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Teamwork in Operating Room Nursing

Conceptual Perspective and Finnish, British and American Nurses' and Nursing Students' Experiences

Doctoral dissertation

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ABSTRACT

Background of the study: Operating room (OR) patient acuity has increased, technology has become more complex, and the pre- and postoperative stays in hospital have shortened. The staffing crisis in OR is further fuelled by government promises to cut elective surgery waiting periods. That will result in a situation where the need for collaboration will also increase. For nursing students, it is difficult to get enough practical experience about OR teamwork because of the general urgency and the preceptors' multiple responsibilities in the OR context. The problem therefore is, that staff members may lack the skills needed in teamwork, and poor teamwork may jeopardize patients' safety. Moreover, novice staff entering the specialty often leave when they discover the overwhelming demands of OR nursing. Even though there is a need to clarify teamwork as a context where OR nurses work and nursing students practise, the literature fails to describe how OR teams work in terms of organizational patterns and to instruct how students could be assisted to develop teamwork skills.

Purposes and design of the study: The purpose of this qualitative study was to characterize the essential quality of teamwork in OR nursing by describing how teamwork is experienced by Finnish, British and American OR nurses and nursing students and by describing how the concept 'team' is defined. This research focused on collaboration as an element of teamwork, the positive and negative features of OR teamwork, nursing students' experiences as novice team members and the applicability of teamwork in the OR context. Interview and written data were collected by using the critical incident technique and analysed by using the descriptive phenomenological method and the content analysis method. The conceptual analysis method was also used to analyze written documents about previous studies of teamwork.

Results: The aim of OR teamwork was to provide professional and efficient care for patients undergoing surgery. Professional teams were competent and willing to collaborate and thus consisted of a mixture of caring, social-emotional balance and technical skills. Ability to recognize both actual and potential risks and to provide direction to others characterized safety in OR teams. Small units were experienced as more flexible and comfortable than big ones, because small units helped staff members to communicate better and made decision-making easier. Unpredictability, constant changes in team composition, the need to work overtime, unnatural perfectionism and communication problems hindered teamwork. Therefore, employment in OR teams was considered too stressful for novice and senior nurses. Students gained team membership during the placement period if there was an adequate mentoring process and an accepting team atmosphere, which could result in a desire to be an OR nurse after graduation. Only a couple of weeks' placement period, mentors' negative or overbearing attitudes, strict technical orientation and denial of mistakes made OR teams stressful learning contexts. Only a few remarkable cultural differences were discovered, namely the ways of organising shifts and overtime work, the attitudes towards unlicensed assistive staff members, and the team members' obligation to write incident reports after malpractice. The cultural consistency of the results suggests that OR teamwork could be developed interculturally. The most important attribute of 'team' is having a shared goal and mode of action. Therefore, the challenge in aiming at good patient care in ORs is to maintain good teamwork between individuals from different professions.

Conclusion and implications: Recommendations include the need to recognise the ways in which teamwork culture affects patient care, particularly with regard to safety issues, and to link its mission with customer service strategies and goals. The emotional atmosphere of ors should be fostered to develop positive OR teamwork cultures that attracts nurses to work in the OR. More evidence is needed to identify the aspects of OR teamwork in different OR settings to understand when and how changes in the OR team composition affect patient care. Economic aspects of organising smaller units from the perspective of smoothly functioning teams and solving the problem of overtime work in OR teams also requires clarification. While developing OR nursing placement periods, it will be important that students are adequately prepared at school to work in interprofessional teams, and that the period is understood as a time of learning instead of service.

TIIVISTELMÄ

Tutkimuksen tausta: Leikkausten akutisoituminen ja monimutkaistuminen, teknologian kehittyminen, leikkausta edeltävän sekä leikkauksen jälkeisen sairaalassa vietetyn aja lyhentyminen ja valtion takausjärjestelmä lyhentää leikkaukseen odotusaikoja ovat lisänneet leikkaussaleissa työskentelevän hoitohenkilöstön paineita. Näiden muutosten johdosta yhteistyön tarve leikkaustiimeissä on lisääntynyt. Leikkausosastoilla harjoittelun aikana sairaanhoidon opiskelijoille ei aina pystytä tarjoamaan riittävästi käytännön kokemuksia tiimityöstä, koska leikkausosastojen yleinen kiire ja ohjaajien moninaiset velvollisuudet häiritsevät ohjaustilanteita. Jos koulutuksen aikana ei opita tiimityötaitoja, tulevat tiimien jäsenet eivät mahdollisesti hallitse yhteistoimintaa leikkaustiimeissä ja saattavat vaarantaa potilaan turvallisen hoidon. Opiskeluajan ylivoimaisilta tuntuvat ja stressaavat kokemukset saattavat myös johtaa siihen, etteivät opiskelijat valmistuttuaan hakeudu leikkausosastoille työhön. Leikkaustiimityötä on tarpeen selkiyttää. Aikaisemmat tutkimukset eivät kuvaa riittävästi tiimityön ilmenemistä leikkaushoitotyössä hoitajan työn ja/tai opiskelijoiden taitojen oppimisen ja harjaannuttamisen näkökulmasta.

Tutkimuksen tarkoitus ja tutkimusasetelma: Tämän laadullisen tutkimuksen tarkoitus oli kuvata tiimityön merkitystä leikkaushoitotyössä suomalaisten, englantilaisten ja amerikkalaisten hoitajien ja hoitotyön opiskelijoiden kokemusten kautta sekä kuvata tiimi-käsitteen määrittelyä ja ilmenemistä aikaisemman kirjallisuuden perusteella. Tutkimus tarkasteli yhteistoiminnallisuutta, myönteisiä ja kielteisiä tekijöitä tiimityön osana, opiskelijoiden kokemuksia tiimityöstä vasta-alkajan näkökulmasta sekä tiimityön käsitteellistä soveltuvuutta leikkaustoiminnassa. Haastattelut ja kirjallinen aineisto kerättiin merkityksellisten tapahtumien menetelmää käyttäen ja analysoitiin kuvailevaa fenomenologista menetelmää ja laadullista sisällön analyysiä käyttäen. Käsiteanalyysiä käytettiin aikaisemman tiimityöstä olevan tutkimustiedon analysointiin.

Tulokset: Leikkaustiimityön tavoite oli turvata ammattitaitoinen ja sujuva hoito leikkauspotilaille. Ammattitaitoiset tiimit olivat kyvykkäitä ja halukkaita yhteistyöhön hoidollisen osaamisen, persoonallisen taitavuuden sekä sosiaalisten ja teknisten taitojen osalta. Tiimin jäsenten kyky havaita sekä mahdollisia että ilmeisiä riskejä ja ohjata toisten tiimin jäsenten työskentelyä ylläpiti leikkauspotilaan turvallisuutta. Pienet leikkausyksiköt olivat joustavampia ja olemukseltaan miellyttävämpiä kuin suuret yksiköt, koska pienissä yksiköissä oli helpompi olla toisille avuksi, kommunikoida ja tehdä päätöksiä. Epävarmuus, jatkuvat muutokset tiimien kokoonpanoissa, tarve ylityöhön, täydellisyyden tavoittelu ja pulmat vuorovaikutuksessa vaikeuttivat sujuvaa tiimityötä. Vasta-alkajat ja iäkkäät työntekijät kokivat työn leikkaustiimeissä stressaavaksi. Hyvä ohjaus ja hyväksyvä oppimisilmapiiri auttoivat opiskelijoita pääsemään tiimien jäseniksi. Nämä seikat saattoivat myös edesauttaa sitä, että opiskelijat halusivat valmistuttuaan työskennellä leikkausosastolla. Vain muutaman viikon mittainen harjoittelujakso, ohjaajan kielteinen tai ylisuojeleva asenne, teknisen toiminnan korostuminen sekä virheiden kieltäminen tekivät leikkaustiimeistä vaativan ja hankalan oppimisympäristön. Tässä tutkimuksessa ilmeni vain muutamia kulttuurieroja: tapa järjestää työvuorot ja ylityöt, asenne alemmin koulutettuun hoitohenkilöstöön ja tiimin jäsenten vaatimus raportoida kirjallisesti hoitoon liittyvistä laiminlyönneistä. Tulosten kulttuurinen yhdenmukaisuus mahdollistaa leikkaustiimien ja leikkaustiimityön koulutuksen kansainvälisen kehittämisen ja eri maissa saatujen tulosten hyödyntämisen paikallisesti. Tiimityön käsitteelliseltä kannalta keskeisintä oli työn yhteinen päämäärä ja sen mukainen toiminta. Haasteena onkin ylläpitää ja kehittää eri ammattiryhmien välistä yhteistyötä potilaan hyvän ja turvallisen leikkaushoidon takaamiseksi.

Johtopäätökset ja suositukset: Tiimityötä on tarpeen selkiyttää sekä työntekijöiden toiminnan että leikkauspotilaiden turvallisuuden osalta. Leikkaustiimien henkistä työilmapiiriä on tärkeä kehittää, jotta hoitajat haluavat jatkossakin työskennellä leikkausosastoilla. Tarvitaan myös lisää näyttöä siitä, miten tiimin kokoonpanojen toistuvat muutokset vaikuttavat erilaisten leikkausosastojen toimintaan, erityisesti potilaiden yksilölliseen ja turvalliseen hoitoon. Tulee myös selvittää pienten leikkausyksiköiden taloudellista ja toiminnallista organisointia sekä ylitöiden järjestämistä organisaation ja yksilön kannalta mielekkäästi. Kehitettäessä leikkaushoidon harjoittelujaksoja tulee myös pitää huolta siitä, että opiskelijat saavat riittävästi tietoa tiimityöstä oppitunneilla ennen harjoittelujakson alkua ja että harjoittelu ymmärretään oppimisen, ei työnteon näkökulmasta.

Yleinen suomalainen asiasanasto: leikkaushoito; hoitotyö; tiimityö; yhteistyö; kulttuurierot; Suomi; Iso-Britannia; Yhdysvallat

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LIST OF TERMS

Operating room (OR)
The physical environment where surgical operations take place and where the staff, e.g. scrub, circulating and anaesthesia nurses, surgeons and anaesthesiologists, work.

OR nursing
Scrub or circulating nurses' activities during intraoperative nursing. Synonymous to the British term 'theatre nursing'.

Perioperative nursing
The patient´s total experience related to the surgical intervention, consisting of preoperative, intraoperative and postoperative phases.

Preoperative phase
The part of perioperative nursing that begins with the decision to carry out surgery and ends when the patient is transferred into the OR.

Intraoperative phase
The part of perioperative nursing from the time the patient is transferred on to the operating table to the time he/she is admitted into the recovery area.

Postoperative phase
The part of perioperative nursing that begins with the patient's admission into the recovery area and ends when the patient is finally discharged from the care of the surgical team.

Scrub nurse
Establishes and maintains sterile fields and assists surgeons with instrumentation during surgical procedures in the operating room.

Circulating nurse
Functions outside sterile fields, orchestrating the entire process within the OR and providing assistance to all surgical team members. This includes monitoring the sterile field, patient positioning, limiting traffic flow inside the OR suite, ensuring the effective use of surgical equipment and carrying out safety checks associated with the use of equipment and swabs.

Operating department practitioner (ODP)
A health care employee who has formal training but is not a registered nurse. Can work as a member of surgical teams in ORs with anaesthetists, surgeons, and nurses. Can also work in trauma care and in intensive care units, accident and emergency departments and obstetric and neonatal units. Also called operating department assistant (ODA).

Teamwork
Work done by people who are committed to a relevant shared purpose and have common performance goals and a shared approach to their work.

Collaboration

A process that takes place between individuals. Describes the manner in which team members perform and underlines joint involvement in all activities. In health care emphasizes joint process of communication and decision-making with the explicit goal of satisfying the patient's needs for wellness and illness while respecting the unique qualities and abilities of each professional.

Object (in phenomenological research)

A fact, feeling, dream, image, sensation, thought or referential object that presents itself to human consciousness and gives meanings about a phenomenon. Objects are understood in their given modalities as phenomena usually containing many phenomenal meanings.

Intentionality

The direction of consciousness towards understanding how objects appear. All mental acts, such as memories and anticipations, are intentional in that they point to something and significe what is important in the particular object. Through the intentionality of consciousness actions, gestures, habits and human behaviour have meanings.

Intuition

Consists of awareness of the essence of a phenomenon as it emerges from overlapping intentional actions. Additionally, it involves actual insight into abstract objects. In research, intuition is an inductive process that includes analysis of representative examples of meanings from the viewpoint of the participant.

Reduction

Reflective thought about what is important in the experience, leading to identification of the essence of the phenomenon. To gain reduction, the researcher needs to give up his/her natural attitude of being in the world and, thus, to concentrate on the phenomenon and experience it as if for the first time.

Bracketing

Reflection on the person's past and current experiences in an attempt to separate them from that revealed by the others. In research, bracketing means approaching the phenomenon under study without presuppositions or advance assumptions in order to encounter it freshly.

Essence

An essential or invariant characteristic of a phenomenon. In research, intuition-based articulation of the phenomenon without which it is not itself and which limits the variations a meaning can undergo.

Description

An analytical process exploring the meaning of an individual experience and articulating it precisely as it emerges in the experience. Descriptiveness within phenomenology is maintained through considering the alternatives of linguistic expressions. This involves free imaginative variation in which a specific instance of the meaning is explored through its range of forms.

LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following original studies, referred to in the text by the Roman numerals:

I Silén-Lipponen M., Turunen H., & Tossavainen K. 2002. Collaboration in the operating room: The nurses' perspective. Journal of Nursing Administration 32 (1) 16-19.

II Silén-Lipponen M., Tossavainen K. & Turunen H. 2004. Käsiteanalyysi tiimistä - sovelluksena leikkaushoitotyön tiimi (A concept analysis of team – applied in operating room team). Hoitotiede 16 (4) 188-200.

III Silén-Lipponen M., Tossavainen K., Turunen H., Smith A. & Burdett K. 2004. Teamwork in operating-room nursing as experienced by Finnish, British and American nurses. Diversity in Health and Social Care 1 (2) 127-137.

IV Silén-Lipponen M., Tossavainen K., Turunen H. & Smith A. 2005. Potential errors and their prevention in operating room teamwork as experienced by Finnish, British and American nurses. International Journal of Nursing Practice 11 (1) 21-32.

V Silén-Lipponen M., Tossavainen K., Turunen H. & Smith A. 2004. Learning about teamwork in operating room clinical placement. British Journal of Nursing 13 (5) 244-53.

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APPENDICES

1 INTRODUCTION

The anticipated shortage of nurses in the future will be a worldwide problem. This means that not only will the number of nurses in general decrease, but there will also be a shortage of nurses with the skills experience and specialised knowledge needed to provide care to high-acuity patients (Buerhaus 1999, 2000, 2001, Duffield et al 2004). While all areas of nursing are affected, operating room (OR) nursing is likely to be one of the most significantly affected specialties. For example, in the USA and the UK, it is already difficult to recruit enough nurses to ORs (Happell 1999, Seifert 2000, Bauer 2001). In Finland, too, according to the forecasts, there will be a shortage of nurses within the next 5 years (Ministry of Social Affairs & Health 2002). Moreover, the changes currently taking place in health care indicate that day surgery will be increasing and leading to an increased need for OR nurses. The staffing crisis in ORs is further fuelled by the numerous government promises to shorten elective surgery waiting periods. (Leach et al 2000, Bernier et al 2003, Elliott et al 2003, Williams et al 2003.)

In the OR, patient acuity has increased, technology has become more complex, and the demands applied to OR nurses have therefore multiplied. Additionally, because the operations are becoming quicker and the pre- and postoperative stays in hospital shorter, a situation may arise where the need for collaboration will also increase (Lahtinen et al 1998, Jacobs 1999, Thomas et al 2003, Scott & Summerbell 2004). Due to their multiprofessional nature, OR teams are likely to experience conflicts between the team members with differences in education and status (Verschuren & Masselink 1997, McGarvey et al 2004). The quality of teamwork may also suffer if not all team members are able to participate fully, or if they have different skill levels (Crowell 2000). Even though collaboration seems to be part of the way teams work, the relationship between the concepts 'collaboration' and 'teamwork' has not been clarified. Additionally, there is much rhetoric on how to set up teams, while the process of teamwork has not been studied systematically. Furthermore, there is no clear understanding of how OR teams work in terms of organizational and managerial patterns. Most likely, teamwork in different contexts has different meanings (Adams & Bond 1997, Cott 1998, Payne & King 1998, Thomas et al 2003), and the aspects of teamwork in one context cannot always be transferred as such into other contexts. Thus, knowledge about the ways of fostering teamwork and the positive outcomes of teamwork in the OR context is needed.

Learning the art of intraoperative nursing is a long process, but today's busy ORs with their reduced resources cannot afford their staff enough time for orientation (e.g. Penprase 2000, Speers 2002). Graff et al (1999) argued that adequate orientation in the OR takes about 6 months, but it takes at least one

full year for a nurse to become competent enough to function independently in an OR team. The problem, therefore, is that novice staff entering the specialty with unrealistic expectations tend to leave once they discover the overwhelming mental and physical demands of OR nursing. Burnout of experienced nurses further complicates the problem (Beitz & Houck 1997). It follows that staff members may lack the skills needed in teamwork, and poor teamwork may jeopardize patients' safety (McKay 1993, Sexton et al 2000).

The decline in the number of basic nursing programmes offering educational perioperative clinical experiences also has a negative impact on OR teamwork because it is difficult to recruit nurses to a practice of which they have little knowledge or skills. In addition, the time allotted for perioperative nursing education is often much shorter than that allocated to other specialties. However, Penprase (2000) suggested that exposure of a larger number of nurses and students to perioperative nursing would create opportunities to demystify the image of OR nursing as indirect caregiving and a job only suited to highly qualified nurses.

Overall, a complex set of factors are contributing to the shortage of OR nursing staff. It is therefore necessary to examine whether poor collaboration is one of the factors causing problems in OR nursing. Moreover, to be able to respond to the growing needs for surgical care, there is an urgent need to study the current practice of teamwork as a context where OR nurses collaborate and nursing students practise. The purpose of this study was to explore the nature of teamwork in OR nursing by describing how the concept 'team' is defined and applied in OR nursing and by describing how teamwork is experienced by Finnish, British and American OR nurses and nursing students. Such research can reveal both the positive and the negative features of OR teamwork, describe what nurses do, list the skills they need and the challenges they face in teamwork and, thus, to sensitise administrators to the value of professional nurses' presence in the OR. With that knowledge, it will be possible to foster the development of a satisfying working environment in the OR, thereby offering the surgical patient the best possible care as promptly as possible. Moreover, this information will help educators orient OR nursing programmes more towards the direction of the future demands of OR team members and also to develop mentoring and internship programmes to incorporate new graduates into the OR setting.

This study is part of an international research project titled Evaluation and Development of Theoretical and Clinical Nursing Education: Cultural Comparison, which has been carried out at the Department of Nursing Science, University of Kuopio, since 1993 (e.g. Tawse 1995, Tossavainen et al 1998, Smith et al 1998, Turunen et al 2000, Turunen 2002). The purpose of the project is to produce theoretical and

methodological knowledge of nursing education in different contexts using multicultural comparative designs. The progressive development of Finnish nursing education at the university and polytechnic levels as well as in the working life of health care professionals has been the focus of this research project, and the following subtopics have been addressed: theoretical and clinical studies of nursing students, tutoring and mentoring practices, collaboration, teamwork and critical incidents.

Chapter two provides an overview of the literature. The chapters three and four describe the aim of the study and the methods used in the data collection and analysis. The results are presented in chapter five in six main sections. In chapter six the validity of this study and the results are discussed, and chapter seven presents conclusions based on the results, gives recommendations for further studies and suggests ways to develop the practice of OR teamwork.

2 TEAMWORK IN THE OPERATING ROOM ENVIRONMENT

My decision to choose this topic of research was influenced by my ten-year experience as an OR nurse. During those years, I noticed that both working capacity and motivation were somehow dependent on teamwork, but I could not point out the precise factors that contributed to good teamwork. Review of the earlier studies on the topic revealed that OR teamwork is an under-researched aspect of nursing. Thus, the skills, attitudes and co-operational factors needed in OR teams have not been explicitly described. Moreover, the fact that OR teams operate behind closed doors generally mystifies the image of OR nursing. It was obvious that all these aspects also had on impact on the OR working conditions, OR nursing education and, eventually, the workforce situation in future OR teams. Therefore, I was convinced that research of OR teamwork was urgently needed.

The importance of multiprofessional teamwork generally in nursing has been recognized internationally. However, while there is much rhetoric on how to set up teams and manage them, research explaining how OR team members manage their concerns and work together in practice is minimal. Previous reports on teamwork have concentrated on the positive elements of teamwork, ignoring research-based experiences and real outcomes of teamwork. (E.g. Becker-Reemes 1994, Robbins 2000). However, from the phenomenological perspective, the world is not that simple. Instead of taking the world for granted, phenomenology explores the ways in which subjects experience, i.e. `know or comprehend' the world. That means a need to see the world around us from multiple perspectives. Therefore, studying teamwork from the experiential perspective might help us to question the popular stereotypes of the OR nursing environment and enhance both educators´ and administrators' understanding of the patterns that are habitual among team members and the factors that motivate them to engage in teamwork. Moreover, better understanding of the issues that are significant in daily teamwork situations and act as catalysts for tension in teams can help to make the OR more satisfying for employees and students and thus, ultimately, safer for patients. Additionally, the rhetoric of teams could be reduced by defining the terms used when talking about co-operative actions in the OR context. From the experiential and conceptual perspective, the current gaps in our knowledge of OR teamwork could most likely be filled.

In this chapter, teamwork and OR nursing are briefly defined and discussed from the viewpoint of nursing characteristics, working and learning environment and competency demands, to indicate how vital, complex and still unclear issue teamwork in the OR is. This chapter also introduces the international context of this study.

2.1 Characteristics of operating room nursing

'Operating room (OR) nursing' is one of the oldest nursing specialties (Lee 1976, McGee 1991), but the first official definition of OR nursing only appeared in 1969. The term 'OR' referred to nursing by activities performed by nurses, and it served as a guideline for nursing education and practice (AORN 1993, Rothrock et al 1993.) The term 'OR nursing' is synonymous to the British term 'theatre nursing', and it covers scrub or circulating nurses' activities in intraoperative nursing. In addition, OR refers to the physical environment where surgical operations take place and where the staff, e.g. scrub, circulating and anaesthesia nurses, surgeons and anaesthesiologists, works.

The term 'operating room nursing' was expanded in 1985 in the USA by the term 'perioperative nursing' (AORN 1985), to introduce a more holistic view about the patient's total experience related to a surgical intervention. The new definition suggested that comprehensive planning of surgical care, preparation for the procedures and patient advocacy during the whole perioperative process are part of OR nursing (Rothrock et al 1993, Bull & Fitzgerald 2004b). The term 'perioperative' covers the preoperative, intraoperative and postoperative phases (Figure 1). The preoperative phase begins with the decision to do surgery and ends when the patient is transferred to the OR. The intraoperative period runs from the time the patient is transferred on to the operating table to the time he/she is admitted into the recovery area. The postoperative phase begins with the admission of the patient into the recovery area and ends when the patient is finally discharged from the care of the surgical team. (AORN 1985, Atkinson 1992, Phillips 2004). Thus, the term 'OR' is narrower than 'perioperative'. In this study, the term OR is used because the aim is to clarify OR teamwork by focusing on the intraoperative phase from scrub and circulating nurses' and nursing students' viewpoint.
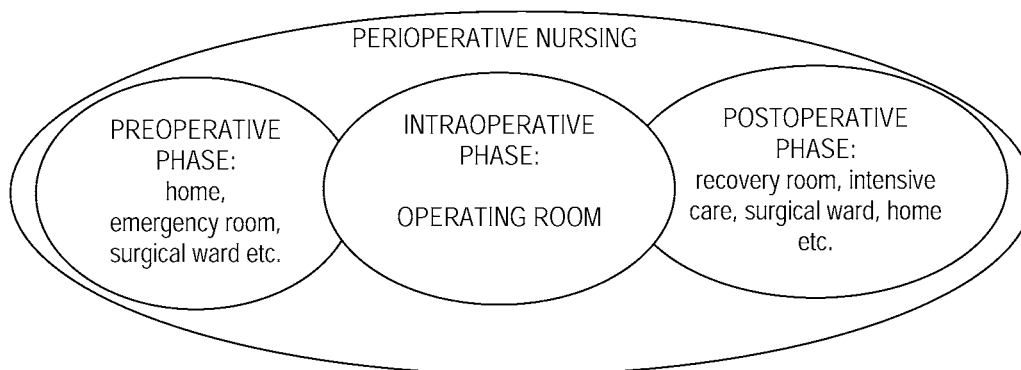
Figure 1. Phases of the perioperative process.

Depending on the types and roles of other OR staff, OR nurses function as scrub or circulating nurses, and in the USA also as RN first assistants (Heizenroth 1996, McGarvey et al 2000, Hughes 2003). Their nursing responsibilities revolve around maintaining the patient's overall safety and dignity during intraoperative care. Scrub personnel focuses on establishing and maintaining sterile fields and assisting the surgeons with instrumentation during the surgical procedures. The idea of scrub nursing is two-sided: scrub nurses assist the surgeon by handing instruments, while at the same time they care for the patient during the operative procedure. OR nurses focus on ensuring optimal patient outcomes, and complex critical thinking, troubleshooting and continuous patient assessment are therefore the key skills of scrub nurses. Circulating nurses, being unscrubbed nurses, function outside sterile fields, orchestrating the entire process within ORs and providing assistance to all surgical team members. (Fairchild 1996, McGarvey et al 2000, Scott & Summerbell 2004, Timmons & Tanner 2004.) Typically, this includes monitoring the sterile field, positioning the patient, limiting the traffic flow inside the OR suite, ensuring the effective use of surgical equipment and carrying out safety checks associated with use of equipment and swabs (Beyea 2004, Scott & Summerbell 2004).

ORs differ in size, financial resources, academic affiliations and patient populations. This diversity makes it difficult to characterize the general competency demands applied to OR nursing. In addition, the roles of OR nurses vary between different OR settings due to the available surgical subspecialties. Therefore, a nurse who is highly proficient in ambulatory surgery, for instance, may need additional skills to function with equal proficiency in an OR where cardiovascular or total joint replacement procedures are performed. Heizenroth (1996) pointed out that competent nurses have two or three years of perioperative experience and follow a deliberate plan in organizing their work but may need to refine their speed and flexibility. Proficient nurses have at least three years of perioperative experience and view each clinical situation as a whole rather than a compilation of many tasks. Expert nurses have 10 or more years of experience in perioperative settings and are able to solve problems intuitively, bypassing fruitless alternative solutions. Even though expert nursing skills are not always apparent during routine OR nursing, they may become crucial when the unexpected occurs. (Mardell 1998, Sigurdsson 2001, Scott & Summerbell 2004.) Most likely, without prior experience, nurses´ ability to flexibly incorporate caring into highly stressful situations is limited (Parker et al 1999, McGarvey et al 2004).

Regardless the particular context, OR nurses´ overriding priority is the physiological, psychological and sociocultural wellbeing of the patients undergoing operative procedures (Chard 2000, Kleinbeck 2000). Positive patient outcomes depend on nurses' abilities to advocate the patients' interests and to integrate

both medical and nursing knowledge into the technical tasks (Parker et al 1999, Sigurdsson 2001, Bull & Fitzgerald 2004b). OR nurses also attempt to guarantee the wellbeing of patients through the use of the nursing process and by working in multiprofessional teams (Kalideen 1994, Mardell 1998, Scott & Summerbell 2004). On the contrary, however, McGarvey et al (2004) emphasized that the nursing process was not readily embraced by nurses. Some believed it was not helpful in providing care and complained that the nursing process required too much paperwork, especially for minor procedures, and was too general to provide individualized care. Instead, the main emphasis was on getting the work done safely and efficiently.

As regards teamwork, the need for teamwork in the OR environment has been emphasized because the ability to orchestrate smooth actions and a scheduled flow of operations requires simultaneous collaboration by a variety of professionals with complementary and overlapping skills and mutual understanding of their work (Crowell 2000, Kleinbeck 2000). In addition to surgeons and anaesthesiologists, OR teams usually consist of scrub, circulating and anaesthesia nurses. Depending on the operation and the particular organization, OR teams may further involve assistants, residents and various consultants, such as radiologists or cardiologists. OR teams may also be complemented by other assistive personnel, such as porters, maintenance supply personnel and scrub technicians. Therefore, it is important that the team members' particular responsibilities within a highly technical and stressful OR environment are identified, in order that they can work together harmoniously and ensure the smooth implementation of high-quality intraoperative care. However, there is only scant research evidence about the roles of team members or about the process of teamwork in the OR context. Additionally, there is confusion about the terms 'team' and 'teamwork'. 'Team' is a specific structural unit in the organization and can be considered a means rather than an end. 'Teamwork' is about performance and how to achieve the primary objective, which, in the OR, is the best possible care of the patient. Moreover, 'teamwork' also refers to the way people work together, collaboratively integrating group effort and complementary competence. Therefore, collaboration seems to be an attribute of an effectively functioning team. (E.g. Katzenbach & Smith 1993, Manion et al 1997.)

2.2 Operating room as a working and learning environment

OR nursing is affected by its external context of invisibility. Because of the geographical isolation of the OR, OR nurses literally practise behind closed doors, out of sight of other nurses and the public. Access

to OR is restricted, which means that patients, students and most members of hospital staff are barred from this area. The reason why OR remains a secluded environment is to maintain asepsis. (Fox 1997, Riley & Manias 2002, AORN 2004, Beyea 2004.) Professional isolation is also evident, as OR nurses are viewed either as 'elitists' or the 'costly RN's in the OR' (Baker 1996, Bull & Fitzgerald 2004a, Timmons & Tanner 2004) or as technicians focusing on assisting the surgeon rather than really practising nursing (Mahoney 1997, Montgomery 1997, McGarvey et al 2004). However, those who criticise OR nurses' caring role misunderstand the nature of direct and indirect care. OR nurses do the same as their ward counterparts in caring for patients, but they partly care for patients in a way that is subtle and indirect (e.g Mardell 1998), e.g. by arranging suitable facilities and by maintaining a high level asepsis and technical competence to alleviate patients´ anxiety and fear.

Tanner and Timmons (2000) emphasized that behaviour in the OR is different from that in the other hospital areas. Any area where patients and visitors are present, such as wards, accident and emergency units or outpatient clinics, are front-stage, while such areas as staff rooms and ORs are backstage. Once inside the OR, one is in a 'private' environment, and the medical and nursing staff display different behaviours than they would in wards where patients are present. Patients are obviously present in the OR, but the majority of them are anaesthetized or sedated and thus unable to see, hear or at least remember what is going on around them. In a backstage area, workers can behave in a relaxed manner and talk freely without self-censorship. Interaction includes joking, talking about aspects of private life and familiar behaviour between the different staff levels. (Tanner & Timmons 2000.) Since, however, it seems that the other nursing specialties are similarly becoming more relaxed, the uniqueness of the OR atmosphere may be decreasing in comparison to the other hospital units. Most likely, assessment of the quality of care also demands that backstage coalitions should be made more visible. Moreover, besides the relaxed atmosphere, profanity, open sexual remarks, elaborate griping (Tanner & Timmons 2000) and mental violence, such as shouting, abusive language and humiliation, have been associated with OR nursing (Furlow & Hoglan 1994, Cook et al 2001), which may subordinate nurses to a position where they are not able to work as equal team members (Kreizer et al 1997, Cook et al 2001).

All the above-mentioned aspects are also likely to modify nursing students´ images of the OR nursing environment. Overall, successful clinical placement experiences are important for nursing students: they foster professional development, enhance role socialization and maintain reflective learning (cf. Lauder 1994, Jarvis 1999). Opportunities to combine theoretical knowledge with practical experiential knowledge are also significant for students as a way to learn nursing in practice (Landers 2000, Chan

2002). Generally speaking, therefore, learning in a clinical placement is dependent on the specific functional and organizational environment, social atmosphere, collaboration and balance between the possibilities to practise and the desired nursing care outcomes in the particular placement (Daley 1997). In OR clinical practice, the special contextual elements are related to the perioperative nursing process, practical OR nursing skills and teamwork in different patient care situations, which cannot be learnt in any other environment (Sigsby & Yarandi 2004). However, today's model of learning often predisposes students to observe the follow-through of patients' perioperative experience and surgeons' work instead of full participation in OR nursing. Therefore, students mostly have an inactive role because they are seldom permitted to scrub for cases, as were their predecessors. In addition, nurses in the OR find the supervision of students challenging, because of the general urgency of the work and the many simultaneous responsibilities they have while working in teams. The multiple demands of the work during the short but intense perioperative period may cause physical and emotional stress and outweigh nurses' personal resources. (Furlow & Hoglan 1994, Graff et al 1999, Sigsby & Yarandi 2004.) In such a hectic context, supervision of nursing students' integration into teamwork most likely occurs in quite a haphazard fashion. On graduation, however, nurses are expected to be able to function as members of integrated teams. Therefore, the OR placement period can be a trial period during which new students decide if they like to work in OR teams after their graduation.

The influence of clinical placement periods on nursing students' competence and attitudes has generated considerable interest, but no consensus has been reached. From the students' point of view, a good learning context consists of a good tutoring relationship, positive communication (Dunn & Hansford 1997, Koskinen & Silén-Lipponen 2001), acceptance as a learner with a legitimate role in a team (Hart & Rotem 1995, Nolan 1998, Myrick 2002) and a patient-centred caring orientation (Baillie 1993). However, the OR as students' learning context has not been studied much. On the other hand, there are a few studies of OR as a learning context from nurses´ perspective, which elicit interesting general aspects of learning in the OR environment. Penprase (2000) and Graling and Rusynko (2001) emphasized that OR nursing is a typical context of adult learning, where the orientation should be self-directed, paced to meet learners´ needs and able to provide learning mechanisms that support different learning styles. However, OR has also been said to maintain routines, a strict hierarchy and clearly determined objectives, which do not allow individual divergence or individualized learning styles (Bushy & Furlow 1989, Furlow & Hoglan 1994, Scott & Summerbell 2004).

Another shortcoming in the literature is that there are only a few studies about teamwork experiences in clinical placements. No reports were found that would have integrated perioperative clinical placement

experiences with teamwork. However, it is obvious that, in all nursing contexts, interaction with a variety of health care professionals and a constructive ability to work as part of teams is required. Moreover, working in teams requires an ability to negotiate and to resolve conflicts or competing demands when they emerge, and it therefore requires both contemporary and responsive complementation of skills (Cheek & Jones 2003). Although these issues have been identified at a conceptual level, only a few studies have been undertaken to understand how these issues can be transferred from theory to action or from classroom to practice. In addition, some published articles describe the development of perioperative courses but fail to relate it to research and to evaluate the effectiveness of these courses. Most likely, because multiprofessional teamwork is one of the most important contextual elements in ORs, it needs to be practised during initial nursing studies programmes.

2.3 Teamwork as a criterion of competency in nursing

Teamwork can be defined as work done by people who are committed to a relevant shared purpose and have common performance goals and a shared approach to their work (Katzenbach & Smith 1993, Manion et al 1997, Heermann 1999). Effective teams are flexible and typically outperform individuals when the tasks being done require multiple skills and experience (Heermann 1999, Robbins 2000). Teamwork is also likely to provide support to less experienced staff and thereby to reduce stress (Firth-Cozens & Moss 1998, Firth-Cozens 2001). However, it has also been noted that staff in different contexts attributes different meanings to teamwork (e.g. Adams & Bond 1997, Cott 1998, Payne & King 1998, Thomas et al 2003).

Teamwork has evolved primarily from social and organisational sciences and aimed to make organisations effectively functional and better able to utilize employee talents (Zenger et al 1992, Senge 1996, Heermann 1999). A great deal of the research on teamwork has focused on the psychological factors of teams. Tuckman (1965) developed a model of team progress and proposed four stages of team process: forming, storming, norming and performing. These stages described the task behaviours, structure and development of the team. Forming is characterized by the members attempting to structure the unknown and trying to deal with the tasks at hand. The goal of this stage is to reduce ambiguity and discover other team members' acceptable interpersonal actions. In the storming stage, the team undergoes intra-team conflict, which involves hostility, defensiveness and competition. The goal of this stage is to resolve the internal conflicts and to focus on the task at hand. Norming means a phase where new norms and boundaries are set for team behaviour. There is a sense of openness, constructive feedback and mutual support. The goal of this stage is to enhance cohesiveness and

overcome resistance in an effort to pull together. The final stage of performing is characterised by the members working in a problem-solving mode to attain the goals of the team. The goal of this stage is to resolve structural issues and generate energy to tackle the task at hand. (Tuckman 1965.) Tuckman's model of team has been used as a basis for other models (e.g. Tuckman & Jensen 1977, Kormanski & Mozenter 1987, Heermann 1999), and it is generally accepted that the progress from stage to stage is dependent on the resolution of the tasks and goals of the preceding stages. Furthermore, both the tasks and the interpersonal concerns must be addressed before moving to the next stage. In addition, the team may fluctuate from one stage to another and experience highs and lows within the stages.

From the 1990s onwards, teams have been studied from the point of view of organizational learning. Learning organizations develop in continuous interaction and have uncomplicated interactive relations (e.g. Clutterbuck 2002). As an operational environment, a learning organisation is structurally flat, encourages innovations (Reutter et al 1997) and guarantees recognition of work (Hart & Rotem 1995, Firth-Gozens 2001). In addition, it has the characteristics of an efficient team: team members are satisfied, have explicit roles and independence in addition to collaboration, and information flow within the team is fluent. Moreover, the staff members in learning organizations are individually willing to work in teams (Adams & Bond 1997).

Teamwork has also been studied in various nursing contexts, including intensive care, surgical and mental health nursing (Adams & Bond 1997, Baggs & Schmitt 1997, Risser et al 1999, Eve 2004, Kennedy et al 2004). In nursing teamwork, joint responsibility, intellectual participation and commitment to the common goal in pooling the employees' special skills and time have been emphasised and valued (Keenan et al 1998, Payne & King 1998, Risser et al 1999, Malloch et al 2000). Teamwork has also been seen as a useful method of nursing because it leads to active communication between health care professionals, thereby improving job satisfaction (Baggs and Schmitt 1997, Kennedy et al 2004). Patients benefit from teamwork because nursing procedures take less time, the waiting lines for operations are shorter, and patients get better care (McNamara 1995, Firth-Gozens 2001, Hindmarch & Pilnick 2002).

Communication is an important aspect of functional teamwork, and communication between nurses and physicians has been studied extensively. Stein et al (1990) defined the 'doctor-nurse game' as a stereotypical pattern of interaction, in which nurses learned to show initiative and offer advice while appearing to defer passively to the doctor's authority. Studies supporting the change from the 1970s to the 1990s in the nurse-doctor relationship indicate that the 'game' is sometimes still observable, but

nurses more frequently offer advice openly and defend their opinions more assertively than previously (Porter 1991, Stein et al 1990). Heermann (1999) and Boyle and Kochinda (2004) emphasized that communication should be congruent among team members. Congruence in communication means that a person experiences an emotion and then communicates it honestly to the others. Additionally, Furlow and Hoglan (1994) have described OR as an environment where nurses are assertive and determined, and where purely 'feminine' aspects of care do not exist at all. Determination helps one to remain matter-of-fact and thus makes communication straightforward but honest. However, there are no studies about communication and teamwork in OR since the mid-1990s.

Teamwork is automatically associated with OR nursing. Moreover, collaboration is connected to good teamwork. However, only a few studies conducted in the OR context have indicated that collaboration and teamwork are important in intraoperative nursing. Graff et al (1999) evaluated the effectiveness of leadership in the OR and found that team leadership involved coordination of tasks, supervision of other staff and intervention in solving problems between team members. A study of the quality of OR nurses' working life emphasised collaborative decision-making as an important factor in a good working environment (Donald 1999). In Leinonen´s et al (2001, 2002) study, patients described OR staff members as friendly and thorough, as capable of good collaboration and intelligent and as having a sense of humour and being trustworthy. However, none of these studies defined the nature of teamwork in the OR or the connection between teamwork and collaboration or discussed ways of fostering teamwork. This is significant because OR teams are multiprofessional and sometimes characterised by conflicts between individuals who insist on applying their own views of patient care and approaches towards acting and communicating in teams (Verschuren & Masselink 1997, Crowell 2000, Espin & Lingard 2001). It would be important to find out how teamwork is carried out in the OR, where individuals work under pressure and with busy schedules, to pursue the common goal of high-quality intraoperative patient care.

Time management is an important feature within OR teams, where the interests of individuals with differing roles and professions should be harmonised (Chard 2000). Time management is maintained by breaking down actions into subactions, so that each fragment of time can be allocated to ensure maximum speed and efficiency (Sigurdsson 2001). Management of short preoperative waiting times requires careful planning (Otte 1996, Law 1997), reasonable economic inputs and flexible arrangements at the team level (Riley & Manias 2002). Thus, time management may also be a constant source of dissension. When a team runs past the time allocated for a booked list of operations, they are faced with a need to cancel or reschedule the remaining operations or to get a permission for 'list over-run',

whereby the team uses part of the next surgeon's allotted time (Riley & Manias 2002, Bull & Fitzgerald 2004a). Time management during on-call hours is even more complex because an overload of emergency cases will cause delays in the daily schedule of elective patients, and the longer waiting times tend to make them less satisfied.

An important approach towards evaluating efficiency in OR teamwork is the calculation of turnover times, average times from admission to closure and discharge and procedure time versus surgeon time. However, despite the pressures to complete lists or to undertake more operations, quality criteria must also be met in every instance of OR nursing. The quality of OR care can be assessed from multiple perspectives, including those of patient satisfaction, safety, frequency of infections and other complications and postoperative recovery. (Brown 1995, Pontin & Webb 1996, Beyea 2004, Scott & Summerbell 2004.) For example, increasing pressure for available resources and communication breakdowns between team members can influence directly or indirectly the occurrence of adverse events (Hind 1997.) Additionally, technical hazards, such as internal tissue damage caused by instrumentation, diathermy burns, nerve damage due to incorrect positioning and equipment failures are ever-present risks (cf. Scott et al 1999, Scott & Summerbell 2004). On the whole, the problem in evaluating the quality of care is that it is difficult to prove whether complication-free practice is due to good teamwork or some other reasons.

2.4 Finnish, British and American operating room nursing and nursing education as a study context

Even though teamwork is a global phenomenon, it is shaped by local socio-political cultures (e.g. McCallin 2001). Teamwork is influenced by the country and the culture, but also by the context where it is done. Moreover, teamwork emphasizes different aspects in different nursing settings. On the other hand, based on the international literature, OR culture seems to be rather similar internationally. (McCallin 2001, Thomas et al 2003, Eve 2004.) However, there is not much international knowledge of OR teamwork. To gain as versatile descriptions of OR teamwork as possible, this research was conducted in three countries, Finland, the UK and the USA. An additional reason to include participants from these three countries was that most of the literature on OR nursing comes from the UK and the USA. Therefore, OR nursing has been mostly developed by the UK and the US initiatives.

The challenges of OR nursing in all these three countries are mainly similar: the population is getting older, the number of people waiting for surgery is increasing, and adequately educated nurses are

needed in ORs. Moreover, OR nursing has been under much scrutiny as a result of the economic constraints on health care (e.g. Buerhouse 1999, McGarvey et al 2000, Ministry of Social Affairs & Health 2002).

All these countries have a long history of nursing education both in general and in OR nursing. Similarly, all these countries have a registration system that covers the final qualifications for nursing. Undergraduate nursing education in Finland is a three and a half year polytechnic diploma programme, including an elective six-month line-specific component, one of them being OR and anaesthesia nursing. In Finland, the polytechnics themselves are responsible for steering their activities, and the Ministry of Education supervises their annual goal attainment (Laki 255/ 1995, Asetus 256/ 1995).

In the UK, it is possible to take either a three-year full-time diploma course or a three or four-year degree course to qualify as a nurse. Education is provided by universities, with placements in local hospitals and community settings. The first year is a Common Foundation Programme, which provides an introduction to health and social care within the UK and the principles and practices of nursing. In the second year, students enter a branch programme specialising in adult, children's, mental health or learning disability nursing. Depending on the school and its curriculum, one placement can be OR. The Nursing and Midwifery Council (NMC) is a governmental body that sets the standards and guidelines for nursing education and conducts quality assurance of nursing education in Britain. (NMC 2002.)

To gain RN registration in the USA, students must graduate from a state-approved school of nursing – either a four-year university programme or a three-year diploma programme and pass the RN licensing exam. Courses include adult acute and chronic disease, maternal/child health, pediatrics, psychiatric/mental health, and community health nursing. During the last two years of this programme, students participate in supervised clinical practice in hospitals and other health care facilities, including OR settings. There is no national law on the nursing education framework in the United States, but each state issues their own regulations and standards of nursing education. However, the federal government, national associations and state authorities work together in the development of a national nursing education policy. (US Department of Education 2004). Additionally, a variety of nursing associations have a major impact on the public policy for nursing and nursing education in the USA. The Association of Operating Room Nursing (AORN) works actively with other nursing organizations, health care groups and associations in monitoring issues concerning the quality of care, patient safety legislation and liability for possible action and advocacy in the perioperative arena. (AORN legislative databases 2004.)

In all these three countries, OR nurses are Registered Nurses (RNs) who work in hospitals' surgical departments, day surgery units, clinics or physicians' offices. Perioperative nursing in all these countries is a dynamic specialty that provides state-of-the-art patient care to health care consumers before, during and after the surgical experience. A scientific knowledge base, in-depth knowledge of anatomy and physiology, implementation of governmental recommended practices, understanding of surgical procedures and caring are major components of the specialty. (Cf. Beitz & Houck 1997, McGarvey et al 2000, AORN course directory 2004.)

Nurses in the OR setting may have had some specialized education, but such education is not compulsory to be able to work in the OR setting. In Finland, OR nursing specialization is available in polytechnics, and it consists of one year of full-time or two years of part-time studies. In the UK, in-depth education for nurses in the OR setting (theatre) is part of the Continuing Professional Development framework (CPD), which can be attended after initial registration. The education is usually undertaken on a part-time basis, and it may lead to the award of a degree or a Master's degree, which incorporates specialist modules or units of study relating to preoperative nursing care, anaesthetics and recovery nursing. (NMC 2002.) In the USA, the Perioperative Nursing Programme usually consists of one year of part-time studies, and successful completion of the Perioperative Nursing Programme makes perioperative nurses eligible to take the Perioperative Certification exam after two years of perioperative nursing practice (Beitz & Houck 1997, AORN course directory 2004).

The main difference between the practices of OR nursing in Finland, the UK and the USA is that, in the UK and the USA, there are more unlicensed assistive personnel in the OR than in Finland. The strategic vision has been that OR assistants, e.g operating department assistants (ODA) or operating room practitioners (ODP) would provide ORs with healthcare professionals at a faster pace and at a lower cost. However, the candidates study for a more limited and technical scope of practice than RN education. (Cf. Murphy 1995, AACN 1998, Buerhaus 1999, McGarvey et al 2000, Sigurdsson 2001, Bureau of Health Professions 2002, DOH 2002a,b.) Nevertheless, the actual cost benefit of substituting RNs has been questionable, because assistive personnel still require RN supervision. Moreover, the poor working relationships between nurses and ODAs, for instance, have occasionally led to marked job turnover in ORs (Graff et al 1999, Walker & Adam 2001). It seems that administrators do not have complete understanding of what kind of competency OR nursing demands or what OR nurses actually do.

2.5 Summary and gaps in the existing literature

As a conclusion, it can be stated that, even though teamwork in general has been studied, OR teamwork is an under-researched aspect of nursing practice. The earlier attempts to address the special aspects of OR nursing have emphasized environmental characteristics and the demands for special nursing competency in the OR. Additionally, recent reports have focused on the problem of keeping and increasing OR nurses and descriptions of the positive elements of teamwork. In much of the literature, however, teamwork and OR nursing have been studied separately, and the picture of OR teamwork is therefore inaccurate, since an emphasis on one topic is often made at the expense of another. The previous research especially lacks clarification of the factors fostering teamwork and the positive outcomes of teamwork in the OR context. Evidently, collaboration partly overlaps teamwork, but the relationship between the concepts is not clear yet. Further research is needed to clarify the concepts of collaboration and teamwork in the OR environment. Additionally, there is no clear understanding of how OR teams work in terms of organizational patterns. There are negative reports about the hierarchy in OR being autocratic and top-down, which is opposite to the ideal basis of teamwork. On the other hand, despite the common belief that the OR is one of the most stressful health care environments, there is currently no evidence of the stressors causing tension among surgical team members. Therefore, it is important to capture what teams do and how they do it as they work and interact together in them OR context, to find out whether teamwork improves patient outcomes and benefits the OR organization. Especially, more research is needed to provide empirical evidence grounded in practical experiences to make ORs more satisfying for employees and students and thus ultimately safer for patients. Therefore, a qualitative approach, which is the method of this study, can possibly add to the knowledge base of OR teamwork.

3 PURPOSE OF THE STUDY AND STUDY QUESTIONS

The purpose of this study was to characterise the essential nature of teamwork in OR nursing by describing how teamwork is experienced by Finnish, British and American OR nurses and nursing students and how the concept 'team' is defined and applied to OR nursing.

The following study questions were addressed:

1) What is the role of collaboration in the work of OR teams from the point of view of Finnish OR nurses? (Paper I)

2) How is the concept 'team' defined and used in OR nursing on the basis of previous studies? (Paper II)

3) What are the benefits and disadvantages of OR teamwork, and what is the positive outcome of teamwork from the point of view of OR nurses? (Papers I, III and IV)

4) How is the responsibility for errors experienced in OR teamwork from the point of view of OR nurses? (Papers III and IV)

5) How is OR teamwork experienced by nursing students during their pre-service OR clinical placement period? (Paper V)

4 METHODS OF DATA COLLECTION AND ANALYSIS

The focal aim of this study was to characterize the essential nature of teamwork in OR nursing. A triangulation approach was used. Triangulation means the combination of at least two or more theoretical perspectives, methodological approaches, data sources, investigators or methods of data analysis within the same study (cf. Shih 1998, Thurmond 2001). In this study two types of triangulation were used. They were data source triangulation and methodological triangulation. Data were obtained from OR nurses and nursing students and from the previous literature, to attain versatile information about OR teamwork (cf. Shih 1998). Methodological triangulation involved the use of three types of data collection methods and three types of data analysis methods. Data were collected by using interviews, written descriptions and written documents of previous studies and they were analysed by using conceptual analysis, descriptive phenomenological analysis and content analysis. The participants, the methods and the reasons for the choices made are explained in the following chapters.

4.1 Participants

The participants in this study consisted of 51 OR nurses and 30 nursing students. The first phase of the study was conducted in the year 1997 in one Finnish university hospital. That was the starting point, and the experience thereby gained motivated the researcher to expand the study into a second phase of intercultural research co-operation in intercultural contexts. The informants in the year 1997 were 21 Finnish registered nurses who were working as OR nurses at the time of data collection. For the participants in 1997, there were no limits on age or working experience, and such details were therefore not asked. All nurses participating in the study worked in a university hospital, which operated mainly in its catchment area with a population of about one million. The OR unit was organized into divisions for various surgical specialties, e.g. gastrointestinal and urological surgery, orthopaedic surgery, neurosurgery, obstetrics and gynaegology, and oral and maxillofacial diseases. Furthermore, the hospital had excellent video-assisted facilities for endoscopic surgery, all types of adult open-heart surgery except heart transplantation as well as hand surgery and day surgery services. Nurses mostly worked in the surgical service where they were assigned to, but they were qualified to work in all other services as well.

The informants in the year 2000 consisted of 30 OR nurses and 30 nursing students. The nurses worked in Finnish (n=10), American (n=10) and British university hospitals or British district hospitals (n=10). A purposeful sample of nurses was chosen in order to gain illustrative descriptions of OR teamwork. The inclusion criteria were that the participant was a registered nurse, had worked as an OR

nurse for at least two years and was working in an OR at the time of data collection. The nurses who participated in this study in 2000 were 24 to 51 years old, had 2 to 26 years of OR working experience (Table 1) and were working in ORs with many different services: thoracic and cardiac surgery, neurosurgery, paediatric and plastic surgery, ear, nose and throat surgery, eye surgery, gynaecological surgery, gastrointestinal and urological surgery and orthopaedic surgery. In each of the three countries, the nurses were engaged in one service, where they worked for most of the time. The American OR nurses also had permanent day, evening or night shifts and occasional on-call duty as well. The shifts of both British and Finnish OR nurses were more variable. Some Finnish nurses had irregular three-shift work.

Table 1. Age range and OR working experience of the nurses who participated in 2000 (N=30).

| Working experience (years) | Age range (years) | | | | |
	25-29	30-39	40-49	≥ 50	Total
< 5	F (2), B (1), A (1)	-	-	-	4
5-9	-	F (3), B (3), A (4)	A (1)	-	11
10-15	-	F (3), B (2)	A (1)	-	6
> 15	-	F (1)	F (2), B (3), A (2)	A (1)	9
Total	4	16	9	1	30

F= Finnish nurse
B= British nurse
A= American nurse

The group of nursing students included participants from Finland (n=10), the UK (n=10) and the USA (n=10), who were practising in the OR for the first time and spent at least two weeks there. At the time of data collection, the students were in the middle third of their studies and thus had earlier experience of at least two clinical placements. The sample was selected using a purposive sampling design, and the data were collected in one Finnish social and health care polytechnic and one British and one American university nursing school.

The participating students had their OR placement periods in OR units providing many different services. All OR units were in teaching hospitals and had either three-shift work or a day shift with 24-hour on-call service. Some students also practised in day surgery units. Finnish students had a three-week OR placement period, including one and a half weeks both in anesthesia and in OR practice.

British students also had a three-week placement period, which consisted of one week in an anesthesia unit, one week in an OR and one week in a recovery unit. American students spent four weeks in an OR. In Finland and the UK the OR practice period was compulsory, but in American nursing education it was an elective mini-term course.

4.2 Data collection methods

A qualitative research design was used. The qualitative approach was chosen because the aim of this study was to characterise the essential nature of teamwork in OR nursing by describing how the teamwork was experienced by Finnish, British and American OR nurses and nursing students and by describing how the concept 'team' was defined and applied to OR nursing. The qualitative approach was considered to heighten awareness of this under-researched issue. The data were collected by using three methods: interviews, written descriptions and written documents about previous studies. The methods and the times of data collection are shown in Table 2.

Table 2. Methods and times of data collection in 1997-2002.

DATA 1: YEAR 1997	DATA 2: YEAR 2000	DATA 3: YEAR 2000	DATA 4: YEAR 2002
Interviews of and written descriptions by Finnish OR nurses (n=21).	Interviews of Finnish, British and American OR nurses (n=30).	Written descriptions by Finnish, British and American nursing students (n=30).	Written documents about previous research of teamwork in nursing in 1992-2002.

4.2.1 Critical incidents in collecting data of operating room teamwork

The interviews were conducted and the written data collected by using the critical incident technique (CIT). The primary aim was to collect one or more descriptions about each participating nurse's and nursing student's experiences that were perceived to be special examples of OR collaboration or teamwork. The underlying assumption of data collection was that factual incidents could enlighten the overall meaning of OR teamwork and therefore give a possibility to develop it in the future.

Flanagan developed the CIT by asking combat veterans to report direct observations of their own or others' critical behaviour in bombing situations. These observations, in turn, were used in developing the performance of certain tasks and in solving practical problems in aviation. (Flanagan 1954.) From the 1990s to the early 2000s, CIT was used for a variety of other purposes, including quality assurance,

attitude assessment, stress debriefing and learning (Norman et al 1992, Burns & Harm 1993, Pursey & Luker 1995, Smith 1998, Ingleton 1999, Redfern & Norman 1999, Turunen 2002).

There is no single universal definition or interpretation of CIT. According to Flanagan (1954, 327), "critical incident is an observable type of human activity which is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical the incident must be performed in a situation where the purpose or intent of the act seems fairly clear to the observer, and its consequences are sufficiently definite." Observation means that the persons are able to tell about their own experiences in situations they were involved in. 'Critical incident' has also been defined as a decisive situation that makes a significant contribution, either positive or negative, to the activity under investigation (Mårtensson 2001), or an unanticipated and uncontrolled fleeting happening that changes and empowers the person (Woods & Eames 1993). On the other hand, Hollister (1996) talks about traumatic and strongly affecting incidents, which may require therapeutic debriefing to alleviate stress. In this study, critical incidents were used for the purpose of describing the divergent events considered by the participants significant for themselves in relation to OR teamwork. Therefore, the incidents could be extremely dramatic events but also merely pleasant or irritating everyday incidents, but something the participants wanted to share.

CIT is an inductive data collection method, which aims to assist the participants to recall specific incidents and to describe them in a detailed way (Atwal 2002, Broström et al 2003, Turunen et al 2004). Moreover, the method helps the participants to describe systematically but freely the events and their feelings in certain situations (Narayanasamy & Owens 2004) by focusing on something specific, of which they were expert witnesses (von Post 1996). The uniqueness of the method in this study was that it elicited individuals' likes or dislikes or aspects of best and worst OR teamwork practices, reflected nurses' satisfaction or dissatisfaction, and therefore reflected the variety of everyday life experiences in OR teams.

Methodologically, CIT is related to the phenomenological approach while searching for meanings in the participants' individual experiences. The basic idea of CIT is that it allows the informants to describe the actual real-world events they consider important rather than to describe things as they should be (Narayanasamy & Owens 2001, Atwal 2002). Moreover, underlying the approach is the assumption that specific critical incidents often have the generic practice embedded within them. Therefore, concrete and contextually described experiences give information about how people characterize certain phenomena (Brookfield 1990) and thus make it possible to describe the meaning of these phenomena

(Norman et al 1992, Ingleton 1999.) On the contrary, Byrne (2001) is unsure about the association of CIT with phenomenology, claiming that Flanagan's definition of critical incident refers to a definite and strictly structured incident. On the other hand, rigid observance of Flanagan's definition without any emphasis on the importance of the nature of the experience itself may cause confusion. Most likely, however, the consequences of human actions are not definite but, through reflection, appear as more or less fragmentary or inaccurate descriptions of events that truly have meaning for the participant.

Critical incidents can be collected by direct observations or from retrospective accounts (Atwal 2002, Broström et al 2003), and data can be gathered through written or oral reporting (Norman et al 1992). The data of 1997 were collected from written descriptions (n=15) and through informal interviews (n=6). The nurses' data in 2000 were collected through individual interviews and the students' data as written descriptions. When the critical incident technique of data collection is used, the participants should be given short and clear instructions about what kind of information they should provide and what particular phenomena they should focus on (cf. Atwal 2002). The aim of this study was to collect descriptions of factual incidents that could enhance understanding of nurses' and nursing students' experiences of OR teamwork. At the beginning of the data collection, the participants were given the following request to describe their individual teamwork incidents: "*Dear Operating Room Nurse/Nursing Student, please describe your own critical incident about teamwork / collaboration in operating room nursing. Describe the incident as if you were telling it to your friend. Also describe the place and time of the incident, the other persons who were present (not to be mentioned by real names) and why the incident was meaningful for you. If you can, indicate whether the incident was positive or negative.*"

The same person collected nurses' data in all of the three countries and gave instructions that helped the participants to produce descriptions of teamwork incidents. The nurses were told that they could tell about their incidents confidentially, and it was explained that they could be any incident related to teamwork in the OR that had made an emotional impact on them. The number of incidents to be reported was not limited. The nurses were also asked to mention if the incidents strongly influenced the accomplishment of some activity or changed the prevailing attitudes or emotions towards teamwork and to mention why the incident was meaningful. The incidents might also have been difficult to handle or made them feel anxious. Moreover, the nurses were asked to describe the incidents as they had happened in as much detail as they could and to indicate how the incidents had started and ended. The participants were also encouraged to give some background information about the contexts: the time when and the places where the incidents occurred and the other people who were present. While the students' data were collected in writing, they were orally given the above instructions in the introductory

sessions, and they also got the instructions in writing. The participants' anonymity was guaranteed by keeping the collected data confidential and by giving each participant a code number and a pseudonym. Thus, each recording and transcript had a numerical code without the participant's name. (cf. section 4.3)

Some of the incidents were highly detailed descriptions of separate teamwork incidents and their situational context. However, having memorized the actual teamwork incident, some participants described more than one incident at the same time and occasionally presented combinations of incidents. Still, these incidents represented the participants´ personal experiences of events that had somehow touched them. Therefore, only those descriptions were rejected (less that ten incidents) that did not deal with teamwork or were too short statements, opinions or some sort of suggestions of optimal teamwork and could not be feasibly analyzed. Byrne (2001), in accordance with Flanagan (1954), mentioned that the critical incident itself is the basic unit of analysis. However, this may suggest that Flanagan's original technique, which traditionally accepts only full descriptions of incidents, is too rigid in capturing the complexity of human experiences in versatile social situations. Therefore, some researchers have included into their data also incidents that do not fully meet Flanagan's criteria. For example, Norman et al (1992) found that the most appropriate basic units of their analysis were "happenings" revealed by incidents that were "critical" by virtue of being important to the respondents. Thus, critical incidents were not demarcated scenes with a clear beginning and an end, but could also arise from the informants´ summaries of their overall experiences, as was also the case in this study.

4.2.2 Written documents about previous studies

Written documents about previous research and other written documents were used to gain understanding about the issue of OR teamwork at conceptual and practical levels. A literature search was conducted via the MEDLINE, CINAHL and EBSCOhost databases from 1992 to 2002, using the following words in combination with the word 'team': OR nursing, perioperative nursing and organisation of nursing (n=1055). Studies (n=52) and books (n=15) that described teams as actions of team members, organisation of teamwork and especially teams in OR were included. In addition, studies about OR teams (n=7) and classical publications about teams (=7) found by a manual search were included into the analysis.

4.3 Data analysis methods

The data were analysed by using three methods: conceptual analysis, descriptive phenomenological analysis and content analysis. Because the aim of this study was to better understand and communicate about OR teamwork, both conceptual and experiential clarification of teamwork was needed. In the early stage of the research process, there was some confusion between the concepts 'collaboration' and 'teamwork', which required a thorough analysis. Therefore, a conceptual analysis of 'team' was conducted. By using conceptual analysis as a method, it was also possible to elicit the development and changes of the meaning and the importance of the context in relation to use of the concept 'team'. (Cf. Meleis 1991, Chinn & Kramer 1995.)

The phenomenological approach was used because the aim was to elicit knowledge about nurses' and nursing students' individual experiences of OR teamwork. Phenomenology focuses on the nature of human experience (Husserl 1965, 1962, Merleau-Ponty 1962) and thus respects experiential knowledge as a source of data. Moreover, phenomenology was chosen because OR teamwork has not been studied much, and descriptive data could possibly fill the gaps in our knowledge of OR teamwork. The initial phenomenological analyses were conducted to answer the research questions: 'how does collaboration characterize the work of OR teams from the point of view of Finnish OR nurses, what are the benefits or disadvantages of OR teamwork from the point of view of OR nurses, and how is OR teamwork experienced during the studies of the OR clinical placement period from the point of view of nursing students.`

In the process of describing what they felt about teamwork, the participants explored their subjective experiences, and errors repeatedly come up as one meaning of teamwork. These descriptions were the focus of secondary analysis. Qualitative content analysis was used as an additional method in secondary analysis to identify more details about the specific theme, i.e. errors, from the already existing available data. (Cf. Patton 1990, Sandelowski 1995, 2000). Below, each of the methods is presented in detail.

4.3.1 Conceptual analysis method

Conceptual analysis is a method of enquiry that elicits clarification and identification of words and gives labels to the concepts that carry their meaning. Additionally, it is a process of dissecting phenomena to understand them better and to optimise the communication about them. (Meleis 1991, Chinn & Kramer 1995.) Several methods of conceptual analysis exist, and most of them are clearly related to Wilson's

approach (1971) (Walker & Avant 1982, 1995, Haase et al 1993, Rodgers 1993, Schwartz-Barcott & Kim 1993). The method for analysing the concept 'team' was based on Walker and Avant's (1995) method, which is based on a literature review. Walker and Avant's approach has been attractive due to its popularity with many researchers (e.g. Holcomb et al 2002, Aita et al 2003, Baldwin 2003).

On the other hand, Walker and Avant´s approach has been criticised for simplifying complex concepts (Morse 1995), representing a static view of concepts and focusing on a practice-related application of conceptual analysis (Rodgers 1993). Nevertheless, Rodger´s hybrid model has also been criticized for favouring an excessively interpretative approach of conceptual analysis in establishing the concept's maturity. While Morse's (1995) approach is comprehensive, it is a rather complex method of analysis. Despite the critique, Walker and Avant´s (1995) method is usable in analysing such concepts as 'team', which have been defined earlier, but have gained new meanings over time. Moreover, the use of this step-by-step approach allows examination of the attributes or characteristics of a concept and clarifies some over-used concepts that are prevalent in nursing practice. According to Walker and Avant (1995), the conceptual analysis process involves selecting a concept, determining the aim of the analysis, identifying the uses of the concept, determining defining attributes, constructing cases and identifying antecedents and consequences of the concept.

Selecting a concept and determining the aim of the analysis

The aim of this conceptual analysis was to produce information about the use of the *concept 'team'* and to describe its use in OR nursing. In the first phase of the study, the researcher's pre-understanding about the terms 'collaboration' and 'teamwork' was that collaboration could cover the meaning of multiprofessional co-operation in OR. That is why the nurses' experiences of collaboration were studied. During the analysis, however, the researcher's understanding of the concepts increased, and 'teamwork' turned out to be a much wider concept than 'collaboration' and to describe better the co-operation that occurs in OR teams. Therefore, the concept 'team' was chosen for analysis in this study. Even though 'team' is an old concept (cf. Tuckman 1965), popularity and common usage have caused it to become more vague over time, and it has most likely gained new special meanings in different contexts. Additionally, 'team' has been used partly rhetorically and indiscriminately, and it is thus unclear what working in teams requires from the team members (Guzzo & Dickson 1996, Frilander 1997, Lehtinen 2000, Kärkkäinen & Saarinen 2002). Therefore, clarification of the concept 'team' is a step towards its better understanding and implementation in OR nursing.

Identifying the uses and determining the defining attributes of the concept 'team'

In order to explore how a concept is used, the definitions and applications of the concept across different disciplines should be explored in sufficient depth. In addition, the analyses should include examples of studies, quotes of dictionaries and indirect references to the concept. (Walker & Avant 1995.) The literature search for this conceptual analysis was conducted via the MEDLINE, CINAHL and EBSCOhost databases from 1992 to 2002. The material gained from the literature search was read through for statements pertaining to teams and for the ways in which the concept 'team' was used in different situations, especially in OR working teams. As a result of the analysis of written documents, similar statements were combined into themes, and a summary of the use of the concept was compiled. The themes were "definitions of teams", "development of teams around the turn of the 21st century", " goals and advantages of teams", "individualism within teams" and "skill-mix in teams." Based on the summary, the *attributes of team were defined.* Attributes are characteristics of the concept that are always present in its application; therefore, they are the features that best describe the concept. Overall, these characteristics must be present in any context where the concept is applied. (Walker & Avant 1995.) While the concept 'team' consisted of several meanings, it was important to emphasize the most useful meanings from the viewpoint of this study. The meanings that were not associated with teams between employees, but were related to, for instance, nurse and patient teams, were excluded.

Constructing cases of the concept 'team'

A model case taken from practice rather than created is the next stage of conceptual analysis. A model case is a real life example of the use of the concept, which includes all of its critical attributes. *Related cases* are instances of concepts that are related to the concept under study but do not include the critical attributes. All cases have related cases because concepts cannot be studied in isolation. When deciding what case is related and what is not, it is helpful to think of how the concept is similar to some related concept and how it differs from it: there should be marked similarities but a slight difference compared to the other concept. *Borderline cases* are examples or instances that contain some but not all of the critical attributes of the concept being examined. In borderline cases, the analyst is not sure whether or not a case is an example of the concept. *Contrary cases* reveal what it is about the cases that makes them differ from the concept. Sometimes it is easier to say which cases are not the concept than which ones are. (Walker & Avant 1995.) Model, related, borderline and contrary cases of the concept 'team' are presented in paper V.

Identifying antecedents and consequences of the concept 'team'

Based on the progress of the analysis, the aim was to examine the *antecedents* and *consequences* of the concept 'team' in the OR context. However, there was not much research on teams in OR, and the antecedents and consequences of teams were therefore defined at the general level. The antecedents and consequences are stages of conceptual analysis that are often ignored, even though they enrich the analysis by placing the concept in a certain context. Antecedents are events that must occur before the concept. (Walker & Avant 1995.) Antecedents for 'team' could be deduced from the literature. Consequences are the outcomes that result from the application of the concept (Walker & Avant 1995).

4.3.2 Phenomenological analysis

Phenomenology as a philosophy is rooted in the phenomenological movement of the late 19th and early 20th centuries. It began in Germany with the contributions of Husserl (1859-1938) and Heidegger (1889-1976) and was further developed in France by such philosophers as Sartre (1905-1980) and Merleau-Ponty (1908-1961). (Husserl 1965, 1962, Spiegelberg 1972, 1982, Juntunen 1986.) In phenomenology, return to the world of experience is the starting point of all science. However, people live their everyday lives with the "natural attitude" and tend to take things for granted. From a philosophical viewpoint, this is naive. Instead of taking the world for granted, phenomenology aims to explore the ways in which subjects experience e.g. `know or comprehend ' the world. (Merleau-Ponty 1962.)

When phenomenology is adopted as a framework for a research, confusion easily arises if the researcher remains unmindful of the fact that phenomenology is primarily a philosophy. This confusion is compounded by the general assumption that phenomenology is an integrative approach applied in human disciplines that turn to alternative (other than quantitative) ways of doing scientific research. However, there is no single phenomenological approach that can adequately cover the major phenomenological enterprises. Moreover, there are no common guidelines for how to carry out phenomenological analysis. Therefore, it was important to clarify the origins of the philosophical underpinnings and the personal notions of phenomenology prior to undertaking phenomenological analysis. (Cf. Giorgi 2000ab.)

This analysis follows the descriptive phenomenological perspective and has its epistemological basis in Husserl's phenomenology. Thus, the main aspects of phenomenological philosophy were taken into account when planning, performing and evaluating this study. In the following text, descriptive

phenomenology is described, the main concepts of phenomenology are introduced, and some practical actions undertaken during the process of studying OR teamwork are explained.

Philosophical issues of descriptive phenomenology

Husserl's descriptive phenomenology aims to understand why there are events at all, and what things interest and motivate conscious human beings. It is strongly epistemological and considers experience the fundamental source of knowledge. Thus, the aim of descriptive phenomenology is to present the essential features of phenomena, to describe the lived experience as it appears in the participants' consciousness through an intentional relationship between the object and consciousness (Husserl 1962, 1965, Spiegelberg 1982, Juntunen 1986). An object is anything, i.e. a fact, feeling, dream, image, sensation, thought or referential object that presents itself to consciousness and gives meanings about the phenomenon. The objects of intuition, to which consciousness is necessarily directed, do not need to have the characteristic of being "real". Therefore, in phenomenology, no claim is made about how marginal the meaning in itself is, and only its presence for the experiencing subject counts. Furthermore, all objects should be understood in their given modalities as phenomena that usually contain many phenomenal meanings. (Husserl 1962.)

The core concept of phenomenology is intentionality, the direction of consciousness towards understanding the world. Intentionality can also be understood as an act of consciousness, which helps the object to appear. (Husserl 1962, 1965, Juntunen 1986). All mental acts, such as memories and anticipations, are intentional in pointing to something and signifying what is important in the particular object. Thus, through the intentionality of consciousness, all actions, gestures, habits and human behaviours have a meaning. (Spiegelberg 1982, Juntunen 1986.) The presentation of objects to human experience also includes intuition. Intuition consists of awareness of the essence of a phenomenon as it emerges from overlapping intentional actions. Intuition is an inductive process that includes analysis of representative examples of meanings from the viewpoint of the participant (Knaak 1984).

The phenomenological method in practice needs to include phenomenological reduction. Reduction means giving up the natural attitude of being in the world, concentrating on the phenomenon, and experiencing it as if for the first time (Husserl 1962, Giorgi 1997). In addition, reduction involves reflective thoughtfulness about what is important in the experience, leading to identification of the essence of the phenomenon (Giorgi 1985, 1997). The other requirement of reduction is bracketing. Bracketing allows the researcher to reflect on her past and current experiences in an attempt to separate them from that revealed by the participant (Crotty 1996). This does not mean that the

researcher empties her/himself of all possible past knowledge, but s/he should try to approach the phenomenon under study without presuppositions or preliminary assumptions in order to encounter it freshly (Adams & Bond 1997, Sbaih 1997). Husserl determined different levels of reduction, but they have mostly philosophical significance and are refinements of basic phenomenological reduction (Giorgi 1997, 2000a).

For a synthesis of the structure of lived experience, it is necessary to identify the essence of the studied phenomenon (Cohen & Omery 1994, Giorgi 1997). Essence is the intuition-based articulation of the phenomenon without which it is not itself (Giorgi 1985, Sadala & Adorno 2001), and which limits the variations a meaning can undergo. Scientific essences are more contextualized and dependent upon the unique perspective of the discipline than philosophical essences are. Therefore, the disciplinary perspective and the focus of the research partly determine the most invariant meanings of the phenomenon at hand, i.e. the fundamental meaning (Giorgi 1997, Giorgi 2000a.)

The overall purpose of a descriptive phenomenological analysis is to describe the essential structure of the phenomenon under study, and the findings are thus descriptive rather than interpretive or explanatory (Paley 1997). Interpretation is not a description because it introduces, either from theory or for pragmatic reasons, a perspective that is not appropriate by intuitive evidence (Giorgi 1997, Maggs-Rapport 2001). Understanding is the outcome of interpretation: the interpreter overcomes the phenomenon's strangeness, transforms it into a more familiar form (Dreyfus 1987, Cohen & Omery 1994, Koch 1995) and discovers the concealed meanings embedded in the informant's words (Spiegelberg 1982, Merley-Ponty 1962). Description is an analytical process exploring the meaning of an individual experience (Husserl 1962, 1965, Juntunen 1986) and articulating it precisely as it emerges in the experience (Knaak 1984, Mohanty 1989). Descriptiveness within phenomenology is maintained by considering the alternatives of linguistic expressions. This involves free imaginative variation, in which a specific instance of the meaning is explored through its range of forms. (Knaak 1984.)

Phases of descriptive phenomenological analysis

The method of descriptive analysis developed by Giorgi (1985) was used here. The method begins by studying individual examples of a larger phenomenon and progresses via a process of inductive reasoning towards the 'universals', which are presented descriptively (Giorgi 1985, Walters 1995). The process involves five phases: reaching the sense of the whole experience, discrimination of meaning units, translation of the meaning units into the language of the discipline, synthesis of the translated meaning units into a specific description of a situated structure and synthesis of the general description

of a situated structure or types of general structural descriptions (Giorgi 1985). Despite the systematic and rigorous structure of the analysis, the shape of the analysis develops flexibly in each research project in response to the specific qualities of the data (Giorgi 1997, 2000a). The progress of the method and examples of the important tasks in each phase of analysis of the nurses' data in 2000 are presented below and in the Table 3. The phases 1-4 describe the progress of the analysis at the level of a single participant, while phase 5 is a combination of all participants. In the fifth phase of the analysis, the individual meaning structures could be combined either into a single general meaning structure, which was done in this study, or into types representing the most important meanings of the studied phenomenon.

Table 3. Progress of descriptive phenomenological analysis and examples of the tasks done in each phase of analysis.

PHASE OF ANALYSIS	TASKS DONE DURING THE PHASE
Phase 1: Reading of the entire description of experiences to obtain a view of the whole.	- reading the texts as often as necessary to get a good grasp of the whole
Phase 2: Identification of the individual meaning units of the experience based on the researcher's intuition and reflection.	- reading through the text with the specific aim of discriminating meaning units from a nursing perspective and with a focus on teamwork - maintaining openness to let unexpected meanings emerge - re-grouping the meaning units based on their fitting together and placing them as they reflect the structure of the original experience
Phase 3: Translation of the participants' language into the language of science = expressing the explicit and implicit meanings of the experience.	- translating the individual meaning units with intuition through a process of reflection and imaginative variation = rewording and restructuring the everyday expressions into the language of nursing science with an emphasis on teamwork - presenting the translations as clearly as possible, - avoiding too early commitment to theoretical concepts, and retaining the participants' descriptions as far as possible
Phase 4: Synthesis of the insights into a description of the entire experience = individual meaning structure.	- maintaining the importance of structures in the interrelationships between essences and their relationships, not so much the parts themselves - going back to the raw data and rendering variations → reanalysis if some meaning is missing in the synthesis → synthesising all of the translated meaning units into a consistent statement of the structure of each participant's experiences about OR teamwork
Phase 5: Integration and synthesis of the focal meanings of individual structures = one general meaning structure.	- dividing the structures into meaning units that no longer represent the individual experience but the essence of teamwork - emphasizing the most important meanings of the structures and determining which features of the structures manifest a general meaning of OR teamwork - comparing each individual's structures to the others and identifying the convergences and divergences → the similarities become part of the structure (cf. Giorgi 1985)

Phase 1: Reaching the sense of the whole experience

The entire description of each participant was read in order to develop a general idea of the whole experience and re-read as often as necessary to get a more detailed grasp of the experiences. In this first phase, instead of trying to thematize the results, the researcher tried to maintain the individual

experiences intact. This was done by retaining a global sense of the data and determining how the parts were constituted. In addition, the prior thoughts, conceptions and judgements that could have interfered with the researcher's openness towards the description were set aside as far as possible. (Table 3)

Phase 2: Discrimination of meaning units from a nursing perspective and focusing on OR teamwork

Each entire description was divided into parts known as "meaning units." Having grasped the essence of the whole, the researcher read the texts through once more with the specific aim of identifying meaning units from the perspective of OR teamwork. Each time when a transition in meaning was experienced, a meaning unit was elicited. The meaning units did not exist in the descriptions as something self-evident, but were constituted by the analyst´s sensitive attitude to the discipline and to OR teamwork. Moreover, in order to discover meanings in the data, an active thinking process and bracketing was used to let unexpected meanings emerge. In practice, bracketing required the researcher to reflect on her preliminary assumptions about OR teamwork, to differentiate her personal experiences from those included in the data and to absorb the important meanings of the informants' experiences. When the meaning units had been identified, they were re-grouped based on their similarity of content and placed into categories of original experience. These 'units' were separate entities, which together constituted the whole meaning of the experience. (Table 3)

Phase 3: Translation of the everyday expressions into the language of nursing science with an emphasis on OR teamwork

In the third phase the participants' everyday expressions were transformed into the language of nursing science with an emphasis on OR teamwork. Translation included the identification, rewording and restructuring of the individual meaning units by intuition through a process of reflection and imaginative variation. To intuit was an inductive process, which allowed thoughts to wander and to see the meanings from the viewpoint of the participants. Because the reflection on the participant's expression and its description had to be consistent, the translations were presented as clearly as possible, avoiding too early commitment to theoretical concepts. However, whenever some theoretical concepts of teamwork were illustrative and reflected the participants' individual experiences, they were used in the translation. (Table 3)

Phase 4: Synthesis of the transformed meaning units into a specific description of situated structure

All of the transformed meaning units were synthesized into a consistent statement of the structure of one participant's experience of OR teamwork. The fourth phase of the analysis involved looking at both the natural units and the meanings and asking 'what does this tell me about OR teamwork?' Thus, the aim of the research allowed narrowing of the focus to OR teamwork, to be able to emphasize the most important meanings. The importance of structure lay in the interrelationships between essences and their relationships, not so much in the contextually specified parts themselves. When each of the structures had been delineated, the researcher went back to the raw data to ensure that the process had not changed the original experience. The ultimate outcome of this phase was a synthesis of each participant's experiences, i.e. 21 Finnish OR nurses' (lived) subjective experiences about collaboration and 30 Finnish, British and American OR nurses' and 30 nursing students' (lived) subjective experiences about OR teamwork, which were translated into the language of nursing science. (Table 3)

Phase 5: General description of situated structure

In the fifth phase of the analysis, the individual phenomenological structures were divided into meaning units that no longer represented the individual experience. Based on the meanings, it was determined which features manifestly reflected the essence of OR teamwork. Therefore, each specific situated structure was compared to the others by identifying the convergences and divergences. Then, the themes and specific meanings were separated and their relationships with the other themes and meanings were described. In formulating the specific situated structure, all translated meaning units were taken into account, and the most essential meanings related to OR teamwork were emphasized in the integration of structure. When the meanings had been placed together, the structure no longer represented the individual experience but reflected the essence of the meanings in various illustrative ways. (Table 3)

4.3.3 Content analysis method

Qualitative content analysis, which is a method developed specifically for the analysis of written material, was used in the secondary analysis of the OR nurses' data in the year 2000. During the detailed reading of the transcripts about OR teamwork experiences, it became evident that the descriptions were rich in content and detail. Specifically, the data recurrently revealed errors as a meaning of teamwork. Therefore, a secondary analysis to extract the meanings and to identify the

details of the error-related aspects of teamwork was conducted using a method of qualitative content analysis.

Content analysis involves identification, coding and categorization of primary patterns in a text. It can be quantitative, focusing on, for example, counting the number of times certain expressions occur. It can also be qualitative, resulting in an interpretation of the contents of a text. In either case, a classifiable item of data may consist of a single word or a phrase or a combination of words and phrases. Items classified under a particular theme are presumed to have similar meanings. (Patton 1990, Morse & Field 1996.) In this study, the use of qualitative content analysis was based on the assumption that the nurses' descriptions were likely to yield concrete responses about the error-related aspects of teamwork (cf. Patton 1990, Sandelowski 1995, 2000). As the study was exploratory and descriptive in nature, the analysis was primarily guided by the study question: "What are the error-related aspects and potential errors in OR teamwork from the point of view of OR nurses."

The qualitative content analysis was carried out step by step as the data were conceptualized and reformulated in new ways. Therefore, each transcribed interview was analyzed as a whole, concentrating on the error-related aspects of OR teamwork. First, the research read the interviews several times to immerse in the data and to understand the meaning of the experience as a whole. Each word and each sentence in the text was analysed to identify possible aspects of errors. Each instance where the informant alluded to or described how errors manifested for her was marked. Subsequently, the segments of text that reflected meaningful aspects of errors were identified and compared with the others, to point out similarities and differences across the data. That is how the formulation of sub-categories started. The connection between each two sub-categories was clarified in an attempt to raise the data to a higher level of abstraction. In this manner, nuances within categories developed and new sub-categories evolved. When the analysis was complete, expressions indicating the same issues were grouped together as the final sub-categories. The expressions were part of a sentence, a complete sentence or several sentences linked together by their content classifiable into the sub-categories. In the next phase, the relationships between sub-categories were identified, nominated and labelled into main categories (cf. Morse & Field 1996.) As a result, three main categories of potential errors, with subcategories, were identified and formulated.

The purpose of this secondary analysis was to put aside the known theories, explanatory models and personal pre-insight of teamwork and, instead, to let the text speak for itself. Therefore, the codes were grouped into tentative categories and subcategories, which were then reorganized in relation to the course of the descriptions about errors in OR teamwork. To ensure that all categories were mutually

exclusive and represented the true meaning of the experience for the participants, the researcher repeatedly went back and forth between the complete text. (cf. Morse & Field 1996, Sandelowski 1995, 2000.) The aim was to prevent the data from being fragmented and thereby misinterpreted. Additionally, in order to strengthen the credibility of the analysis, the categories were discussed with the co-authors and the category names were agreed upon.

4.4 Ethical issues

Each study should be planned individually in accordance with the codes, laws and regulations pertaining to clinical research. The ethical concerns of this qualitative study can be described in terms of the ethical principles of autonomy, beneficence, non-maleficence and social justice (Beauchamp & Childress 2001).

One of the aims of research in general and a particular challenge in a cross-cultural study like the present one is the need to protect the participants from harmful effects. Thus, the research had to meet the international ethical standards for the human rights agenda (Charter of Fundamental Rights of the European Union 2000/C 364/01). Standards for Human Rights make it clear that every individual has the right to personal integrity, freedom from unwanted intrusion, personal autonomy. For autonomy to be exercised in relation to a study project, the organization and the individual must be informed about the nature of the research and how the information will be used. This allows the study participants to make an informed decision concerning their participation and to give informed consent. (Beauchamp & Childress 2001). In this study, autonomy was achieved by obtaining informed consent from the participants and confidentiality agreements from the organizations (Seedhouse 1998, Beauchamp & Childress 2001). Firstly, this involved submitting the documents (research proposal and consent forms) to the institutions involved and, after the review process, getting an approval to carry out the study. This was the practice in the years 1997 and 2000, when the critical incident data of this study were collected. Therefore, a permission to collect the data was obtained, followed by local ethical procedures for approval in each country. Secondly, the participants were fully informed about the study in an information session and by using written information. (Appendix 1) The written information allowed the individual time to think about it freely rather than feel coerced (Beauchamp & Childress 2001). The information included a description of the purpose, aim, participants and methods of data collection. The participants were also informed about their rights and the voluntary nature of participation, and their self-

determination was respected. Additionally, the researcher emphasized the value of each individual participant and explained that all information would be confidential and anonymous.

When nurses agreed to participate, they were given an information sheet, and their involvement confirmed. Written or verbal consent to participate was obtained before the interviews were started, and it was re-confirmed after the interviews, when the participants were asked again whether they still wanted to give permission to use the data they had provided as research material. Thus, a combination of informed and processual consent was used in this study. Miles and Huberman (1994) and Behi (1995) also suggest that ongoing dialogue and re-negotiation is needed for voluntary, informed decisions in qualitative research. The nursing students were given both written and oral instructions about the intentions of the study and gave their informed consent in a written form. In practice, the students wrote their descriptions in their spare time after the clinical placement, and they could therefore have dropped out whenever they would have felt like it. Therefore, to maintain autonomy, the right to withdraw from the study at any time was emphasized and was practically possible for both nurses and students.

Beneficence in a study means the need to find a balance between the benefits and the risks from the point of view of the participants, humanity and science (Beauchamp & Childress 2001). Although the assessment of a benefit for each participant is difficult, the overall atmosphere of the interviews was positive, and the participants seemed to be interested in the study. Moreover, it seemed that the participants were willing and even relieved to tell about their OR teamwork incidents. They had an opportunity to reflect on their own practices, and that was most likely to be beneficial for them. Additionally, some of the participating students wrote at the end of their descriptions that they were happy to give feedback on their incidents, because they found this study important and urgently needed to improve learning within the OR context. Similarly, Miles and Huberman (1994) suggest that, in qualitative research, informant benefits may include the experience of being listened to, gaining insight and learning and improving personal practice.

Non-maleficence in a study refers to the obligation of the researcher to avoid harming the study participants or causing them any risk (Beauchamp & Childress 2001). As the data was collected in three countries, the principle of non-maleficence was related to the cross-cultural nature of the study. Therefore, building trust between the researcher and the participants was important. The researcher entered the interview field as a conversationalist, not as a teacher or an evaluator, because that resulted in a more inclusive and equal relationship. In the conversational interview approach, the

researcher actively listened in a way that encouraged and provided the participants both time and space to tell about their personal incidents of teamwork (cf. Miles & Huberman 1994). One aspect of gaining access to ORs in three countries was the researcher´s ability to establish a confidential relationship with the OR nurses. Most likely, the researcher´s familiarity with the OR context promoted easy access to the frequently closed and unattainable field and thus helped in maintaining a relaxed and safe atmosphere. However, even though the researcher, who herself was a former OR nurse, had an advantage in interviewing the participants who were OR nurses, she was not immune to potential ethical violations. For example, dual-role relationships where the researcher is a friend or a colleague of a participant may cause problems in autonomy. Participants may also find it difficult to withdraw from the study if an authority Figure (e.g. a manager or a teacher) consents to their participation (e.g. Ford & Reutter 1990). Additionally, if the participants are interviewed in their own setting (here the OR), the field worker can be regarded more as a guest than as a researcher. These factors may lead to violation of participants' autonomy, confidentiality and justice. However, in this study such aspects were not present.

The principle of non-maleficence was also related to the protection the participants' identity (Beauchamp & Childress 2001). Therefore, absolute confidentiality was emphasised, and the participants were advised that they were free to choose what to reveal in their interviews and written comments. Anonymity of the institutions was also respected, and the names of the institutions are therefore not revealed in publishing the results. Additionally, all data were treated confidentially by giving each participant a number code and a pseudonym, and each recording and transcript thus had a numerical code for purposes of identification. All OR nurse participants gave permission to audiotape the interviews. Apart from confidentiality, credibility was also enhanced by tape-recording, because an analysis of narrated information without word-for-word recording could easily have altered the experiences. None of the nurses were disturbed by the recording.

The principle of justice means fair distribution of all rights and responsibilities within a social community (Beauchamp & Childress 2001). It also emphasizes the importance of the integrity of the investigator and states that the interests of society must never take precedence over the interests of the individual (cf. Miles & Huberman 1994). The participants of this study did not represent vulnerable groups and did not suffer from social inequality. This research, however, may possibly promote social justice by motivating nurses and students to develop OR teamwork. Informal feedback to the researcher indicated that the organizations´ readiness to participate in the research was due to the fact that the study design and practical arrangements were accomplished with good ethical standards, sensitivity and efficiency, but also because the nurses and students were very willing to take up teamwork for a thorough

discussion. Especially the generosity with which busy OR nurses gave their time was remarkable and most likely reflected their full understanding of and personal interest in the study.

The data were collected in the years 1997 and 2000 following the local ethical procedures for approval then valid in each country. The regulations governing research were amended in the UK in 2001 through the implementation of Research Governance (Department of Health 2001), which re-emphasises the need to ensure the safety and wellbeing of the participants in studies through more rigorous review and monitoring of research. If the data collection of this study had taken place after 2001, the changes in the regulations would have necessitated different ethical procedures and some things should have been done differently. Firstly, permissions from the ethical committees of each participating institution should have been obtained to ensure that the research was ethical, safe and scientifically sound. Secondly, consents should have been obtained from all participants and recorded on regular forms. However, despite the differences in the regulations ensuring ethical standards between the time of data collection and today, the ethical guidelines for nursing research were observed throughout this study.

5 RESULTS

In this chapter, the results are presented in six main sections. The first section describes how collaboration characterizes OR teamwork from the nurses' point of view (Paper I), and the second section describes the conceptual analysis of 'team' in the OR context (Paper II). OR nurses´ experiences of the benefits and disadvantages of OR teamwork are discussed in the third section (Paper III) and the responsibility for errors in OR teamwork in the fourth section (Paper IV). The fifth section contains the results of nursing students´ experiences about OR teamwork (Paper V). In the sixth section, the results are summarized and an overall conclusion of the results is presented. This chapter summarises the results that were presented in more detail in the papers I-V.

5.1 Collaboration characterizing operating room teamwork

In this section, OR nurses´ experiences of collaboration based on phenomenological analysis are described under two subheadings: skills needed in collaborative teams and collaboration for the patient's best interest. (Paper I)

5.1.1 Skills needed in collaborative teams

Organizational skills, active and open communication and both assertiveness and positive flexibility were needed in multiprofessional OR teams. When the employees had sufficient professional skills, they could work collaboratively. The organization of OR activities required flexibility, anticipation and constant communication. Inadequate flow of information caused conflicts in and between the occupational groups and thus obstructed collaboration. Open discussion about even difficult matters, in which everyone's opinion was appreciated, "clarified the atmosphere" and released energy for nursing. Openness was described between nurses, between the different occupational groups and also between nurses and their managers. While collaboration in OR teams included flexibility, assertiveness and self-confidence were also expected. Moreover, a fair division of work, compliance with the common rules and confidence in one's professional skills further improved collaboration. The ability to collaborate developed when knowledge and skills increased, but experience and good reputation in the work community were also important in achieving trust and acceptance in the team. Additionally, in order to enjoy their jobs, OR nurses needed enough challenges and opportunities to develop their work, which became frustrating if there was a poor response to new ideas.

5.1.2 Collaboration for the patient´s best interest

Collaboration in OR teams aimed at the patients although the emphasis varied between the emotional, technical and organizational aspects of OR nursing. Personal experience of patients' well-being helped the employees to see their work from the patient's point of view, motivated them to further develop it and, if necessary, caused them temporarily to deny their own needs, e.g. abstaining from breaks or working overtime. When each team member experienced their work as part of a bigger whole, the employees "pulled together". In working for the patient's best interest, it was considered important to know the special features of all team members' tasks, because real collaboration could be achieved only by looking "beyond one's own work". Appreciation of individuality was also important in aiming at the best possible results in teams.

5.2 Conceptual analysis of 'team' and use of this concept in the operating room context

As a result of the conceptual analysis, the first section of this chapter discusses the essential attributes, antecedents and consequences of the concept 'team'. In the second section, empirical referents and concepts related to 'team' are presented.

5.2.1 Essential attributes, antecedents and consequences of the concept 'team'

Based on interdisciplinary definitions and practical utilization of the concept 'team', the essential attributes of the concept were defined (Paper II). While 'team' had several meanings, it was important to emphasize the most useful meanings from the viewpoint of this study. The meanings that were not associated with teams between employees, but were related to, for instance nurse and patient teams were excluded. To sum up, the key attributes of the concept 'team' are:

1. two or more people doing something together,
2. people doing something willingly together to reach a goal,
3. people doing something together have sufficiently both similar and different skills and abilities, which they combine to reach the goal,
4. people doing something together are responsible for their own and the others' actions and for the outcomes of the teamwork, and
5. people doing something together have a balance of power: they discuss and interact honestly without hierarchic barriers.

Based on the progress of the analysis, the antecedents and consequences of 'team' were determined (Table 4). These antecedents and consequences are both economic and functional, but also psychological.

Table 4. Antecedents and consequences of team.

ANTECEDENTS OF TEAM	CONSEQUENCES OF TEAM
More than one, but not more than 10 individuals All know what the goal of the work is and are willing to devote time and energy to the relationship All team members have • professional competence • understanding and appreciation of each other's perspectives • knowledge about the action policies of the organization The team has • enough financial resources • a unified front and mutual support • open and honest communication • mutual trust and respect • shared responsibility and accountability	• savings of time, money and human effort • improved performance outcomes • greater job satisfaction • unity of purpose • ownership, increased commitment • collective problem-solving, willingness to openly discuss differences • better utilization of skills • sharing knowledge • opportunity to learn new skills • flexibility • freedom to concentrate on the main things • increased autonomy • increased appreciation of others' efforts • improved moral • increased creativity • increased confidence and peer respect

5.2.2 Empirical referents and related concepts of team

As a result of this conceptual analysis, the empirical referents of OR teams were defined as shown in Table 5. Working in OR teams resulted in rapid patient turnover, effective use of OR time and safe care during the surgical procedure. From the point of view of the employees, working in teams makes it possible to clarify the responsibilities of staff members and to foster continuous development.

Table 5.   Empirical referents of team.

EMPIRICAL REFERENTS IN OR TEAMS
• rapid patient turnover
• optimal operation times
• effective use of OR time
• the best possible and safe care during the operation
• good learning environment for new employees and continuous development of new strategies and procedures
• appropriate processing of errors and guidance to error-free actions
• flexible principles concerning on-call time or emergency situations
• low staff turnover

As a result of this conceptual analysis, the relationship between the concept 'team' with the concepts 'group' and 'collaboration' were also clarified. Basically, both 'group' and 'team' refer to doing something together instead of individual performance. However, the difference between these terms has become clear over time, and 'team' is considered a more developed, detailed and many-sided concept than 'group'. 'Group' is a collection of individuals who come together for a joint effort, but whose outcomes rely primarily on the individual contributions of its members. Even though the group communicates, coordinates and cooperates so that each is better able to do his or her job, the main focus is on the individual roles, tasks and responsibilities.

The aim of a team is to accomplish efficiently and thoroughly specific day-to-day operations. Therefore, teams are structural entities set up to have the work done by different professionals, who combine their abilities and resources, and to increase the involvement of employees in decision-making related to their work. Collaboration is the manner in which teams perform, and it is typically described as a process that underlines joint involvement in intellectual activities. Although organizations can be instrumental in supporting collaboration, they cannot ensure its success. Collaboration is, in fact, a process that takes place between individuals, not institutions, and only the persons involved ultimately determine whether or not collaboration occurs. As collaboration relates to health care, it can be defined as a joint process pf communication and decision-making with the explicit goal of satisfying the patient's needs for wellness and illness while respecting the unique qualities and abilities of each professional. Competence, confidence and commitment on the part of all parties involved, besides respect and trust in oneself and others, are keys to collaboration. As such, patience, nurturance and time are required in teams to build their internal relationships to the point where collaboration can occur. Additionally, in a collaborative atmosphere, the team members become autonomous and able to work cooperatively as

equal partners. Although some may argue that being autonomous does not suggest working in teams, autonomy is necessary for the collaborative process.

5.3 Nurses' experiences of the benefits and the disadvantages of operating room teamwork

In this section, as a result of phenomenological analysis, nurses´ experiences of the benefits and disadvantages of OR teamwork are first considered in detail in four sections dealing with professional, distracting and organized OR teamwork and physical environment as markers of OR teamwork. Each section is labelled based on the most important meanings attached to teamwork by the nurses. The results are then considered in one general meaning structure, which describes the essence of OR teamwork from the point of view of all participants. (Paper III)

5.3.1 Professional OR teamwork

Membership in professional OR teams required competency, including knowledge, practical skills, ability to prioritize needs and willingness to collaborate. Competent team members often had long experience of OR nursing and were well known in their working community, especially in their own service. Familiarity with the team members individually and as members of OR teams created trust, made preliminary preparation possible and helped nurses to understand each other´s needs from mere gestures. Trust in each other's professionalism enabled the team members to overcome educational boundaries and to flexibly aim at good care. Moreover, it increased work satisfaction.

OR teams worked under extreme pressure to achieve the high standards set by themselves. Perfectionism, such as always being accurate and never making mistakes, was emphasized, and team members therefore continuously monitored each other's actions. Mistakes were not allowed, but if they occurred, they were soon widely known and harshly judged. Even though senior nurses had more experience than their novice colleagues, both could be a source of irritation because of their inadequate teamwork skills. Slowness, tiredness and overall unawareness of work were not well tolerated. Additionally, excessively emotional attitudes or overreacting to situations were seen as a disadvantage of teamwork.

5.3.2 Distracting OR teamwork

Distraction in teamwork was due to the fact that it simultaneously demanded many things and was characterised by urgency. Constantly changing situations forced the team members to respond quickly and to share information. Teamwork was unpredictable, especially during the on-call hours, because the work was unscheduled, the teams were established in a rush, and all surgical services were covered. The sense of not belonging to a team was also a source of distraction. Anaesthetic and OR nurses often felt their own specialty groups to be their real teams rather than the daily scheduled teams. It seemed hard for the nurses to be members of teams other than their own. However, the composition of teams changed daily and could thus cause distraction and impair one's ability to work effectively. Also, the emotional balance of teams was disturbed by changes, which thus caused stress. Successful and pleasant team efforts helped people bond together and fostered a feeling of belonging.

Lack of collegiality was another source of distraction, and it could be manifested as bullying. Bullying could consist of rude behaviour, constant impolite or patronizing communication and public humiliation. In addition, the reluctance of individuals to talk to one another made nurses act as buffers between other occupational groups. Differences in educational level or professional esteem between the team members caused distrust, leading to a tendency to make excuses, to act offensively or to be reluctant to work in teams. Power struggles could take place among surgeons, anesthetists and anesthetic nurses, and the ways of misusing power included shortened lunch breaks, making OR nurses feel guilty about leaving on time and lying about a patient's critical condition. Furthermore, a single difficult person in the team could imperil the whole team's cohesion. Overall, distraction reduced effectiveness and could make nurses reluctant to co-operate.

5.3.3 Organised OR teamwork

Organised OR teamwork was characterised by optimal order and timing of patient allocation. Continuous interaction between the anaesthetic and operating room staff was extremely important because collaborative decision-making ensured the effectiveness of teamwork. The OR manager ensured organized teamwork by assigning enough experienced staff to each team. However, inconsistent demands or values in teams, such as a contradiction between the desire to have the best nurses for each case and the novice nurses' learning needs, caused disagreements. Both financial (e.g. extra salary) and emotional (e.g. praise and encouragement) rewards kept the teams motivated, and feedback was expected not only from the manager but also from the co-workers and physicians. This was particularly important for new team members.

The problem of organised OR teamwork was that the daily schedules were often overbooked, and nurses working in different shifts were under constant threat of a demand to work overtime. Thus, the schedules needed manipulating, and some surgeons pushed teams to work faster and longer, even though rushing in non-urgent situations hindered teamwork. The problem of overtime work was solved in culturally specific ways. The Finnish OR teams had specified shifts that worked overtime when needed. In British ORs, the nurses who were already working with cases requiring overtime were expected to stay as long as necessary. In the American OR culture, surgeons personally asked nurses to stay longer.

5.3.4 Physical environment as a marker of OR teamwork

The success of OR teamwork was partly dependent on technology. Competent use of equipment and a task orientation, especially in emergency situations, fostered the nurses' tendency to act as responsible team members. The physical size of the unit and the number of employees were also environmental markers of teamwork. Larger ORs had difficulties in setting up teams, mainly because it took too long to get hold of all the necessary team members. The teams in small units were flexible, comfortable mingling with each other and better at implementing decisions than those in big units.

5.3.5 Finnish, British and American nurses' general meaning structures: Benefits and disadvantages of OR teamwork culture

Professionalism was beneficial for OR teamwork. Professional teams were competent and willing to co-operate and thus able to anticipate each other's needs. Professional OR teams were also sensitive to the need to value patients' lives and had a task-oriented approach to their work, especially in emergency cases. Familiarity with the team members' competency created trust, made advance preparation possible and allowed flexibility in accomplishing good care. Providing OR teams with members lacking sufficient skills or motivation, e.g. novice, senior or tired nurses, was therefore a disadvantage. Because perfectionism and accuracy were emphasized in teams, and mistakes were not allowed, team members continuously monitored each other's actions. However, excessive perfectionism made nurses worry about mistakes or suppress emotions while working in teams. Both British and American nurses were expected to write reports about events that bothered them or seemed to involve malpractice.

Distraction was a disadvantage of OR teamwork, which manifested as unpredictability and constant changes in team composition. The changes in the composition of teams caused a lack of collegiality

and impaired team members' ability to work effectively. The most permanent aspect of nurses´ work orientation was the membership in the team of a particular service, but the service could also change. Another disadvantage of OR teamwork was the need to work overtime. The problem of overtime was solved in different ways: by designating certain shifts to stay overtime (Finland), asking nurses personally to stay longer (USA) or simply having nurses stay for as long as the operations lasted (UK). The obligation to act as buffers between other occupational groups and the differences in educational level or professional esteem between the team members could imperil the teams' cohesion.

The additional beneficial aspects of OR teamwork were the sense of belonging to a team, good organization and an OR manager who promoted OR teamwork by assigning enough experienced staff to each team and giving feedback. All these aspects ensured the effectiveness of OR teamwork. The benefits of OR teamwork were partly dependent on technology. Accurate use of equipment and task orientation fostered the nurses' tendency to act as responsible team members. Larger ORs had difficulties in setting up teams, mainly because it took too long to get hold of all the necessary team members. The teams in small units were flexible, comfortable mingling with each other and better at implementing decisions than those in big units.

5.4 Responsibility for errors in operating room teamwork

As a result of the content analysis, the core category "responsibility for errors in OR teamwork" was formed. In the following sections, the results are described by the main categories "individual responsibility, shared responsibility and organizational responsibility". (Paper IV)

5.4.1 Individual responsibility

The need to manage difficult technological situations while providing high-quality care caused continuous pressure on OR nurses and resulted in potential risks of error. Therefore, to maintain safety, nurses had to be competent. Competency developed along with increasing experience and resulted in flexibility and more creative approaches by nurses. Competency also encouraged nurses to respond to all kinds of safety issues and correct other people's errors. Continuous monitoring and controlling of safety issues, e.g. aseptic standards and equipment functioning, were thus felt to be the responsibility of nurses.

Nurses had positive attitudes towards teamwork because they were individually willing to work as responsible team members. Tolerating unpredictability was important in preventing errors, and getting over mishaps helped nurses to work well under pressure. Team members with the above-mentioned attitudes and abilities could recognize anything that was abnormal, react quickly to unexpected situations and therefore understand the potential risks. On the contrary, unsure and overly concerned nurses acted unprofessionally, e.g. easily lost their temper or tried to avoid stressful situations. Serious consequences for patients were also possible if novice team members were delegated to do tasks beyond their experience. It also added too much to the responsibilities of experienced team members and thus made them feel stress.

There was extreme pressure towards accomplishment in the OR teams and hence a threat of complications. Errors were not allowed, but if they occurred, they were soon widely known, gossiped about and judged harshly. Inappropriate judgement could result from limited knowledge of the circumstances, leading to errors and inability to differentiate errors from unavoidable incidents. When the team members were seen to be unsupportive, nurses did not feel safe to report their errors. Moreover, because forgiveness was difficult in strict OR teams, fear of errors caused nervousness and easily created new mistakes, which then caused individual feelings of guilt.

5.4.2 Shared responsibility

Shared responsibility in OR teams minimised the possibility of errors. Familiar teams could optimally share liabilities because such teams were comfortable and allowed free and spontaneous interaction between their members. Additionally, teams familiar with their members´ individual skills and their joint procedures could pool their strengths and keep up high-quality practice. However, most of the time the composition of teams changed daily. The changing of teams sometimes even included changing of service and unit. Changes disturbed the balance of teams and especially involuntary changes caused uncertainty, impairing one's ability to work in the new team. Constant changes could also decrease intraoperative safety by impairing nurses' sense of responsibility.

OR nurses´ role in maintaining fluent teamwork included the need to calm down the OR suite and to act as pacifiers. Additionally, the clarification of misunderstandings required both willingness to review issues arising from incidents and time set aside, since they could distract a person from the task in hand. Disagreements were expected to be discussed after operations because arguments during operations could lead to overheated feelings and jeopardize patients' safety. Moreover, judgement

about when behaviour became so unreasonable that it needed disciplinary actions was difficult. Therefore, teams with long-standing problems were forced to tolerate constant stress and fear of errors. The judicial aspect of shared responsibility was that British and American nurses were expected to write reports about any untoward incidents that could result or could have resulted in adverse consequences.

5.4.3 Organizational responsibility

Scheduling, i.e. optimal order and timing of operations, and systematic communication, which resulted from continuous interaction and collaborative decision-making between the anaesthetic and operating room staff, fostered collegial responsibility for safety issues. Problems in organizational responsibility derived from overbooked schedules and the demand to work overtime. Especially the inability to anticipate overtime work caused stress and made teamwork insensitive. Difficulties between professions occasionally caused OR nurses to act as buffers between the other occupational groups and to maintain the information chain. Moreover, even though the OR culture involved excessive rules, strict regulations and constant double-checking, it also involved common sense in the application of guidelines. However, adaptability was difficult because common sense could vary from person to person and from situation to situation.

OR managers had the organizational responsibility for error-free teamwork by arranging enough experienced staff when scheduling nurses into rooms and shifts. However, shortage of manpower could cause intimidation or slipping morale in teams. Moreover, the British and American participants pointed out that OR teams with undereducated team members also occasionally led to liability problems. The physical environment of OR teamwork was also sometimes conducive to errors. Working in too big an OR could jeopardize patients' safety by slowing down actions and making it difficult to reach team members in time. Such situations could arise due to emergencies, sudden loads of work or acutely changing circumstances. Also, transferring patients and equipment from one unit to another was risky since the equipment was very valuable and its incorrect use could cause both economic and human harm.

5.5 Nursing students´ experiences of operating room teamwork

As a result of the phenomenological analysis, the nursing students´ experiences of OR teamwork are discussed in the three sections of this chapter: functional manifestation of OR teamwork, gaining OR

team membership and technical orientation of OR teamwork. Then the results are placed in one meaning structure, which describes the essence of OR teamwork from the point of view of all participants. (Paper V)

5.5.1 Functional manifestation of OR teamwork

It was a challenging opportunity to try out the OR as a teamwork context. The informal atmosphere was relaxing, and the opportunity to share breaks with the staff helped the students to get accustomed to teamwork. The common routines observed by all team members helped to maintain smooth teamwork and precise actions, leading to safe patient care. Competency was shown by individualistic creativity and willingness to share information within teams. For students, participation in fluent interaction, getting important jobs to do and attendance at operations, meant getting experience of multiprofessional teamwork. Since, it had not been possible to practise multiprofessional teamwork in previous placements, they found such teamwork stimulating. Moreover, having positive teamwork experiences resulted in a wish to work in OR teams after graduation.

Participating in the OR teams was also felt to be uncomfortable because the OR was a context separate from the other parts of the hospital. Even the parties to teamwork, i.e the anesthesia and OR staff, were administratively separate and had different shifts. The separateness of the teams made it difficult to perceive the holistic character of intraoperative teamwork. Furthermore, being inexperienced and uncertain about the teamwork orientation made students feel insecure and self-reproachful. Excessive expectations in the teams led to dissatisfaction and negative feelings towards OR teamwork. One feature of OR teamwork was the emphasis on faultless practice, and any mistakes made were therefore viewed harshly. Mistakes were inappropriately discussed in the public and followed by a period of shameful gossiping. However, the reasons and causes for mistakes were not given equal attention, which discouraged learning.

5.5.2 Gaining OR team membership

Overall, placement experiences within the OR were variable and perceived as too short. Exposure to OR nursing activities took much time, and teamwork skills were not practised systematically. Students felt ill at ease and therefore dependent on others. Finnish students expected to be part of the teams and were disappointed when this was not apparent. Conversely, American students did not expect concrete participation in teams and thus found it positive to have opportunities to function as part of the teams. British students experienced themselves as passive objects in random teamwork practice situations.

Gaining team membership was a result of the mentoring process and an accepting team atmosphere. An experienced and teaching-oriented mentor helped the student to become involved in OR teams. This support also enabled students to experiment with the professional roles they were acquiring. Overall, students' ability to function on the team was fostered by experience. Collegiality and motivating practice situations gradually encouraged students to take part in multiprofessional teamwork and increased their respect for other professionals' work. Participation in social interaction and feedback maintained a positive attitude towards teamwork and helped the staff to gain an understanding of the language of professional OR teams. Moreover, students' communication styles developed as their confidence increased, and they learned to express their professional opinions as they became more comfortable within teams. Attendance in teams was hindered by cautious and overbearing mentoring and by having a substitute mentor. Cliques in the OR, close unprofessional relationship between team members and a lack of a respectful attitude also hindered students' possibilities to gain team membership.

5.5.3 Technical orientation of OR teamwork

A balanced OR team was technically oriented, socially mature and flexible. When all team members were technically skilful, the team maintained timely and precise operational actions and concentrated on tasks. Besides being technically accurate, such a team was supportive and offered a safe and high-quality team learning environment. Moreover, in technically demanding situations, the possibility of practising in fair and skilful teams fostered understanding of the pithy and minimalistic interactions as part of teams' effectiveness.

Differences in team members' activity, skills and attitudes caused problems in the division of work. Teams with an exclusively technical orientation lacked interaction skills, unwittingly ignored patients' emotional needs and had an accusing atmosphere, leading to denial and conflicts between employees. Moreover, such teams were error-prone disinclined to changes and did not welcome new members. Thus, students' actions were limited to observation, which made them feel excluded from team membership. Also, the lack of individual acceptance and the difficulty in following unwritten rules hindered the learning of teamwork. Furthermore, arguments related to blaming for slowness, mistakes or quarrelling about who forgot to do something, during the operation made students feel insecure. Therefore, nursing students found it impossible to respect solely technically oriented teams.

5.5.4 Finnish, British and American students' general meaning structure: Gaining OR team membership in technically oriented OR teams

Gaining team membership was the result of a motivating mentoring process and an accepting team atmosphere. An experienced and teaching-oriented mentor helped the students to become involved in OR teams. Therefore, participation in fluent interaction, getting important jobs to do and attendance at operations was possible. This support also enabled students to experiment with the professional roles they were acquiring. Eventually, positive teamwork experiences resulted in a wish to work in OR teams after graduation. A balanced OR team was technically oriented, socially mature and flexible. When all team members were technically skilful, the team maintained timely and precise operational actions and concentrated on tasks. Besides being technically accurate, such a team was supportive and offered a safe and high-quality team learning environment and thus fostered understanding of the pithy and minimalistic interactions as part of teams' effectiveness. However, teams with an exclusively technical orientation lacked interaction skills and unwittingly ignored patients´ emotional needs. Such teams were error-prone, had excessive expectations and an accusing atmosphere, leading to denial and conflicts between employees. Because these teams were reluctant to change, they did not welcome new members. Thus, the actions of inexperienced and uncertain students were limited to observation, which made them feel excluded from teams. Additionally, the ORs' separateness from the other parts of the hospital and, inside the OR, from the other teams made it difficult to perceive the wholeness of intraoperative teamwork.

5.6 Summary of the results of OR nurses' and nursing students' teamwork experiences

In this study, an effort was made to illuminate and clarify the essence of OR teamwork from the conceptual perspective and by analysing OR nurses' and nursing students' experiences, as shown in Figure 2. As a conclusion, it can be stated that there were plenty of benefits of teamwork in OR nursing. Teamwork maintained the fluency of surgical work, made it possible to keep up high-quality practice and thus decreased the possibility of errors in OR teams. However, the composition of teams changed often. Therefore, by diminishing nurses' sense of responsibility, constant changes could decrease intraoperative safety and cause distraction. In addition, differences in educational levels or professional esteem between the team members caused distrust by reducing effectiveness and by leading to continuous stress. The physical technological environment could be either an advantage or a disadvantage of OR teamwork. The teams in small units were flexible, comfortable mingling with each

other and better at implementing decisions than those in big units. Working in too big an OR could jeopardize patients' safety by slowing down actions and making it difficult to reach team members in time.

For students, participation in fluent interaction and attendance at operations was stimulating and helped them to get accustomed to teamwork. OR teams could also be uncomfortable because of difficulties to perceive the holistic quality of intraoperative teamwork and overall insecurity. Good mentoring process helped students to gain team membership, enabled them to experiment with the professional roles they were acquiring and maintained motivation and a positive attitude towards teamwork. The technical orientation of teamwork was experienced as offering a safe and high-quality team learning environment. However, technically oriented teams could unwittingly ignore both patients´ and students´ emotional needs and thus make students feel excluded from team membership.

Overall, there were many similarities between qualified nurses´ and novice nursing students' experiences of OR teamwork. Both nurses and students claimed the OR to be a hectic environment, where working in teams and interacting with each other was demanding due to the fact that teamwork simultaneously required many things and was characterized by urgency. The demands were also connected with the constantly changing situations, daily changing teams and negative team experiences, which could alienate team members from each other and minimise the feeling of team membership. However, the humour and spontaneity of OR teamwork could be relaxing.

One remarkable similarity between nurses' and students' experiences was the pressure of faultless practice, where mistakes were not accepted. Even though the hectic pace of work was a potential source of errors, mistakes were judged harshly, forgiveness was difficult, and fear of errors was common. Nurses´ willingness to detect and correct errors and work as responsible team members was therefore important in preventing errors. However, such an atmosphere made teamwork detrimental from the learning and psychological perspective. Similarly, both qualified nurses and students described the negative feedback on errors as a shameful and scandalous process, which did not always have logical criteria for judgement or any sense of proportion. British and American nurses were expected to write reports about events related to any untoward incidents, which could result or could have resulted in adverse consequences.

The main difference between nurses' and students' experiences was competency, which was naturally developed by the work experience. Work experience gave a sense of permanence and fostered the

sense of belonging to a team. Like students, novice nurses had difficulties in belonging to a team and taking part into the team activities. Regardless of being a novice nurse or a student, new team members were at the mercy of their mentors because the mentor's personality was extremely important in a positive tutoring relationship. However, nurses' and students' collaborative attitude towards teamwork could also influence the guidance they received.

Understanding each
others work

Knowledge of the
policies

Differences in
educational level

Threat of
complications

Mutual support
trust, respect

Financial issues

Power struggles

Fear of errors

Active, open
and honest
communication

Competency

Bullying

Constant
changes

Slowness,
tiredness

Distraction

Organizing

Antecedents of
team

Disadvantages of
teamwork

Overtime

Collaboration
characterizing
teamwork

Willingness to
collaborate

OR TEAMWORK

Professionalism

Sense of
belonging
to a team

Organizing

Assertiveness
and approving
manners

Learning of
teamwork

Environment

Patients'
wellbeing

Empirical
referents in
teamwork

Benefits of
teamwork

Functional
manifestation

Flexibility

Responsibility for
errors

Gaining team
membership

Good learning
environment

Effective use
of OR time

Quick patient
turnover

Best possible and
safe care

Technical
orientation

Low staff
turnover

Optimal
operation times

Appropriate
processing of
errors

Figure 2. Essential nature of the OR teamwork.

6 DISCUSSION

The purpose of this study was to characterise the essential nature of teamwork in OR nursing by describing how the concept of 'team' is defined in OR nursing and by describing how teamwork is experienced by Finnish, British and American OR nurses and nursing students. In the first section, the validity of this study is discussed in relation to the validity of the findings, the evaluation of the suitability and appropriate use of the methods chosen for this study and the applicability of the findings to nursing. In the second section, the results are discussed in five sections: conceptual dimensions of teamwork, collaboration in OR teamwork, benefits of OR teamwork, disadvantages of OR teamwork and learning of teamwork during the OR placement period.

6.1 Validity of the study

Qualitative research is based on the belief of a social world that there is no universal truth or unequivocal reality, and that research thus cannot prove anything (Sandelowski & Barroso 2002). Instead, the world is multi-faceted, and research aims to describe, interpret and understand the variety of meanings that people attribute to their life experiences (Hammersley 1992, Appleton 1995, Cavanagh 1997, Denzin & Lincoln 2000). Therefore, Altheide and Johnson (1994) and McKenna (1997) argue that, whilst all ways of knowing are respected as ways of making sense of human life, researchers must have a logic for assessing the interactive process through which the information is acquired. Therefore, in evaluating a qualitative study, instead of using the criteria applied to quantitative studies (Altheide & Johnson 1994, Cavanagh 1997) or instead of re-languaging quantitative terms, the criteria must fit the qualitative paradigm (Cutcliffe & Mckenna 1999).

Because qualitative research is discovery-oriented, and the truth value of a qualitative investigation resides in the experiences as they are lived and described by the participants (Sandelowski 1986, 1995, Giorgi 1992, 2002), the assessment of a qualitative study requires assessment of the nature of the process of research and the attempts and methods used to establish validity. Qualitative research does have a variety of criteria for assessing validity, but there is a lack of consensus among qualitative researchers on the relevant criteria. Russel and Gregory (2003) proposed criteria that evolve besides the research processes. Their three primary questions for appraising qualitative research are: 1) Are the findings of the study valid, 2) what are the actual findings, and 3) how do the findings apply to patient care? The validity of this qualitative study of OR teamwork is evaluated by answering these questions.

6.1.1 Validity of the findings

According to Russel and Gregory's (2003) criteria, validity reflects on the appropriateness and credibility of the overall research process. The validity of the findings is therefore discussed in the following paragraphs by evaluating the clarity of the research questions, the appropriateness of the qualitative approach for the research questions and the sampling method in relation to both the research questions and the approach. The systematic quality of data collection and the appropriateness of data analysis are also evaluated.

Clarity of the study questions and appropriateness of the qualitative approach for the study questions

The purpose of this study was to find out the essential nature of teamwork in OR nursing from the point of view of OR nurses' and nursing students' experiences and the previous literature. Thus, the study questions aimed to elicit both conceptual and experiential knowledge of OR teamwork. The aim to clarify the concept of 'team' and its use in OR teamwork was consistent with the method of conceptual analysis method because the method adds to our understanding of a widely used concept and helps us to see the possible flaws or faults in the use of the concept. The study question about OR as a learning context of teamwork aimed to highlight the most meaningful features of teamwork on behalf of novice team members. To pursue this aim, appropriate methods relevant to these study questions had to be chosen (cf. Denzin & Lincoln 2000). The aim to describe nurses´ and nursing students´ experiences was consistent with the CIT used in data collection and with the methods of both descriptive phenomenological and qualitative content analysis, because all these methods emphasize subjective experiences as a source of descriptive data (Giorgi 1985, 1997, Sandelowski 1995, 2000).

Assessment of the purposive sampling method in relation to the research questions and approach

Popay et al (1998) state that the relevance of sampling is an important issue in qualitative research, because the sample should produce the knowledge necessary to understand the structure and processes within which the individuals or situations are located. Qualitative studies often use purposive sampling, i.e. select a small number of data sources that meet specific criteria. The criteria are formulated on the basis of the participants' ability to provide relevant data on the issue under investigation. (Patton 2002.) In this study, a purposive sample of nurses and nursing students was chosen in order to elicit experiences about OR teamwork and collaboration in OR teams. The inclusion criteria of the nurses' data was that the participant was a registered nurse, had worked as an OR nurse

for at least two years and was working in an OR at the time of data collection. The criteria hold the assumption that nurses who have worked for at least two years in an OR are capable of describing profound and sufficiently varied experiences on behalf of the competent nursing members of their OR team. The participating nurses had 2 to 26 years of OR working experience, and only 4 nurses had worked in an OR for less than 5 years. As many as 15 participants had worked in an OR for more than 15 years. Moreover, all nurses were willing to tell about their experiences, had an open-minded attitude towards the study and found the study important both personally and organizationally. The students participating in this study had had a pre-service practice period in an OR just before the data collection and therefore had fresh experiences of OR teamwork. Thus, both the nurses and the students were well able to describe their experiences in a detailed and sufficiently rich manner to gain concrete insight into OR teamwork.

The major criticism of purposive sampling is that the method encourages a certain type of participant with a certain type of knowledge. Thus, it may be argued that those who participate make up an 'elite bias' sample (Sandelowski 1995), which means that there has been no attempt to make the sample as varied as possible. However, because the aim of this study was to collect varied data about OR nurses´ and students´ experiences, purposive sampling was used in a positive way as a tool to guarantee the richness of the data. The variations that occurred in this sample were spontaneous and comprised variations in gender, age and working experience. And most importantly, this sample comprised of marked variation in experiences.

Giorgi (2000c) and van Manen (1990) discussed sample size in phenomenological studies in terms of the depth dimension and the pragmatic evaluation of the time and effort needed to undertake research. They concluded that often only a small number of descriptions are enough to reveal the essential nature of the phenomenon. Sample size also depends on the data collection method. When using CIT in data collection, the complexity of the issues under investigation determines the number of decisive situations needed for the study. In general, 100 incidents are considered sufficient for a qualitative analysis with a well-defined purpose (Andersson & Nilsson 1964, Mårtensson 2001). In the first phase of this study, where 21 Finnish OR nurses descriptions were collected, the number of incidents turned out to be sufficient for a meaningful qualitative analysis. In the second phase of this study, 30 nurses and 30 nursing students provided more than 150 separate critical incidents about their OR teamwork experiences, and the incidents described were highly relevant to the issue under study. The number of nurse and students could have been smaller, but since two thirds of the data were collected abroad, it was necessary to ensure that the data would be rich and versatile enough to allow OR teamwork to be

described thoroughly. Overall, the rich data obtained in this study from 51 OR nurses and 30 nursing students reflected the topic well.

Evaluation of the critical incident technique as a data collection method

The critical incident technique was a suitable method to capitalize on the participants' experiences as a piece of reality of OR teamwork. A further advantage of focusing on specific teamwork incidents was that the respondents could identify and clarify the feelings and attitudes they attached to teamwork and therefore humanise the nursing perspective in OR teams.

The critical incident technique was applied in the first phase of this study in the year 1997 while collecting the data from 21 Finnish OR nurses. It was considered necessary to inform the participants about the critical incident technique itself, to make them motivated towards the study and to avoid misconceptions during the data collection. It was also important to give the participants enough time to think back about their incidents and to encourage them to describe the incidents in as much detail as possible. Some of the participants were doubtful about their ability to give adequate reports of something that could be called "critical". Still, all participants gave detailed accounts about their incidents when they realised that the procedure was a tool to elicit information about their personal experiences. Interviews allowed better co-operation with the respondents and a possibility to clarify meanings. When part of the Finnish nurses´ incidents in the year 1997 and the Finnish students' incidents in the year 2000 were collected in a written form, the reports were quite short, but clear and specific, and did not contain unnecessary description. Observation could have added to the available knowledge about the OR context, but could not have elicited the participants' individual experiences. Moreover, combination of the observational data with the interview and written data could have been misleading if the participants' experiences and the researcher's observations had yielded contradictory results. Therefore, there might have arisen the problem of which data would have been more meaningful or more truthful.

CIT as a method also had some limitations. One limitation was that critical incidents tended to overemphasize the negative aspects of the phenomenon under study, possibly because the word 'critical' refers to the negative and avoidable aspects of events. Descriptions of difficult and frustrating critical incidents reported unsolved matters and uncertainty as factors impairing teamwork and thus revealed both personal threats and organizational problems in OR teams. However, many nurses and nursing students experienced their work in an OR team as rewarding, challenging and increasing their self-confidence. Additionally, the influence of the method helped some negative incidents turn into

positive ones, when reflection revealed the learning aspect of the incident. The other limitation was that there were not only clearly described single incidents but also combinations of critical incidents. Therefore, the participants' dependence on a variety of memories and their ability to recollect specific examples may have introduced some inaccuracy into the data (cf. Flanagan 1954, Care 1996, Keatinge 2002). However, Norman et al (1992) suggested that critical incidents should be understood as valid by the fact that they are clearly important to the participants. From that point of view, all of the incidents can be considered valid, because the participants chose the incidents that they found personally important and wanted to share with the researcher. The third limitation of the data collection was that two thirds of the data collected were in English, which is not the Finnish data collector's native language. The researcher may thus have been unable to understand all nuances of the data. On the other hand, the Finnish data collector lived in the USA for one year during the data collection period and was acquainted with the American nursing culture, which helped in this demanding process. In addition, the researcher was able to discuss with the Finnish-British research team the cultural expressions and thus to maintain intact the insights the participants had described. Moreover, the British research team members fostered accuracy of the results in relation to the linguistic expressions.

Evaluation of the appropriate use of the method of conceptual analysis

Walker and Avant´s (1995) conceptual analysis was applicable to clarifying the concept of 'team', which was many-sided, had been defined differently in different contexts and had partly changed over time. The criteria for the width and versatility of the data used here guaranteed the credibility of the analysis. This analysis especially focused on the actions of team members and the organisation of teams in the OR context. Teamwork between nurses and patients was not within the scope of this analysis. Rodgers (1994) suggested that the material for analysis should include at least 30 studies. Therefore, the fact that this study quoted 57 studies and 22 other sources was sufficient for credibility. Moreover, in this conceptual analysis, 'team' was approached from as many perspectives as possible, because the aim was to identify the core attributes of 'team' and the manifestation of 'team' in different contexts. The validity of this analysis can also be evaluated by the step-by-step progress of the analysis. However, even though the conceptual analysis of 'team' is described as a strict, systematically proceeding process, the process actually consisted of reciprocal movement between the different stages of the analysis in order to gain a maximally accurate description of the concept 'team'. A limitation of the validity of this conceptual analysis was that the material had to be obtained from both OR teams and general nursing teams because of the scarcity of material from OR teams. Another limitation could have been the partly inaccurate translation of the foreign data and the consequent misinterpretations.

Evaluation of the appropriate use of the methods of descriptive phenomenological and content analysis

The method of descriptive phenomenological analysis developed by Giorgi was used in the first phase of the study to analyze 21 Finnish OR nurses' descriptions of collaboration, and it turned out both suitable and systematic. However, the descriptive phenomenological method has been criticized for making analysis a technical performance instead of a scientific one (cf. Hallett 1995). Contrary to this, Popay et al (1998) suggested that a good method of qualitative analysis is variable rather than standardized and rigidly adherent to a specific research design. Additionally, Giorgi (1985, 2000a) presents that the descriptive phenomenological method develops flexibly in each research project in response to the data and should be redesigned when writing up the research report.

The fundamental principle of qualitative analysis is that the researcher remains true to the facts in how they reveal themselves. Validity in qualitative analysis is therefore accomplished when the researcher is able to reach the participants' world and to describe it precisely as it shows itself (Giorgi 1992, 1997). One of the processes ensuring the researcher's ability to capture the participants' experiences in this study was bracketing. Bracketing involved recognition of the researcher's 'intentionality' towards OR teamwork and thus prevented any undue influence of her previous theoretical or practical assumptions on the description of the findings. Therefore, throughout the study, the researcher made an effort to put aside her personal experiences about OR teamwork by reflecting on them and fully concentrating on the participants' descriptions. Furthermore, bracketing was conducted by having discussions with the research team about the assumptions of OR teamwork. On the other hand, the researcher's previous experiences about the OR context most likely helped her to understand the vocabulary, organization and personal relations of OR, which are different in each nursing context.

Overall, qualitative research is based on the premise that total detachment on the part of the researcher is unattainable (Mason 1996, Mays & Pope 2000), and that no research is completely free from the biases, assumptions and personality of the researcher (Coffey 1999, Sword 1999, Giorgi 2002). Therefore, the process of data analysis depends upon the unique creative processes between the researcher and the data. It is therefore unlikely that any two people will produce similar accounts of a given set of data (Munhall & Boyd 1993, Sandelowski 1993, Schutz 1994, Guba & Lincoln 1995). Some researchers argue that multiple persons' comprehension of the data do not necessarily enhance validity. Moreover, enlisting the help of others to verify the categories or themes can misleadingly support the positivistic philosophy that there is only one accurate interpretation of reality, and that the accuracy of the interpretation increases when many people agree on it. (Munhall & Boyd 1993, Schutz 1994.)

However, even though one researcher collected and analysed the data of this study, discussions with the research team helped her to focus and re-focus on the data. There were issues that could have been missed, which the research team highlighted during the discussions. One positive outcome of sharing understanding with the research team was the opportunity it provided for challenging the robustness of the emerging types and categories. Furthermore, the obligation to explain the thinking behind the choices assisted the researcher to produce a better argued and more complete description.

6.1.2 Applicability of the findings to nursing

Atkinson (1997) argues that the data as verbalised by the participants constitute the most important result of research. In Morse's (1999a) and Sandelowski's (2000) view, however, qualitative research must be something more comprehensive in order to be considered as a research contribution. In this study, the results are presented as types reflecting the essential meanings of OR collaboration and OR teamwork from the point of view of nurses and nursing students, in categories of potential errors and their prevention in OR teams and as a summary of the conceptual analysis. The types and categories are more discreet than a general structure of all participants, but more general than specific situated structures.

Popay et al (1998) and Russel and Gregory (2003) emphasize the need to evaluate how the study is situated in a historical context and within a disciplinary perspective. Therefore, the effects of contextual elements, e.g. the structures and settings within which the participants were situated during the study, are important to place in connection with the obtained data. This study was conducted in the late 1990s` and early 2000's within the context of progress in OR technology, economic constraints in hospitals and an obvious shortage of experienced OR nurses. Another situational fact is that newly graduated OR nurses are more confident and better educated than a decade ago, which most likely affects the functioning in OR teams. It has been suggested that nurses with higher education demonstrate greater competence in teamwork behaviours than nurses with a college degree (e.g. Fagin 1992). This may simply be a consequence of increased professional maturity or the fact that advanced preparation places one on an educational level equivalent to other professions and encourages critical thinking.

The applicability of these findings can be assessed by exploring what significance they have for the OR nursing practice and how relevant they are for the development of nursing education. This study focused on how OR teamwork is defined and experienced and thus gives some urgently needed information about the OR context, which operates behind closed doors. Additionally, this study was

appropriate because teamwork is an important aspect of organizing the daily OR activities and because the topic has not been studied much. Furthermore, this study gives insights into how to improve OR as a learning context. Thus, the study generally contributes to the current limited knowledge base about the OR teamwork context.

Even though the individual experiences and varied contexts limit and relativize the generalization of these findings, they also increase the credibility of the findings. Therefore, it can be assumed that these results can be exported into other comparable situations, such as various OR teams, if they are recontextualized to meet the demands of the other context (cf. Holloway & Wheeler 1996). Whilst it is often argued that generalizability is not the purpose of qualitative research, Popay et al (1998) and Morse (1999a,b) point out that if qualitative research is not considered to be somehow generalizable, it is of little use. However, while generalizability in quantitative research is statistical, the participants in qualitative research are selected for their ability to provide information about the topic under study. Thus, situational rather than demographic representativeness is sought for in qualitative research. This means that the aim in qualitative research is to make logical generalizations towards a theoretical understanding of a similar class of phenomena rather than probabilistic generalizations to a population.

6.2 Discussion of the results

The results of Finnish, British and American OR nurses' and nursing students' experiences about teamwork and the conceptual analysis of team are discussed here in five sections: collaboration in OR teamwork, conceptual dimensions of OR teamwork, benefits of OR teamwork, disadvantages of OR teamwork and learning of teamwork during the OR placement period.

6.2.1 Collaboration in operating room teamwork

The results of collaborative experiences provided insight into the reality of OR nursing in Finland and the kinds of situations where collaboration can be experienced. Clarification of collaboration as an element of teamwork generally broadens the discussion of OR teamwork and most likely helps to understand the possibilities and barriers of collaboration as well.

Teams are needed to create and orchestrate procedures in the OR. From the point of view of the 21 Finnish OR nurses, functional teams consisted of people who were willing and able to collaborate with other people. Motivation to collaboration was due to nurses' skilfulness and complete commitment to

the team. If the nurse had a personal desire for that, temporary placements in other teams and services could be interesting and motivating. It is quite obvious that not all nurses are equally committed to teamwork or to work in general. However, to be able to develop collaboration among OR staff, considerable attention should be paid to increasing professional skills and creating a constructive atmosphere for learning. Collaboration in OR nursing also required mutual interaction of all team members. Most likely, more training is needed to improve interaction skills and multiprofessional team building skills in both nursing and medical education, because there are still communication problems between team members.

Nurses emphasized that sufficient resources to cope with demanding situations and a desire to develop OR practices allowed them to give the best possible care to patients. Thus, besides working together, collaboration meant understanding of each other's needs, focusing on common goals and sharing of resources and benefits. That is how the resulting outcome of patient care was far better than could have been offered by any individual on their own. However, perioperative team members experience cross-pressures from both the organization and their colleagues, and this might be one of the biggest challenges that need to be overcome to maintain collaboration and hence good patient care in OR teams. Even though OR nurses appeared to have self-confidence and good interaction skills, false accusations, unresolved matters as well as fear and uncertainty about the environment and colleagues were experienced as features that made collaboration difficult. It seems that, under the effective exterior of the OR teams, there are various human features that are not talked about or are only regarded as a small group's problems. Still, negative behaviour in nursing has been stereotypically assigned to such units as OR, critical care and emergency units. (Graff et al 1999, Baker et al 2000, Timmons & Tanner 2003). Therefore, encouragement to build professional relationships and to challenge the traditional ways of working could help to create a more open and humane working culture.

Based on the present results, enterprise, innovative attitudes and full use of one's abilities should be encouraged more in OR nursing. Consciousness of their significance as OR team members and elimination of unproductive thought processes that can negatively affect the daily practices of work will help nurses remain motivated and focused on collaborative success. In other studies, it has been recognized that different sources of insecurity, e.g. inadequate staffing, negative subcultures within health care organizations and disrupted group performance compromise nurses' ability to provide effective care and affect their roles as members of teams. (Graff et al 1999, Baker et al 2000, Blythe et al 2001.) However, collaboration could maintain the efficiency and fluency of work and make the OR an enjoyable working environment. Therefore, maintaining a healthy working environment by valuing

collaboration most likely also supports the day-to-day work of the OR organization and links its mission to the customer service strategies and goals.

6.2.2 Conceptual dimensions of operating room teamwork

This study showed that 'team' is not a stable concept, but something that develops and emphasizes different attributes at different moments. It followed from this that, even though different teams had many features in common, they existed in many configurations and had different tasks and purposes, time-frames and contexts and well as differences in their stability and organizational level as well as their developmental status. OR teams are called upon to undertake different activities that help patients to have successful surgeries. Therefore, OR team members need a variety of skills and enough emotional stability to cope with human suffering, sufficient flexibility to respond to changing demands and frequent emergencies and an ability to interact well. OR teams need to monitor their performance, anticipate each other's actions or needs and co-ordinate their work to maintain a smooth flow of operations. Furthermore, Millward and Purvis (1998) suggest that, for a team to be adaptable in changing circumstances and to be self-corrective, it should have sound knowledge of itself as a team and ability to reflect upon its practices. Most likely, in fast changing OR teams, reflection on team functioning can be assumed to be exceptional. However, reflection on teamwork could foster team members' development and add to the quality of care. Additionally, it can enhance the work of the team (Benner et al 1997).

The most important attribute of 'team' is having a shared goal and mode of action. In ORs, staff work closely in teams, often under the supervision of consultant medical staff, especially surgeons. However, each team member also has individual accountability, which means that it is no defence for a nurse to state that he or she is acting on someone else's orders. Thus, whatever actions professional nurses take, they should be able to justify them. As team members, OR nurses are also responsible for the other team members, e.g. unlicensed assistive personnel, orientees and students. With their variety of professions, however, ORs are sometimes characterized by conflicts between individuals who insist on their own views of patient care and ways of acting and communicating in teams. Moreover, Williams (1997) suggested that OR nurses' work merely aims to facilitate the work of surgeons and anaesthetists, and Donley and Flaherty (2002) emphasized that OR nurses are undereducated compared to the other members of health care teams. This may cause problems in team cohesion, because the less educated members of teams rarely participate in decision-making. Therefore, the challenge in aiming at good

patient care is to maintain good OR teamwork between individuals from different professions. It follows that the notion of nurses being essential members of multiprofessional OR teams should be fostered. Lack of knowledge of the other OR team members' teamwork skills makes it impossible to evaluate OR teamwork from a multiprofessional perspective thoroughly. Still, studies about ICU nurses' and physicians' perceptions of collaboration (King et al 1993) and teamwork in medicine and in aviation (Sexton et al 2000) have shown that physicians have more profound experience of teamwork than nurses. Most likely, the opinions concerning good teamwork differ between professions and therefore need to be clarified from the perspectives of different professionals.

Whilst it is generally agreed that interprofessional teamwork is necessary for effective patient care, it is questionable how frequently 'teams', in the truest sense, exist in health care. It has been suspected that some health care teams are teams only nominally, demonstrating little actual evidence of collaboration underpinned by shared goals. Moreover, the development of an effective team takes time and requires understanding about the nature of group processes and the potential barriers of successful teamwork. In nursing, rhetorical use of the term 'team' seems to be an attempt to implement teamwork as a part of effectiveness strategies. However, nursing managers may be more concerned with cutting costs and managing resources than fostering the functional or social aspects of teamwork. Therefore, the development of OR teamwork as an organizational alternative should also include evaluation of when and how teams are better than the other modes of work, such as group work.

6.2.3 Benefits of operating room teamwork

The aim of OR teamwork, according to the Finnish, British and American informants, was to maintain professional and fluent care for patients undergoing surgery. Professional teams were competent and willing to co-operate and thus able to anticipate each other's needs. This reinforces the importance of a coherent and supportive environment, in which individuals can gain confidence and competence through reflective practice and supervision. Moreover, by recognizing both actual and potential risks, by providing direction to others and by maintaining routines and double-checking, nurses maintained both professional responsibility and the prevention of potential errors in OR teams. Available checklists, policies and critical paths can be excellent guidelines in representing standard patient care in OR. However, learning how to manage with multiple variations and focusing constantly on the team's interests are the most difficult challenges for critical thinking and social skills in teams. Therefore, no re-checking or rules alone can reduce errors, because they rely heavily on human effort. On the contrary,

checking may become ritualistic, shift the emphasis to a series of fixed steps that one must go through and provide the nurse with a false sense of security (Davis & Drogasch 1997, Campbell & Maddern 2003, Scott & Summerbell 2004). Moreover, the extra staff required for checking is not always available in labour-intense ORs.

Safe and professional nursing during operations, as described by these Finnish, British and American OR nurses, consisted of a mixture of caring, social-emotional balance, technical skills and willingness to work in teams. It has sometimes been argued that nursing should not be a technical or task-oriented profession (e.g. Graff et al 1999). However, this argument has not been sufficiently considered in OR nursing. To alleviate patients' anxiety, OR nurses make sure that the patients are cared for throughout their surgical procedures, and that they are never left alone. Additionally, the need to keep operations as short as possible, to avoid infections and nerve damage, is an important aspect of the quality of care. Nursing skills are also displayed through circulating nurses' technical competence and knowledge of surgical procedures, e.g. by ensuring that the necessary equipment functions properly and by monitoring the surgical team members for failures of the aseptic technique. All these actions are undertaken to keep the patients safe, which is one of the most essential manifestations of OR nursing. A recent study by Kuhar et al (2004) showed that, when nursing units invested in technology, they were able to provide more efficient care and to allow RNs to remain at the bedside.

Managers fostered teamwork by assigning enough experienced staff to each team. Also, both financial and emotional rewards kept the teams motivated. However, managers had to find a balance between providing the new team members' opportunities to learn and maintaining an adequate skill mix in teams, which occasionally caused irritation in the other team members. Still, this study did not reveal any liability problems between the staff and the managers. Whether OR managers trust in their staff, which fosters staff members´ individual accountability, or whether OR staff are just so self-confident cannot be concluded from this study. Although, French et al (2000) and Stordeur et al (2001) mentioned the manager as a source of stress, if the manager closely monitored the performance of the staff for corrective actions. No such behaviour was seen in this study.

Environmental aspects influenced teamwork. Small units were experienced as more flexible and comfortable than big units, because small units helped staff members to communicate better and made decision-making easier. This finding of the OR environment is related to the finding of changing team membership. In balanced teams, where the team members knew each other well, working was similar to small units. Large units that had more staff members and services multiplied the number of staff team

members needed to work with. Physically small units emerged as more effective and better controlled than big units. However, ORs are often spread out over wide areas, which means long distances from unit to unit, e.g. from one OR suite to another or from the sterile supply unit to the OR suite, causing staff to waste of time or to hurry.

In earlier studies, workload has been mentioned as an important element in evaluating the environmental aspects of nursing (cf. Hillhouse & Adler 1997). In this study, there was a workload pressure in all of the three countries, but the diversification of work schedules and the flexibility in working time arrangements were different. The American OR nurses had fixed working hours, including evening or night shifts and occasional on-call duty. The shifts of both the British and Finnish OR nurses were more variable, and some Finnish nurses had irregular three-shift work. Additionally, nurses' environmental needs differ in terms of practice areas, age and experience (Robertson & Tracy 1998, Buchan 1999, 2002, McNeese-Smith 2000, Ball et al 2002) or the level of social support available in the environment (Healy & McKay 2000). Ageing was similarly mentioned as a source of stress in this study. However, much still remains unknown regarding the long-term consequences of irregular schedules on older nurses, which is an important point given the aging workforce.

An interesting difference between these three countries was the procedural policy and practice in the UK and the USA concerning written reports of mistakes or malpractice. In Finland, nurses write such reports only when they are officially requested to, but there is no common practice for dealing with minor malpractice issues. However, adequate understanding of the chain of events that leads to adverse outcomes would help the staff to identify the organizational failures underlying errors and to develop methods of accident prevention in complex sociotechnical systems. Moreover, although incident reporting systems of some kind have established in the UK and the USA, they are unlikely to reveal the full nature of errors, because of the possible inconsistencies in reporting and because they rarely reveal the antecedents of errors (cf. Stanhope et al 1997, Meurier 2000, Anderson & Webster 2001). Another aspect of incident reporting is that, through non-punitive or even anonymous incident reporting (cf. Kohn et al 1999), including reports of near misses and problems inherent in the system in addition to actual errors, the factors underlying errors can presumably be revealed. Most likely, the public experience of overcoming errors, a kind of positive safety crisis, also fosters the process of team development and is the basic element of life-long learning and quality development as well.

6.2.4 Disadvantages of operating room teamwork

One disadvantage of OR teamwork was distraction, which manifested as unpredictability and constant changes in team composition. The most permanent aspect of nurses´ work orientation was membership in the team of a particular service, but the service could also change. Therefore, the degree to which OR nurses identified their membership in a team was partly affected by the frequency with which they were required to rotate between different teams and the number of teams of which each nurse was a member. Although an individual considers him/herself a member of a team, she may feel powerless in terms of organizational influence if she is there only for a limited time. Problems in multidisciplinary teams can also derive from the requirements to identify both with the team and with one's professional group (cf. Millward & Purvis 1998, Millward & Jeffries 2001). Even though teams in ORs incorporate members from a wide range of disciplines and cultures, the professional identities of nurses and physicians are likely to have remained strong, and they may thus experience conflict due to the differences in values and practices between their multiprofessional teams and their own professional groups. However, despite the professional or personal distinctions, the common goal of the team should be the most important motivation to work together.

As a result of the changes, nurses were stressed and concerned about the safety of surgical patients, especially about the less experienced team members´ ability to function responsibly. Additionally, the constant changes resulted in an increased workload, unequal working pressures and disagreeable changes of services. On the other hand, the strength nurses derived from changing OR teams was their ability to work fluently in different team compositions and in emergency situations. However, situations could become too demanding if neither the team members nor the operations remain stable. Most likely, this is often the case with on-call teams. The situation may be much better for elective and day surgery teams, in which both the teams and the operations may remain more stable, enabling the staff to further develop their competencies. According to Clutterbuck et al (2002), the problem in changing teams is that they are barely able to develop themselves, and the potential to create learning partnerships is limited. Reflective time, when and if it is available, is used to solve current urgent issues rather than to learn for tomorrow. Furthermore, the changes in health care have earlier affected the cancellation of elective surgeries, the limitations in the health care system's ability to respond to major emergencies, patient complications and injuries and therefore lowered the standard of care (Blegen et al 1998, Aiken et al 2000, Berlowitz et al 2001, Blythe 2001, JCAHO 2002).

Providing OR teams with members lacking sufficient motivation or skills, e.g. novice, senior or unmotivated nurses, could be a source of distraction. Employment in OR teams was considered too stressful for novices and older nurses, because of the rapid patient throughput and high level of patient activity. Even though internal rotation and shift work were less suitable for older than younger nurses, Ingersoll et al (2002) and Letvak (2003) showed that nurses aged 55-62 years were generally satisfied with their jobs, able to meet the physical and mental demands of nursing and confident in their ability to provide care. Still, there is not enough knowledge about older nurses´ teamwork abilities. Overall, the ageing of the OR nursing population is an important issue for individual nurses, for employers and for the nursing profession as a whole. Over the next few years, many of the most experienced nurses are retiring, and there will be a pressing need for new OR nurses. Senior nurses have a huge amount of tacit knowledge, which is easily lost by the organization when they retire. Therefore, ways to rearrange duties in such a way that both novice and senior nurses are able to share responsibilities in OR teams should be worked out.

Based on this study, the different educational levels of nursing staff in British and American OR teams could impair teamwork. The practice of replacing a professional circulating nurse by operating department assistants (ODA) or unlicensed assistive personnel (UAP) is questionable from the viewpoint of safety and fluency. In Finland, different educational levels were not a problem yet, because there were only RNs in the OR nursing staff. However, the situation may also change in Finland because the number of interested applicants for OR nursing programmes is decreasing.

One preventive feature in OR teamwork was the need to work overtime. The problem of overtime was solved by designating certain shifts to stay overtime (Finland), asking nurses personally to stay longer (USA) or simply having nurses stay for as long as the operations lasted (UK). Overtime is an unavoidable aspect of OR nursing, but it could be organized systematically with respect to staff members` other life responsibilities and desires. Individual working arrangements could also increase satisfaction and work commitment and thus decrease work-related stress. Moreover, attention to individual preferences along with the team´s interests is likely to increase the motivation, innovativeness and presumably also effectiveness of the team members. Overtime has been reported in the USA to be one of the major impediments in teamwork (Bauer 2001, GAO 2001), and compressed working weeks, i.e. having to work longer than eight hours, dealing with extra shifts, or having mandatory overtime, have already been reported to have negative effects on nurses' job performance and job satisfaction (Kundi et al 1995, Wintle et al 1995, Shader et al 2001).

This study also highlighted some distinctive psychological features that hindered teamwork. Excessive perfectionism made nurses worry about mistakes or suppress emotions while working in teams. In spite of the obvious high priority of maintaining safety, the idea of never making mistakes was unreasonable and could easily cause undue protective actions or negative scrutiny by other nurses and physicians. Most likely, such an attitude may lead to a breakdown of teamwork and interfere with good patient care. In this study, in case of errors, there was reluctance to admit responsibility because of the fear of public shame or humiliation. In the past, errors committed by nurses have been dealt with severely by punishment or by compromising their careers. In addition, improvements after negative events have been quite narrowly focused on the individuals involved and on the behaviours connected with the event (cf. Meurier et al 1997, Meurier 2000, Reason 2000, Firth-Cozens 2001, Benner et al 2002). Nurses understandably have grown to fear disciplinary procedures.

Fluent OR teamwork required systematic scheduling and continuous communication between team members. However, nurses' need to act as buffers between other professionals highlighted the problems in interaction between team members. Therefore, bullying and the other non-professional behaviours mentioned by the informants should be differentiated from congruent communication, e.g. experiencing emotions and then communicating them honestly to the other team members. Interprofessional co-operation overall continues to be an important source of stress in nursing (cf. Bratt 2000, Kivimäki et al 2000, Ball et al 2002), and especially new nurses have difficulties communicating with physicians (Evans 2001, Boswell et al 2004). Situational factors inherent in the OR, e.g. close working relationships in which physicians and nurses depend on each other, stressful patient care situations, the challenge of working with people of diverse skill levels and the lack of available resources, may predispose OR teams to conflicts. Therefore, nurses need to be encouraged not to tolerate any kind of verbal abuse and to demand for a right to be treated with respect. Additionally, effective strategies to handle stress need to be fostered.

6.2.5 Learning of teamwork during operating room placements

The OR placement period provided the Finnish, British and American student informants with extremely valuable experiences of teamwork, which could result in a desire to be an OR nurse after graduation. Therefore, it was beneficial for both the students and the institutions to arrange supporting and motivating learning possibilities, which enhanced development of the skills of future health care team members. Gaining team membership during the placement period was a result of two factors: an adequate mentoring process and an accepting team atmosphere. The tutoring relationship seemed to

be a comprehensive reciprocal relationship, where the interests of both the organization vs. the OR nurses and the students could be fitted together. Moreover, the more students developed their skills, the more comfortable they felt in the OR setting, and the better they were integrated into the teams. Similarly, Koskinen and Silén-Lipponen (2001), Myrick (2002), and Koskinen and Tossavainen (2003) found that the tutors' interaction skills, personality and eagerness to instruct positively fostered students' learning during the placement period. It has also been emphasized that one of the main goals of OR orientation is to help the orientees to adjust to the perioperative setting without experiencing a reality shock (Penprase 2000) and to become faster productive team members (Winter-Collins & McDaniel 2000). A good tutoring relationship between a student and an OR nurse is also likely to contribute to the development of teamwork skills.

The student informants had overwhelming experiences, while they simultaneously tried to learn various skills and practise collaboration on-action. Limited resources, mentors' negative or overbearing attitudes, high standards of expectations and limiting actions made students feel excluded from team membership. Even though this is not a new finding (cf. Campbell et al 1994, Heizenroth 1996, Tanner & Timmons 2000), it seems that not enough has been done to improve the situation. Most likely, the orientation phase of the OR placement period involves a variety of challenges, e.g. rapidly changing situations and constant hurry. Also, a short-term mentoring relationship, which often focuses on specific tasks, and poor facilitation overall can be damaging to the students´ experiences and further reinforce their prior hostilities toward teamwork. Therefore, it may be assumed that when students are not able to get significant positive learning experiences, and when they cannot maintain or develop their skills during the OR placement period, they are not likely to seek work in OR teams after graduation.

Learning in OR teams was influenced by the attitudes and behaviours of the clinical staff. A couple of weeks' placement period was not sufficient to learn team functioning, but it was enough to get some experiences about OR teamwork. Overall, students could learn teamwork by personal participation and by observation and role modelling and thereby to develop an understanding of the skills needed in multiprofessional teams. There are no other studies about students' experiences of learning in OR teams, but it has been noticed that an appropriate length of orientation has increased nurses´ sense of belonging to organizations (Winter-Collins & McDaniel 2000), which should be taken into account when planning orientation or preceptoring programmes.

Even though the importance of diversity in teams has been emphasized in theory, deviations from the 'norm' were not acceptable here, and both the staff and the students had to follow the written and

unwritten rules. The strict technical orientation mentioned in this study did not seem to contribute much to the students' professional growth, but led to a dichotomy between emotional and technical responsibilities. Mistakes were not allowed, but when they occurred, they were publicly revealed and openly gossiped about. These characteristics made OR teams stressful learning contexts. However, students´ fears and other negative experiences could have been discussed with support persons and tutors. Therefore, tutoring strategies that support students´ coping mechanisms and adjustment to interprofessional teamwork should be fostered. Additionally, this study showed that nursing students entering into the OR initially lacked the knowledge and skills required to perform adequately, and thus caused a need for the staff to train them to a sufficient competence level. There is no doubt that inadequate human resources affect direct patient care, but they also compromise the supervision and support of nursing students. Therefore, preceptoring also requires more resources.

It has been emphasized that, during perioperative orientation, more self-directed learning methods should be used (Heizenroth 1996, Penprase 2000, Graling & Rusynko 2001). However, the students participating in this study were unsure about what they could do in the new context and did not describe self-directive learning aspects. Most likely, further collaboration between nursing schools and ORs could improve learning during the placement period. Additionally, regular and more spontaneous dialogue between the teachers and nurses could alleviate some of the problems of learning in OR teams. In that way, the responsiveness of OR clinical placements to the contemporary needs and to the concomitant challenges faced by students and nurses in their future careers could also be made visible and fostered. Additionally, it has been asserted that interprofessional education has a potential to promote effective teamwork by, for instance, enhancing understanding of the work of other health professions, addressing interprofessional stereotypes and learning how to work effectively together (Freeth & Nicol 1998, Sternas et al 1999, Freeth et al 2001).

The present findings of the conceptual analysis and the OR nurses' and nursing students´ descriptions of their experiences revealed some new functional and psychological aspects of OR teamwork. Competency was important in hectic and highly technical teamwork. However, especially constant changes in both team compositions and services were stressful. Most likely, the subjectively experienced stress was related to the nurses' competence and attitude. The more skilful and positive the nurses were, the more changes they tolerated. Belonging to a team gave both nurses and students the feeling of permanence and security they needed to avoid distraction. Additionally, the findings emphasized the importance of preventing potential errors in OR teamwork and therefore served as the first step towards discussion of ways to improve safety in intraoperative care. Most likely, understanding

both the positive and the problematic features of OR teamwork help to make ORs more satisfying for employees and thus safer for patients.

The results of this study demonstrated many similarities between the three countries and clearly indicated that OR culture has universal dimensions. Only a few remarkable cultural differences were discovered, namely the ways of organising shifts and overtime work, the attitude towards unlicensed assistive staff members and the team members' obligation to write incident reports after malpractice, which could be taken into account when rescheduling and developing OR nursing. However, the cultural consistency of the results suggests that OR teams and OR teamwork as learning contexts are amenable to partly intercultural development. Furthermore, the culturally uniform environmental, functional and attitudinal findings of this study imply that moving across state boundaries and working in multicultural teams is possible regardless of the country where the nurse comes from. This study also provided insight to the educators and managers of OR nursing on how teamwork, the basic orientation of the OR context, is experienced and how more positive experiences could be offered to the students and nurses who are thinking about choosing the OR as their specialty.

7 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

The primary intention of this study was to increase understanding about the nature of OR teamwork in three OR nursing cultures. The findings, which were mainly culturally consistent, contribute to the currently limited knowledge of OR teamwork. Based on this study, suggestions for further studies in OR nursing practice and nursing education can be made:

1. Despite the assertion that teamwork is the key to future healthcare development, interprofessional teamwork is not a clear-cut or unambiguous practice. Teamwork in OR lacks the necessary organizational arrangements and clarification of team members´ roles, which weakens individual members´ commitment to teamwork. Therefore, appreciation of the contribution of colleagues from different professional groups is needed in OR teams to ensure that the collaborative services are delivered more efficiently. Additionally, it is very important to clarify the responsibilities of team members to be able to give more time for patient care. The development of teamwork also requires more knowledge about team members´ participation in decision-making and the organizational ability to accommodate the needs of the whole team. More research about the ways in which teamwork can be improved by maintaining a satisfactory standard of OR nursing for patients and a good working environment for employees will be needed.

2. OR teamwork involves a wide range of potential workplace stressors as it requires a high level of skills, provision of care in multiple services and working in teams whose compositions often change. However, the long-term effects of rotation of team members between services has not been analysed. Most likely, permanent teams could be a solution to the problem of establishing permanence in care in day surgery and elective surgery units. Therefore, more evidence is needed to identify the aspects of OR teamwork in different OR settings to understand when and how changes in OR team compositions affect patient care. The economic consequences of organising smaller units could be studied from the perspective of smoothly functioning teams, and the possibilities to solve the problem of overtime work in OR teams requires clarification. Moreover, the number of hours worked at a time and the quality of care provided by exhausted OR team members should be assessed. This is how the prevention of potential errors could be made visible.

3. Ways to rearrange duties in such a way that both junior and senior nurses are able to share responsibilities in OR teams could be explored. Constructive clinical supervision and mentorship besides the provision of life-long learning possibilities will have a significant role in motivating both

senior and novice nurses. Additionally, providing comprehensive orientation programs that prepare novice nurses for their roles as team members could be an integral aspect of adjustment and satisfaction in the OR. Research on how the experience and competency of team members correspond to the demands of the work is needed.

4. The practice of striving for perfection weakened both nurses´ and nursing students´ self-image and hindered their participation in teamwork. There are a number of constructive changes that can be made to alleviate the atmosphere of error censorship in OR teams. Firstly, there is a need to acknowledge that errors cannot be completely eradicated, but should be reduced by systematically handling the potential error situations in order to develop the quality of OR nursing. That is how the focus of error prevention needs to be widened from an individual to a team responsibility and made to include the underlying organizational factors as well. By linking individual and team responsibilities into a joint responsibility of all practitioners, it is possible to carry out safe patient care. Additionally, novice team members would benefit if the taken-for-granted knowledge of clinical safety practices were examined and teamwork responsibilities were thus made more explicit. Secondly, in fostering error prevention, making errors and learning from mistakes should be intimately connected. Thus, it is imperative that all adverse and potentially adverse incidents are evaluated systematically. Moreover, a supportive learning atmosphere that helps novice team members to become empowered rather than demoralized should be created. This would encourage nurses to share both error prevention and actual errors with their team members without fear of unfair treatment. Thirdly, the good practice of writing reports and systematic critical analysis of both near misses and malpractice issues could also reveal the factors underlying errors. Therefore, an error reporting system needs to be introduced more systematically in Finland, and more effective ways in reporting incidents could be adopted in the UK and the USA.

5. One of the greatest challenges in contemporary and future ORs is to attract motivated and compassionate nurses. ORs should hence be environments that are conducive to holistic nursing and facilitate the transition from novice to competent staff status. Making the OR atmosphere more accepting, learning-oriented and sensitive to the learners' needs will help team members to get better clinical experiences and will thus foster interest in the OR. The permanence of nurse employment is also dependent on how well the organization values the staff. Managers could therefore emphasize the staff as a valuable resource rather than as a source of cost and adopt an effective leadership style. That is how OR nurses could be made individually satisfied, more efficient providers of high-standard patient care and evidently more cost-effective to the organization. Additionally, the other team members will also be more likely to be satisfied with working with them. Further research will be needed to identify

characteristics of OR nurses as preceptors of multiprofessional teamwork, to find out whether OR teamwork preceptorship is understood as an important job or merely as a formal obligation. To improve the image of OR teamwork and to generally attract nurses to work in OR teams, ORs could also be harnessed with 'open door' policies by establishing links with nurses on surgical wards and other clinical areas.

6. The challenge in OR nursing education is to ensure that the curriculum meets its intended objectives. Thus, while developing OR nursing placement periods, it will also be important to consider carefully the current and future demands of OR nursing and to state them explicitly in the curriculum. Consequently, students need to be adequately prepared at school to meet the demands of working in interprofessional teams. This may require further OR nursing lessons and preservice practice at school. Another important aspect of developing OR clinical placements is that the period should be understood as a time of learning instead of service needs. The knowledge, skills and attitudes required in ORs are highly specialised and cannot be learnt in any other environment, although the skills, once learnt, are transferable to other settings. Therefore, the limited but valuable time spent in the OR placement should be used effectively. In Britain, there are clearly identified standards for clinical placements and supervision, which have to be maintained (ENB 2001a,b). This would suggest that the OR as a learning context can be additionally strengthened in Finland and the USA by a written preceptorship strategy. That would probably also direct more recources to preceptoring.

It can be concluded that teamwork and the learning of teamwork in an OR context are complex and multi-level phenomena. In order to promote positive development of teamwork, at least three aspects should be considered. Firstly, good working conditions, e.g. competency, stability of teams and adequate physical environment, are needed to maintain high-quality patient care and a fluent flow of operations. Secondly, the prevention of errors in OR teams requires systematic and discreet practices that help to maintain the safety of patients and the learning of staff. Thirdly, the learning atmosphere in ORs and the possibilities for aged and novice nurses to work together need to be developed to foster the motivation to work in OR teams.

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Hello Operating Room Nurse / Nursing - student

The aim of this study is to get descriptions about operating room (e.g. operating theatre, OR) nurses´ and nursing students´ experiences of TEAMWORK in OR. I hope that through your experiences it is possible to study the reality, where OR nursing takes place and also to increase understanding of why, how and in what kind of situations operating room nurses experience teamwork. That is how we can develop OR teamwork in the future.

Critical incident technique is the method of data collection in this study. Critical incidents are descriptions of persons own life experiences and focus on some specific happenings which the participant can testify as an expert witness. The incident can be very emotional positive or negative or it could have strongly influenced the accomplishment of the activity. The primary concern is to collect one or more descriptions about factual incidents that can enlighten our understanding about why and under what circumstances people act the way they do. That is why your personal experience is very important.

Please, do not hesitate to tell/write because only you can tell/write about your own experience and describe it the way you lived it. There are not right or wrong incidents because every experience is different and unique. The only limitation is that the experience should **deal somehow with teamwork.** It can be a teamwork incident between nurse/student and doctor, student and nurse, nurse and nurse or whole surgical team. You do not have to think at all about the grammatical expression because in this study the interest is in your pure experience.

So briefly, **Dear Operating room Nurse or Nursing Student**, please

- describe any critical incident about teamwork in OR which you prefer and try to describe it as it happened

- describe the incident like telling a story using whole sentences, not only single words or only a one sentence

- describe exactly what happened, like in a conversation when you tell your incident to your friend

- remember that the most important is that you recall your own experiences and describe them as they really happened

- describe whether the incident was positive or negative one and why it was meaningful

- describe also the place and time when it happened, the other persons who were present and why the incident was critical to you

- you can write/tell confidentiality because any of the respondents can not be identified in the study

Your participation into this study is voluntary. If you choose to participate, please mark on the description that you give permission to use it as a research data. Please contact me if you have anything to ask or comment. E-mail marja.silen-lipponen@uku.fi. Many Thanks for your concern. I deeply appreciate you taking part to this study.

Appendix 2. Original publications I – V. (Printed with the permission of the copyright holders.)

Kuopio University Publications E. Social Sciences

E 108. Mshana, Simon. Health management information system evaluation: lesson from Tanzania.
2004. 239 s. Acad. Diss.

E 109. Mäki, Tiina. Laadun informaatio-ohjauksen haasteet: hoitohenkilökunnan ja laatusuositusten laadulle antamien merkitysten harmonisuus ja ristiriitaisuus.
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E 110. Korhonen, Jukka. Näkökulmia ehkäisevään sosiaalipolitiikkaan: lähtökohtiin, linjauksiin toteutukseen ja haasteisiin.
2004. 164 s. Acad. Diss.

E 111. Kvist, Tarja. Hoidon laatu - potilaiden ja henkilöstön yhteinen asia?
2004. 191 s. Acad. Diss.

E 112. Okkonen, Tuula. Lapsen terveyskäsityksestä lapsen terveyden yhteistoiminnalliseen edistämiseen.
2004. 120 s. Acad. Diss.

E 113. Jauhiainen, Annikki. Tieto- ja viestintätekniikka tulevaisuuden hoitotyössä: asiantuntijaryhmän näkemys hoitotyön skenaarioista ja kvalifikaatioista vuonna 2010.
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E 114. Kattainen, Eija. Pitkittäistutkimus sepelvaltimoiden ohitusleikkaus- ja pallolaajennuspotilaiden terveyteen liittyvästä elämänlaadusta.
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E 115. Kuivalainen, Leena. Eturauhassyöpää sairastavien miesten terveyteen liittyvä elämänlaatu vuoden seuranta-aikana.
2004. 179 s. Acad. Diss.

E 116. Lammintakanen, Johanna. Health care prioritisation: evolution of the concept, research and policy process.
2005. 141 s. Acad. Diss.

E 117. Hintsala, Arjaterttu. Autonomia ammatista poistumisen ennakoijana hoitotyössä: nais- ja mieshoitajien arviointia ja vertailua päätöksenteosta, pätevyydestä, työn tärkeydestä ja johtamisesta hoitotyössä.
2005. 199 s. Acad. Diss.

E 118. Virtanen, Ritva. Sairaanhoitajat Suomen sota-ajan lääkintähuollon tehtävissä 1900-luvulla.
2005. 275 s. Acad. Diss.

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