal circumstances (single or married, children, life satisfaction). Lindfors et al. demonstrated a relationship between family life and the well-being of female anaesthesiologists. Future research about well-being and job satisfaction should measure these variables.[11]

Parker and Brotchie[e] studied the psychological profile of an anaesthesiologist. They recommend the use of the Five Factor Model (FFM), with a representative measure of the NEO Personality Inventory Manual developed by Costa & McCrea.[12] The FFM assumes that all humans occupy some position along five key dimensions: ‘neuroticism’, ‘extraversion’, ‘openness’, ‘agreeableness’, and ‘conscientiousness’. Some of these dimensions are comparable to the personality dimensions used in this thesis. After psychological screening, Parker and Brotchie suggest that the candidate attend a two-week training course in technical procedure to assess their competence and potential. It would be interesting to perform a longitudinal study among a test group of nurse anaesthetists to measure the performances of all nurse anaesthetists, using these types of selection methods. However, this poses another problem: measuring the provision of anaesthesia care is still problematic because of the influence of other factors, e.g. surgical complications.

[e] Parker G, Brotchie H. Medical career selection – what is the psychological ‘right stuff’ for the future anaesthetists? Prince of Wales Hospital, Randwick, NSW, Australia. Submitted for publication.

Measuring work environment is measuring the subjective response of individuals towards those issues that affect their motivation.[13] Cooper developed the stress monitor which explores, at an organisational level, sources of stress and job satisfaction, and evaluates the effects of preventive policies.[14] Perhaps this instrument can identify the PE-fit for the individual and the organisation. This stress monitor, in combination with the results of this thesis, could be customized as a monitor for this specific profession. Further study is necessary to develop such an instrument for nurse anaesthetists.

In modern management, a 'happy' work environment, with the catchphrase 'every day, a happy day', is growing in popularity. Pleasure is becoming a factor in the success of the organisation. Entrepreneur Michiel Drijber initiated the Internet platform 'Iedereen Elke Dag Plezier' (IEPD) [f], and launched the IEDP certificate for organisations. IEDP has no rules or demands, but it is focused on the question, 'How can we work together in an enjoyable work environment?' The only way to find out is by communication and dialogue with each other. This IEDP principle originates from the same principles about events and emotions demonstrated in the study in this thesis. Pleasure is emotion, and a dialogue about pleasure can create a dialogue about events. Further study to determine which events initiate positive emotions would be interesting.

Practical implications

In hospitals, where humans are the main capital of the organisation, creating a culture of retention is one key strategy for reducing staff turnover and replacement costs. In order to retain nurse anaesthetists for the job, managers should stimulate higher levels of job satisfaction and lower levels of burnout by focusing on extrinsic and intrinsic motivation: 1) stimulate a positive work climate; 2) stimulate career development; 3) provide financial rewards as acknowledgements of performance; 4) stimulate a positive relationship between the nurse anaesthetist and the supervisor (manager and/or anesthesiologist); 5) invest in task contents, which should be in line with the needs and desires of nurse anaesthetists and appropriate within the organisation; and 6) create a social environment in which informal contacts are possible, as well as freedom of movement during work and breaks.

In order to select nurse anaesthetists, one should focus on the level of the personality dimension 'easy going', which should be present to an appropriate degree.

[f] English translation: Everybody EveryDay Pleasure

Notwithstanding the above, work environment not only depends on the organisation, the management and the content of the work; it also requires a positive and motivated attitude on the part of nurse anaesthetists towards their work.

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Useful knowledge is meant to be applied. Useless knowledge may even be an encumbrance and may be occupying a cell that could be better employed

Charles FM Saint (1886-1973)

Kennis is de aperitief van alle wijsheid

Chapter 12

English and Dutch summary

English summary

Chapter 1 Study design and theoretical background

The aim of this thesis was to explore bottlenecks and to make recommendations for an optimalisation of the work environment of nurse anaesthetists in order to keep them preserved for the job.

An adequate infrastructure, efficient organisation and above all, a well trained and highly motivated health care workforce is essential to cope with the demands of current health care services. Several reasons are mentioned: composition of the population, developments in health care, required inflow and career options of nurse anaesthetists. In this respect it is essential to decrease job turnover and increase recruitment of nurse anaesthetists by developing an optimal work environment.

The central question of this thesis is: “Can we find predictors which cause nurse anaesthetists to definitely abandon their job?” Since turnover intention has been found to be a strong antecedent of actual turnover behaviour, studying the precursors, affective and cognitive job satisfaction, burnout, work climate, work content characteristics and personality traits, among nurse anaesthetists will provide information to decrease turnover intention.

Chapter 2 The history of nurse anaesthetists – a global perspective. The progress of non-medical professionals in anaesthesia

One of the most important contributions made towards the perfection of surgery has been the improvement in the conduction of general anaesthesia. NAs have been providing anaesthesia care in the United States and in some European countries for nearly 150 years, and were the first "nursing specialty group". Today's field of nurse anaesthesia has evolved from a low status women's specialty to a high status profession where males comprise nearly half of all employees.

Worldwide, the development of non-physician anaesthesia occurred in a similar way as in the USA where NAs work independently but under supervision of a physician, in the UK where nurses work under supervision of the anaesthesiologist or in Germany where nurses work under supervision of the surgeon. Specialist anaesthetists had to fight for their position in a dominantly surgical world and against a large general practitioner workforce.

In order to find their place in society anaesthetists had to do better at their craft than surgeons, medical students, GPs, religious sisters and nurses. Though not universally

so but especially in those countries where anaesthesia developed after WWII, Health Departments opted not to employ NAs and chose, essentially, to restrict anaesthesia to physician anaesthetists. With the introduction of muscle relaxants, induction agents, potent inhalational agents and other anaesthesia-specific medications as well as a burgeoning array of anaesthesia delivery systems, and regional anaesthesia modalities anaesthesia became progressively more difficult for surgeons. It was no longer medicolegally possible to administer anaesthesia without a profound knowledge of drugs and techniques (such as intubation and ventilation).

Societies forces, gender, war, economic, educational, certification and organizational issues all had a powerful effect on the development of NAs. NAs currently provide much of the anesthesia care world-wide. Although responsibilities, tasks and roles differ widely among NAs in the world, it is clear that NAs made a significant contribution to health care as an indispensable anaesthesia team member**.**

Chapter 3 Composition of the anaesthesia team: an European survey

At present, the anaesthesia workforce in Europe is very diversified in name, education, training, certification, and tasks allocated within the anaesthesia team. On average two European models can be defined: the nurse anaesthetists who are allowed to maintain anaesthesia without a direct supervision of the anaesthesiologist; and circulation nurses who can just help for a specific procedure but need a direct supervision of the anaesthesiologist and cannot monitor patients and maintain anaesthesia alone. Uniformity in training and certification of nurse anaesthetists and circulation nurses in Europe is essential and needs urgent attention. It will also contribute to the legal status of nurse anaesthetists within the anaesthesia team, furthering the professionalism of nurse anaesthetists, increase patient safety and finally the enhancement of anaesthesia as a speciality.

The value of well-trained, uniformly-certified, skilful nurse anaesthetists, who can move easily between anaesthesia teams from country to country, may become increasingly relevant with the imminent shortage of anaesthesiologists in Europe. The models of organisation using nurse anaesthetists supervised by an anaesthesiologist may give solutions for other countries in case of shortage. Obviously, that makes retaining these health care workers in their jobs of paramount importance.

The availability of reliable, systematic, country-based workforce statistics is generally poor throughout Europe. The registration of nurse anaesthetists or circulation nurses is not national organized or legally required. Also the accuracy of the data presented

may not necessarily reflect the exact number of active anaesthesiologists in a particular country and is depending the source.

Chapter 4 Comparison in job perceptions amongst Dutch nurse anaesthetists with and without nursing background

In The Netherlands, the employment as a nurse anaesthetist is comparable to that of a registered nurse anaesthetist in e.g. the Scandinavian countries. However, the Dutch healthcare system employs nurse anaesthetists both with and without nursing backgrounds. Perceptions about work context factors, psychosomatic symptoms, burnout, sickness absence, general health and job satisfaction were similar between NA's with or without nursing degree which suggests an equal perception on the part of both groups of competence to perform their jobs. This lack of difference may suggest that competency-based training programs for non-physician anaesthesia professionals are more important for their future performance than a background in nursing. The Dutch healthcare system does not distinguish between the two differently trained groups of nurse anaesthetists (with and without nursing backgrounds) when allocating tasks and work assignments. These findings may prove significant in solving the shortages in nursing personnel, and the problems in the recruitment of more anaesthesia professionals.

Chapter 5 Discriminating work context factors in the working environment of Dutch nurse anaesthetists

There is a need to identify the work context factors of importance for nurse anaesthetists. Identifying the job demands (job aspects referring to physical and/or mental effort) is crucial for hospitals in order to use their resources effectively and prevent negative outcomes, such as lowered health, dissatisfaction and job turnover. In addition, the availability of job resources (job aspects that are functional in achieving goals and stimulate personal growth, learning and development) can buffer the effect of these demands. We found four work context factors (career/rewards, relation with supervisor, task contents and social environment) that explain 48% of variance in work context, which Dutch nurse anaesthetists consider important in their job. These four work context factors serve as the essential buffers for job demands among Dutch nurse anaesthetists. The size and type of the anaesthesia department did not show to have an impact. Supervisors differed from nurse anaesthetists in their perception of the work context factors 'relation with supervisor', 'task contents' and 'social environment'. As supervisors often make decisions about the overall

work context of nurse anaesthetists, it is likely that this discrepancy results in lower job satisfaction in nurse anaesthetists.

Chapter 6 Personality dimensions and their relationship to job satisfaction amongst Dutch nurse anaesthetists

Depending on their personality traits, people create their own work ethic and environment, and influence their job satisfaction through cognitive, affective and behavioural processes. The relationship between personality and job satisfaction can be interesting because it emphasizes the importance of using personality scales when selecting new nursing staff and may be helpful in retaining them in the job. Four personality dimensions, easy going', 'orderly', 'receptive' and 'compassionate' were found in which the personality dimensions 'easy going' and 'orderly' explained 3.5% of the variance in job satisfaction, which still indicates the existence of a dispositional base of job satisfaction. Although personality is generally considered stable over time, several age differences have been noticed. The negative correlation between age and the personality dimension 'easy going' showed the expected evolution in this personality dimension.

Before using personality dimensions as a selection tool to retain employees, it is important to understand the relationship of particular personalities to job satisfaction. Factor analysis of the MBTI questionnaire resulted in different personality dimensions than those used originally. The popularity of the MBTI, despite the lack of validity, warrants continuing reevaluation. Based on the results of this study, caution is advised in regard to using the MBTI as a selection device.

Chapter 7 Work climate related to job satisfaction among Dutch nurse anaesthetists

Creating the right work climate, by providing the essential job resources that effectively buffer the negative aspects of the job, stimulates nurse anaesthetist's motivation. Motivating nurse anaesthetists to the utmost is about realizing their full potential, and the work climate can be seen as an indication of how well the organisation is realizing its full potential.

Higher levels of job satisfaction can be achieved when work climate characteristics that have a high correlation for job satisfaction are frequently present. Five work climate characteristics ('recognition', 'encourage development', 'mission statement', 'progress' and 'learning & growing') showed a relatively high correlation with job satisfaction, but a mean

work climate value below four. By focusing on these five characteristics, there is potential to increase the job satisfaction among Dutch nurse anaesthetists. Support from supervisors (head nurse anaesthetists) can be helpful in creating a positive work climate, and ultimately a higher level of job satisfaction, by adjusting negative perceptions.

Chapter 8 Burnout, psychosomatic symptoms and job satisfaction among Dutch nurse anaesthetists: a survey

The role of the NA can be stressful because they are repeatedly confronted with changing patient needs, medical problems and suffering, while dealing with demands from surgeons, supervising anaesthesiologists and their hierarchical supervisors. Burnout and psychosomatic symptoms were negatively associated with job satisfaction, and perceived general health was positively and sickness absence was negatively related to job satisfaction. Mainly short term sickness absence was presented, which is considered as a type of coping behaviour used in situations where a longer recovery period is needed as e.g. in cases of stress. Burnout often occurs among younger and less experienced employees, possibly due to 'reality shock' caused by a lack of job experience or by facing the harsh realities. However, no reality shock was found, older NAs had a higher incidence of burnout than their younger counterparts. Specifically, age related significantly to exhaustion and depersonalization. It is possible that older employees experience insufficient recovery time, inducing emotional exhaustion. The relation between age and depersonalization can possibly be explained by the limited career options.

Two or more psychosomatic symptoms were found in the majority of the NAs, which is five times higher than among employees in the general public. The higher incidence of psychosomatic symptoms in females in our study can be explained by the combination of outside employment and family responsibilities among females, and their higher sensitivity to internal, physical sensations.

Chapter 9 Understanding nurse anaesthetists' intention to leave their job: how burnout and job satisfaction mediate the impact of personality and workplace characteristics

Nurse anaesthetists' turnover intentions were predicted by burnout symptoms and job satisfaction, which in turn were predicted by personality dimensions (in case of burnout), work climate (in case of personality and job satisfaction) and work context characteristics (in case of job satisfaction). Based on this knowledge, hospitals can influence and prevent

turnover by selecting employees with specific personality traits, creating a positive work climate, and improving important work context characteristics. This study found a high percentage (42%) of turnover intention. Additionally, the nurse's age was significant related to turnover intention. The older nurse anaesthetists' lower levels of turnover intention may be explained by their need for job security and resistance to change.

Every work context characteristics had a indirect effect on job turnover intention via job satisfaction. Only the work context characteristic 'social environment' had an indirect effect on turnover intention via burnout. Maybe this is caused by the limited contact nurse anaesthetist have with their direct colleagues during work. Work climate was the only independent variable that had a high impact on burnout as well as job satisfaction in predicting turnover intention. Three out of four personality dimensions ('easy going', 'compassionate' and 'receptive') were significantly related to burnout. This could mean that nurse anaesthetists with the more pronounced personality dimensions 'compassionate' and 'receptive', have less effective coping strategies in their role as nurse anaesthetist, whereas nurse anaesthetists with more pronounced personality dimension 'easy going', have a more effective coping style. Personality dimension 'easy going' was also related to job satisfaction. Maybe nurse anaesthetists with this personality dimension are happier at work because they interpret their work environment more positively.

The role of the nurse anaesthetist is becoming increasingly important in the Dutch healthcare system. It follows that finding ways to retain trained nurse anesthetists in the profession is vital for the overall success of the system. Our results confirm the importance of a healthy psychosocial work environment combined with a work climate which stimulates the use of the maximal potential of each nurse anaesthetist for promoting higher levels of job satisfaction and lower incidence of burnout.

Chapter 10 The influence of emotions on events and job satisfaction amongst Dutch nurse anaesthetists

Job satisfaction fluctuates throughout the working day, and these fluctuations are in part driven emotions. Emotions are triggered by actual events in the workplace. By stimulating emotions that are positively related to job satisfaction, and reducing the incidence of emotions that are negatively related to satisfaction, it is possible to improve the work environment. Uncertainty can decrease job satisfaction, but uncertainty can be reduced by providing information.

Examining the relationship between events, emotions and job satisfaction and the influence of several 'uncertainties' on this process, a mediating effect of positive emotions

on positive and negative events and job satisfaction was demonstrated. ‘Uncertainties’ at the beginning of the working day did not affect this process. Events had no direct relationship with job satisfaction. To increase job satisfaction, it is important to increase positive emotions.

Chapter 11 General discussion and practical implications

In hospitals, where humans are the main capital of the organization, creating a culture of retention is one key strategy for reducing staff turnover and replacement costs. In order to retain nurse anaesthetists for the job, the manager should focus on extrinsic and intrinsic motivation. However, a positive and motivated attitude of the nurse anaesthetists towards their work is essential.

Nederlandse samenvatting

Hoofdstuk 1 Studie opzet en theoretische achtergrond

Een adequate infrastructuur, een efficiënte organisatie en, zeer belangrijk, goed getraind en gemotiveerd personeel in de gezondheidszorg zijn essentieel om het hoofd te kunnen bieden aan de eisen van de huidige gezondheidszorg. Verschillende redenen worden hiervoor genoemd: samenstelling van de bevolking, ontwikkelingen in de zorg, voldoende instroom en loopbaanmogelijkheden van anesthesiemedewerkers.

Het is daarom belangrijk om het verloop van anesthesiemedewerkers te beperken en de werving te verhogen door een optimale werkomgeving te creëren. De doelstelling van dit proefschrift was om de knelpunten in het personeelsverloop te inventariseren en een advies te geven voor het optimaliseren van de werkomgeving zodat anesthesiemedewerkers voor het beroep behouden kunnen blijven. De centrale vraagstelling van dit proefschrift is: "Zijn er factoren die het personeelsverloop bij anesthesiemedewerkers kunnen voorspellen?" Omdat de intentie om van baan te veranderen sterk gerelateerd is aan daadwerkelijk personeelsverloop, zal het bestuderen van factoren als affectieve en cognitieve arbeidstevredenheid, burnout, werkklimaat, inhoud van het werk en persoonlijkheid bij anesthesiemedewerkers, informatie geven om die personeelsverloop te beperken.

Hoofdstuk 2 De ontwikkeling van anesthesiemedewerkers door de tijd heen – in wereldwijd perspectief. De progressie van niet-medische professionals binnen de anesthesie

Een van de belangrijkste bijdragen aan de perfectie van chirurgie is de ontwikkeling in algehele anesthesie. Anesthesieverpleegkundigen in de USA en enkele Europese landen geven al 150 jaar anesthesie en zij waren zelfs de eerste groep gespecialiseerde verpleegkundigen. Vandaag de dag heeft het werkveld van de anesthesieverpleegkundige zich ontwikkeld van een lage status vrouwenberoep naar een hoge status gespecialiseerde professional, mannen en vrouwen.

Wereldwijd verliep de ontwikkeling van anesthesiepersoneel (anders dan de anesthesioloog) zoals in de USA, waar verpleegkundigen zelfstandig werkten onder supervisie van de chirurg, of zoals in Groot Brittannië waar verpleegkundigen werkten onder directe supervisie van een anesthesioloog, of zoals in Duitsland waar de verpleegkundigen werkten onder directe supervisie van de chirurg.

Anesthesiologen moesten, in een wereld waarin de chirurgen en huisartsen de dienst uit maakten, voor hun werkterrein vechten. Om hun eigen plek te verwerven moesten zij het beter doen dan chirurgen, huisartsen, medische studenten, religieuze nonnen en verpleegkundigen. Hoewel niet wereldwijd, maar vooral in landen waar de anesthesie zich na WOII ontwikkelde, werd anesthesie direct een verantwoordelijkheid van een anesthesioloog. Met de komst van spierverslappers, hypnotica, inhalatie medicatie, andere specifieke anesthesie medicatie, de verdere ontwikkeling van de anesthesieapparatuur en regionale anesthesietechnieken werd het geven van anesthesie te complex voor de chirurg. Het was medisch-juridisch niet langer verantwoord om anesthesie te geven zonder vergaande kennis over de medicatie en technieken (intubatie en ventilatie).

Oorlogen, maatschappelijke, economische, educatieve en organisatorische ontwikkelingen hadden een sterk effect op de ontwikkeling van de anesthesieverpleegkundige. In de meeste landen zijn het anesthesieverpleegkundigen die de anesthesie toedienen. Hoewel de verantwoordelijkheden, taken en rollen wereldwijd sterk verschillen is het duidelijk dat de anesthesieverpleegkundige als onvervangbaar anesthesieteamlid een essentiële bijdrage heeft geleverd aan de ontwikkeling van de gezondheidszorg.

Hoofdstuk 3 Samenstelling van het anesthesieteam: een Europese verkenning

Momenteel zijn naamgeving, training, opleiding, diplomering en taken van de mensen die werken binnen het anesthesie team erg divers. Over het algemeen genomen worden er twee modellen binnen Europa gehanteerd: de anesthesieverpleegkundige die de anesthesie mag onderhouden onder indirecte begeleiding van een anesthesioloog en omloopverpleegkundigen die de anesthesioloog kunnen assisteren bij het uitvoeren van bepaalde handelingen, maar dit altijd uitvoeren onder directe supervisie en zelfstandig geen anesthesie mogen onderhouden of monitoren. Uniformiteit in training en opleiding van anesthesieverpleegkundige en omloopverpleegkundigen is essentieel en verdient op korte termijn meer aandacht. Daarnaast zal het bijdragen aan de wettelijke status van de anesthesieverpleegkundige binnen het anesthesieteam, een verdere professionalisering van het beroep, een toename in patiëntveiligheid en uiteindelijk een verdere ontwikkeling van de anesthesie als specialisme.

Met het toenemende tekort aan anesthesiologen in Europa kan de meerwaarde van een goed opgeleide en getrainde, uniform gecertificeerde anesthesieverpleegkundige die in de verschillende landen binnen Europa kan werken, zeer relevant zijn. Het model waarbij anesthesiologen samenwerken met anesthesiemedewerkers kan in die landen waarin een

tekort ontstaat, een oplossing bieden. Echter, dit maakt het behouden van anesthesieverpleegkundigen binnen hun vak van extreem belang.

De beschikbaarheid van betrouwbare, systematische statistische gegevens over de anesthesiologische beroepsbeoefenaren op nationaal niveau is zeer matig. De registratie van anesthesieverpleegkundigen of omloopverpleegkundigen is niet nationaal georganiseerd en wettelijke registratie is niet nodig. Ook de genoemde aantallen anesthesiologen in een bepaald land kunnen afwijken van de actualiteit en zijn vaak afhankelijk van de gebruikte bron.

Hoofdstuk 4 Vergelijking werkperceptie Nederlandse anesthesiemedewerkers met en zonder verpleegkundige achtergrond

De Nederlandse anesthesiemedewerker is vergelijkbaar met de anesthesieverpleegkundige zoals die werkzaam is in bijvoorbeeld de Scandinavische landen. Echter, een verpleegkundige achtergrond is niet verplicht in Nederland. Waarnemingen over werkcontext, psychosomatische symptomen, burnout, ziekteverzuim, algemene gezondheid and arbeidstevredenheid waren binnen de twee groepen gelijk hetgeen suggereert dat beiden gelijke percepties hebben over hun competenties om het werk goed te kunnen uitvoer
en.

De afwezigheid van een enkel verschil kan de suggestie wekken dat een competentiegerichte training voor anesthesiemedewerkers belangrijker is dan een verpleegkundige achtergrond. Het Nederlandse zorgstelsel maakt bij het toewijzen van verantwoordelijkheden en taken geen onderscheid tussen de twee verschillend opgeleide groepen (met of zonder verpleegkundige achtergrond). Deze bevindingen kunnen een belangrijke oplossing bieden voor het tekort aan anesthesieverpleegkundigen en het werven hiervan.

Hoofdstuk 5 Onderscheidende werk context factoren binnen de werkomgeving van Nederlandse anesthesiemedewerkers

Het is belangrijk om inzichtelijk te hebben welke werk context factoren anesthesiemedewerkers belangrijk vinden. Door het identificeren van werklast (aspecten van het werk die lichamelijke of mentale inspanning kosten) kunnen ziekenhuizen effectief hun werkmotiverende middelen inzetten om zodoende de negatieve consequenties, zoals bijvoorbeeld verminderde gezondheid, ontevredenheid en personeelsverloop, van werklast

te minimaliseren. Daarnaast kunnen deze werkmotiverende middelen (aspecten van het werk die functioneel zijn voor het behalen van doelen en persoonlijke groei en ontwikkeling) als buffer werken tegen de werklast.

Wij hebben vier werkcontext factoren geïdentificeerd (‘career/reward’, ‘relation with supervisor’, ‘ task content’ en ‘social environment’) die 48% verklaarden van de werk context factoren die belangrijk werden gevonden door de Nederlandse anesthesiemedewerkers. Deze vier werk context factoren fungeren als buffer tegen de werklast. De grootte van het ziekenhuis en het type ziekenhuis waren niet van invloed op de vier factoren. Leidinggevenden oordeelden anders over de werk context factoren ‘relatie met leidinggevende’, ‘werkinhoud’ en ‘sociale omgeving’. Doordat leidinggevenden verantwoordelijk zijn voor het afdelingsbeleid kan een andere inschatting van de belangrijkste werk context factoren leiden tot arbeidsontevredenheid bij anesthesiemedewerkers.

Hoofdstuk 6 Persoonlijkheiddimensies en de relatie tot arbeidstevredenheid bij Nederlandse anesthesiemedewerkers

Afhankelijk van de persoonlijkheid ontwikkelt de anesthesiemedewerker zijn eigen werkethiek en omgeving en beïnvloedt door cognitieve, affectieve en gedragsprocessen zijn arbeidstevredenheid. De relatie tussen persoonlijkheid en arbeidstevredenheid kan interessant zijn voor het inzetten van selectie-instrumenten bij werving en selectie van nieuw personeel waardoor medewerkers geselecteerd kunnen worden die beter behouden kunnen worden voor het anesthesie-vak.

Vier persoonlijkheiddimensies 'easy going’, ‘orderly’, ‘receptive’ en ‘compassionate’ werden in dit onderzoek gevonden waarvan de dimensies 'easy going’ en ‘orderly’ 3,5% de variatie in arbeidstevredenheid bepaalden, waarmee de relatie tussen persoonlijkheid en arbeidstevredenheid wordt bevestigd. Hoewel persoonlijkheiddimensies in zijn algemeenheid stabiel zijn in de loop ter tijd, is er verschil binnen de verschillende leeftijdsgroepen aangetoond. De negatieve correlatie tussen leeftijd en de persoonlijkheiddimensie ‘easy going’ bevestigt de evolutie van deze dimensie.

Voordat een persoonlijkheidstest ingezet kan worden voor het selecteren van de juiste medewerker, is het belangrijk om de relatie te bepalen tussen bepaalde persoonlijkheiddimensies en arbeidstevredenheid. Factor analyse van de door ons gebruikte MBTI vragenlijst leverde andere persoonlijkheiddimensies op dan verondersteld werd. De populariteit van de MBTI verdient door gebrek aan validiteit een her-evaluatie. Uitgaande

van onze studie is voorzichtigheid gebaat bij het gebruik van de MBTI als selectie-instrument.

Hoofdstuk 7 Werkklimaat en de relatie met arbeidstevredenheid bij Nederlandse anesthesiemedewerkers

Het juiste werkklimaat kan door het inzetten van werkmotiverende factoren de negatieve werklast bufferen en daardoor de motivatie van anesthesiemedewerkers verhogen. Bij het motiveren van mensen gaat het om het maximaal realiseren van de aanwezige potentie. Werkklimaat is een indicator voor het realiseren van die maximale potentie binnen een organisatie.

Een hoger niveau van arbeidstevredenheid kan bereikt worden door de kenmerken met een hoge correlatie voor arbeidstevredenheid te stimuleren. Vijf werkklimaat kenmerken ('recognition', 'encourage development', 'mission statement', 'progress' and 'learning & growing') hadden een hoge correlatie met arbeidstevredenheid maar een lage gemiddelde score. Door meer op deze kenmerken te focussen is er een mogelijkheid om de arbeidstevredenheid van anesthesiemedewerkers te verhogen. Ondersteuning van de leidinggevende door het bijstellen van negatieve percepties kan zeker bijdragen aan een positiever werkklimaat en uiteindelijk aan een hogere arbeidstevredenheid.

Hoofdstuk 8 Burnout, psychosomatische symptomen en arbeidstevredenheid bij Nederlandse anesthesiemedewerkers: een enquête onderzoek

De rol van anesthesieverpleegkundigen kan stressvol zijn doordat zij frequent geconfronteerd worden met veranderde patiëntenbehoeften, lijden en medische problemen en daarnaast tegelijkertijd geconfronteerd worden met de eisen van een chirurg, anesthesioloog en leidinggevende. Burnout, psychosomatische symptomen en het ziekteverzuim hadden een negatieve correlatie met arbeidstevredenheid en 'algehele gezondheid' had een positieve relatie met arbeidstevredenheid. Met name kortdurend ziekteverzuim was aanwezig. Dit kan duiden op een soort "copingsgedrag" dat nodig is voor het langer herstellen na een stressvolle dag. Burnout kan frequenter optreden bij jongere of pas gediplomeerde medewerkers door de zogenoemde 'reality shock', die ontstaat door een gebrek aan ervaring of door het geconfronteerd worden met de harde realiteit. In dit onderzoek werd er geen hoger niveau van burnout bij jongere medewerkers gevonden maar juist bij de oudere anesthesiemedewerker. Leeftijd kende een significante positieve correlatie met "exhaustion" hetgeen mogelijk verklaard kan worden door een te korte hersteltijd tussen de verschillende diensten in. Ook had leeftijd een significante

positieve correlatie met ‘depersonalization’ die verklaard kan worden door de beperkte carrièremogelijkheden.

Bij de meerderheid van de anesthesiemedewerkers werden twee of meer psychosomatische symptomen gevonden, hetgeen vijfmaal hoger is dan bij de gemiddelde Nederlandse populatie. De hogere score bij vrouwen zou veroorzaakt kunnen worden door de combinatie van baan en verantwoordelijkheden voor het gezin en hun wellicht hogere sensitiviteit voor gevoelens van de ander.

Hoofdstuk 9 Het personeelsverloop van anesthesiemedewerkers begrijpen: hoe burnout en arbeidstevredenheid de impact van persoonlijkheid en werkkenmerken mediëren

De intentie om van baan te veranderen bij anesthesiemedewerkers werd voorspeld door burnout symptomen en arbeidstevredenheid. Burnout fungeerde als mediator voor persoonlijkheiddimensies en werkklimaat, en arbeidstevredenheid fungeerde als mediator voor werkklimaat en werk context factoren. Gebaseerd op deze kennis kunnen ziekenhuisorganisaties het verloop van anesthesiemedewerkers beperken door medewerkers te selecteren met specifieke persoonlijkheiddimensies, een positief werkklimaat te creëren en door de belangrijkste werk context factoren te verbeteren. In de studie werd een intentie tot verloop gevonden van 42% waarbij de leeftijd negatief correleerde met de intentie tot verloop. Misschien hebben de oudere medewerkers meer behoefte aan baanzekerheid en een hogere weerstand tegen verandering.

Alle werk context factoren hadden een indirect effect op het personeelsverloop via arbeidstevredenheid en alleen ‘social environment’ had ook een indirect effect op personeelsverloop via burnout. Wellicht is dit te verklaren door de beperkte sociale informele contacten die anesthesiemedewerkers onderling tijdens de werkdag met elkaar hebben. Werkklimaat was de enige factor die zowel via arbeidstevredenheid als via burnout effect had op het personeelsverloop. Drie van de vier persoonlijkheiddimensies (‘easy going’, ‘compassionate’ en ‘receptive’) relateerden met burnout. Dit zou kunnen betekenen dat anesthesiemedewerkers met de persoonlijkheiddimensies ‘compassionate’ en ‘receptive’ minder effectieve copingsstijlen kunnen hanteren terwijl de medewerker met de persoonlijkheiddimensie ‘easy going’ een effectievere copingsstijl zal hebben. ‘Easy going’ relateerde ook met arbeidstevredenheid. Misschien zijn deze medewerkers meer tevreden omdat ze hun omgeving positiever beoordelen.

De rol van de Nederlandse anesthesiemedewerker wordt steeds belangrijker door o.a. een toegenomen zorgvraag. Onze resultaten bevestigen het belang van een gezonde

psychosociale werkomgeving, gecombineerd met een positief werkklimaat dat de aanwezige potenties maximaal benut zodat burnout wordt beperkt en de arbeidstevredenheid wordt verhoogd.

Hoofdstuk 10 De invloed van emoties en gebeurtenissen op de arbeidstevredenheid bij Nederlandse anesthesiemedewerkers

Fluctuaties in arbeidstevredenheid gedurende de werkdag worden gedeeltelijk voortgebracht door emoties en deze ontstaan vervolgens door gebeurtenissen op de werkvloer. Door emoties die positief de arbeidstevredenheid beïnvloeden te stimuleren en juist de emoties die de arbeidstevredenheid negatief beïnvloeden te beperken kunnen we een positievere werkomgeving creëren. Onzekerheden kunnen arbeidstevredenheid verminderen. Echter, onzekerheid kan beperkt worden door voldoende informatie te verschaffen.

Uit ons onderzoek blijkt dat arbeidstevredenheid indirect beïnvloed wordt door positieve en negatieve gebeurtenissen. Positieve emoties speelden hierbij een medierende rol. Onzekerheden aan het begin van een werkdag hadden geen enkele invloed op het proces. Om de arbeidstevredenheid te verhogen moeten we de positieve emoties stimuleren.

Hoofdstuk 11 Algemene discussie en praktische implicaties

In ziekenhuizen vormen de medewerkers het belangrijkste kapitaal. Het creëren van een cultuur waarin het beperken van ongewenst personeelsverloop voorop staat, kan hierbij een goede strategie zijn om de medewerkers te behouden en kosten te besparen. Voor het behoud van anesthesiemedewerkers is het voor het ziekenhuismanagement belangrijk om zowel de extrinsieke als intrinsieke motivatie te stimuleren. Echter, een positieve en gemotiveerde houding van de anesthesiemedewerker tegenover zijn eigen werk is daarvoor essentieel.

Scientific lectures

1996	IORT (intraoperative radiotherapy) and anesthesia, Catharina Hospital, Eindhoven
1997	Pharmacology for nurse-anesthetists, Fontys Institution, Eindhoven
1997	Anesthesia for the geriatric patient, Fontys Institution, Eindhoven
1998	PONV in surgery for mamma correction
1999	Postoperative Nausea and Vomiting – Eur Congress Nurse Anaesthetists
1999	Pediatric anesthesia (national course), Eindhoven
2000	Tropisetron plus dexamethasone is superior in preventing postoperative nausea and vomiting following elective bilateral mamma reduction, 6th World Congress for Nurse Anesthetists, Chicago, USA
2001	Clinical course for nurse anesthetists and operating assistants
2003	Postoperative Nausea and Vomiting – Fifth United Arabic Emerites Conference of Anaesthesia, Critical Care and Pain Medicine, Dubai, UAE.
2005	Project management for nurse anesthestists - Catharina Hospital, Eindhoven
2005	Working with two different levels of nurses in recovery - Catharina Hospital, Eindhoven
2007	Difficult Airway Management - AMIECO: trauma care congress, Aruba, Netherlands Antilles.
2007	Patients with Burn Injuries - AMIECO: trauma care congress, Aruba, Netherlands Antilles
2007	Abdominal Injuries: chairman - AMIECO: trauma care congress, Aruba, Netherlands Antilles
2007	Theoretical approach of motivation – 3M Health Care Symposium, Utrecht
2008+	Longitudinal study: personality in relationship with learning curve of Dutch students
2009	Career planning and possibilities - National congress of Dutch operating nurses, Veldhoven, Netherlands
2009	Discussion panel: career possibilities and age-related personnel management, Veldhoven, Netherlands
2009	How to organize an Acute Pain Service? - Congress of the World Institute of Pain, Mykonos, Greece
2009	What to do now! - Congress “shortage of professionals, retain them for your organization!”. Den Hague, The Netherlands
2009	Burnout, Job satisfaction, and Motivation among anesthesia providers. Royal Prince of Wales Hospital, Sydney, Australia.
2010	Postoperative nausea and vomiting: physiology, prediction and treatment - New York Society of Regional Anaesthesia (NYSORA) World Congress. Dubai, UAE
2010	Difficult airway workshop. Difficult Airway Congress Australia – Lorne, Australia.
2010	Difficult airway workshop for nurses. Royal Hobart Hospital - Hobart, Tasmania, Australia.
2010	Logistic systems in the operating complex. Royal Hobart Hospital - Hobart, Tasmania, Australia.
2010	How to improve quality in the OR? Royal North Shore Hospital – Sydney, Australia.

Scientific publications

1995 Meeusen V. Polyhistor a manual for Nurse Anesthetists, 1st edition. Houten: NVAM

1995 Meeusen V. Hurricane Luis – St. Martin – Dutch Antilles. NTVA

1996 Meeusen V. Anaesthesia experience in a remote hospital in the Dutch Antilles during a hurricane (SMMC Hospital St. Martin). NTVA.

1997 Meeusen V. Reader: Pharmacology. Eindhoven: Fontys Institution

1997 Meeusen V. The Anaesthesia Machine. NTVA 1997;14:26.

1998 Meeusen V. Reader: Anaesthesia for the Geriatric Patient. Eindhoven: Fontys Institution

1999 Meeusen V. Reader: Anaesthesia for Nurse Anesthetists. Eindhoven: Fontys Institution

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2000 Meeusen V. Tropisetron plus dexamethasone is superior in preventing postoperative nausea and vomiting following elective bilateral mamma reduction. World Congress Nurse Anesthetists, Chicago

2001 Meeusen V. "Geen Hersenloze Kwallen". Career Planning for Nurse Anesthetists. Thesis Registered Health Care Manager. Amsterdam: Hogeschool In Holland

2002 Mannaerts G, van Zundert A, Meeusen V, Martijn H, Rutten H. Anaesthesia for advanced rectal cancer patients treated with major resections and intraoperative radiotherapy. Eur J Anaesthesiol 2002;19:742-748.

2004 Meeusen V. Physician Assistants in Anaesthesia. NTVA 2004;21.

2008 Van Zundert A, Kuczkowski KM, van Zundert T, Meeusen V. The art of maintaining a patent airway: an old problem – new evidence. Can J Anesth 2008;55:380-381.

2008 Meeusen V, Van Dam K, Brown-Mahoney C, Van Zundert A, Knape J. Abstract and poster presentation: do anaesthesia assistants need a nursing degree? - World Congress of Anaesthesiology, Cape Town, South Africa.

2008 Meeusen V, Brown-Mahoney C, Van Dam K, Van Zundert A, Knape J. Abstract and poster presentation: work context in relation to well-being among Dutch anaesthesia assistants - World Congress of Anaesthesiology, Cape Town, South Africa.

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Acknowledgement

First of all, I would sincerely like to thank my promoter Prof.dr. Hans Knape, for all his help and belief within this thesis. He gave me the inspiration and encouragement to participate in starting this thesis. After completing my Masters degree, Hans congratulated me for the development of a new model in stimulating a career development among nurse anaesthetist. However, as the model was purely theoretically it needed further research so Hans asked me to test the model practically. This was easier said than done, but it did not discourage us to continue.

Initially I realized that I needed more help with the concept of the questionnaire from a socio-psychological point of view. Searching the internet I found a lecturer in 'work and organizational psychology' in the nearby university of Tilburg and made an appointment with dr. Karen van Dam. She was critical and showed me the pitfalls of the current concept. I left with many useful tips and tricks which helped me to improve my task. I owe my deepest gratitude to Karen. She taught me how to ask the right questions and express my ideas. She showed me how to approach research problems in many different ways. Also the need to be persistent and therefore accomplish your goals and promote the study findings. She was always available to meet up and by asking the right questions we could discuss my ideas, evaluate and assess them to further my study.

Following the questionnaire, statistical analysis was necessary and without the help of Prof. Chris Brown-Mahoney I would have been lost. After many Skype phone calls and a busy meeting schedule in Brussels she spent a whole day in her hotel room to discuss the statistical options. Thank you Chris, I appreciate the time you took and am very grateful for all your help. You stimulated me to study statistics in greater depth.

Whilst writing the first manuscript, Hans, André and myself were discussing and comparing which term to use for 'anesthesiemedewerkers' which was finally translated into 'nurse anaesthetist'. In this respect I need to thank Jaap Hoekman (President International Federation Nurse Anaesthetists), for our fruitful discussions during our journeys to the NVAM Board meetings in Houten. Jaap gave me a good inside view to nurse anaesthetists worldwide and the associated organization. Although many questions were answered after each journey more questions and research options were created which consequently resulted in even more work.

It was an honor for me working together with professors Stephen Gatt (Sydney Australia), Narinder Rawal (Örebrö, Sweden) and Chandra Kumar (Middlesborough, UK). Their unlimited wisdom was inspiring and the discussions we had were very enriching. Stephen thank you for driving us around Sydney in your cabriolet, to visit impressive

historical places and reciting fascinating facts of both Sydney and Malta. Furthermore not forgetting to thank your wife Alice, for her warm hospitality and exquisite dinners.

I am also indebted to my colleagues Riana Botter, Gerrie Quivooij, Bart van de Reijt and Karel Theunissen who always had a listening ear. They were interested, enthusiastic, simulative and allowed me to bring my theories into practice. Besides the serious moments, most important they created an atmosphere in which humor was always present.

In addition I would like offer my regards to all nurse anaesthetists and their supervisors within the Netherlands who participated and showed their interests in the study and its results. Thanks go to Jane DuBroy (Toronto, Canada) for editing the manuscripts of the thesis.

Not forgetting my gratitude towards my family for their support and acknowledgement in my absence on many social family occasions. Last, but not least, I thank my partner André, who was not only supportive and encouraging, but also for sharing his experience of the dissertation writing endeavor with me, for listening to my complaints and frustrations, and who never stopped believing in me.

Curriculum Vitae

Vera Meeusen finished her VWO at the Heerbeeck College in Best and worked as a nurse anaesthetist in the operating theatres at Catharina Hospital in Eindhoven from 1994 to 2002. In 1995 she wrote the first edition of 'Polyhistor' a manual on the subject of anaesthesia for nurse anesthetists. This was published by the Dutch Society of Nurse Anaesthetists (NVAM). As a guest she gave several lectures on different topics in anaesthesia at the Fontys Hogeschool in Eindhoven. Besides her work in anaesthetics she obtained several management degrees e.g. Management in the Operating Theatre Department (Fontys Hogeschool), Teambuilding (Hogeschool Arnhem/Nijmegen), European Health Manager (University of Innsbruck, Austria). During these years she also wrote several studies on the subject postoperative nausea and vomiting.

In 2002 she began to work as supervisor in the nurse anaesthetist theatre department at the Catharina Hospital in Eindhoven, where she further obtained her master's degree in Health Care Management in 2004. Additionally she developed an age related career development instrument for nurse anaesthetists named 'Geen Hersenloze Kwallen'. She organized several congresses of which three were referred to `Highlights in Health Care Management´. In 2005 she became a board member of the Dutch Society of Nurse Anaesthetists (NVAM).

In 2007 after optimizing the work environment of Dutch Nurse Anaesthetists she started researching using this item as her first study for the thesis. The last few years she has given several lectures regarding work motivation and career development in The Netherlands. As a member within the organizing committee of the NYSORA World Anaesthesia Congress, she has organized the necessary nursing programs. Since the beginning of this year she has become active in the International Federation of Nurse Anaesthetists, and is a member of the Practice Committee.

As of June 2010, due to the consequences of limited career options within the Operating Theatre Department, she made a significant career change and became the new manager of the Department of Internal Medicine at the Catharina Hospital in Eindhoven where she is still employed.


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