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THEMATIC NURSING WARDS

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“If we take care of the means, we shall inevitably reach the goal, sooner or later”

Mahatma Gandhi

MASTER THESIS ISALA KLINIEKEN ZWOLLE

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ABSTRACT

OBJECTIVE

The objective of this research is an advice on managing the nursing staff when developing a Thematic Nursing Ward (TNW) and guaranteeing or improving current quality, safety, patient and nurse satisfaction.

BACKGROUND

Demographic, technologic and socioeconomic changes demand adjustments of traditional health care organizations (WHO, 2013). Aging and the increase of co- and multi morbidity changes the health care demand. Increase of severe and complex diseases requires more intensive and multidisciplinary treatment. The complexity and variety in demand requires a flexible use of resources. Elective beds should no longer be specialty labeled in order to create greater bed aggregates that are more flexible and can admit different patient types (Molema, 2009). Reducing costs is not similar to reducing resources but can be achieved by reducing variability and increasing resource flexibility.

METHOD

A systematic literature search is performed to determine the influence that input variables (i.e. education, certification, skills and knowledge, support and recognition, working with clinical competent colleagues, autonomy, professional development and nurse physician relationships), have on nurse sensitive outcomes, patient and nurse satisfaction. A model is designed displaying the influence an input variable has on outcome variable(s). This model is validated by five hospitals that have experience with a TNW. These five TNW practices are asked which measures are taken in order to maintain or improve outcome. The model is discussed with managers of two nursing wards in the Isala Klinieken that are to be combined in a proposed TNW. By using the model it is systematically determined which consequences the TNW is expected to have on outcome variables. Managers of the nursing wards are asked which measures are required in order to guarantee or improve current outcome variables at their ward and what the expected results, feasibility, duration and costs of these measures are.

RESULTS

Influence of input variables on outcome variables

According to literature nurse variables and nurse work environment variables that influence nurse sensitive outcomes, patient and nurse satisfaction are education, certification, skills and knowledge, support and recognition, working with clinical competent colleagues, autonomy, professional development and nurse physician relationships. A model is developed that displays the nurse variables and nurse work environment variables and their influence on outcome variables.

Measures taken by TNW practices to guarantee or improve outcome variables

Respondents from the five TNW practices recognized the influences of input variables on outcome as displayed in the model. Measures taken by the TNW practices regarding nurse variables are

- Increasing nurses' level of education
- Increasing the number of nurses' certification
- Using difference in skill and knowledge within the nursing team

These measures improve nurse sensitive outcomes, patients and nurse satisfaction at the TNW practices.
Measures taken by the five TNW practices regarding nurse work environment variables are

- Supporting the nursing staff by listening to nurses need and facilitate whenever possible
- Stimulating and facilitating personal development (e.g., by training or attending symposia)

  These measures improve nurse satisfaction and are considered to subsequently improve the nurse sensitive outcomes and patient satisfaction of the TNW practices.

The measures taken by the TNW practices are inextricably linked to the mission statement and vision of the hospital, specified for nursing care and the nursing staff and translated into a nurse staffing strategy. The respondents recommend to make an inventory of the nurses' education, certification, skills and knowledge. This enables the hospital to manage the nursing staff at an individual level. Measures taken by the TNW practices and their results are summarized in table 16, page 33.

Expected consequences of a TNW on outcome in the Isala

A TNW is expected to decrease the current nurse sensitive outcomes, to decrease patient satisfaction and decrease nurse satisfaction. Lack of specific knowledge of the patient groups hinders nurses to provide the current level of nursing care. An overview of expected consequences of a TNW on outcome variables is summarized in table 17, page 41.

CONCLUSION

Required measures in order to guarantee or improve outcome at a TNW in the Isala

Managers use their own experience and goals to staff nurses at the ward. The hospital does not have a mission statement and vision on nursing care and the nursing staff. There is no nurse staffing strategy at the tactical level that for instance describes the desired level of nursing care. Also an inventory of available skills and knowledge of the nursing staff is not available. Therefore the detail and the extent of the measures that are required to employ the current nursing staff on a TNW cannot be determined.

Based on the current situation the required measures are increasing nurses' level of education, certification skills and knowledge in order to secure nurses' skills and knowledge of all patient groups. This is expected to improve nurse sensitive outcomes, patient and nurse satisfaction. These measures are considered to be feasible and vary in amount of time and costs. An overview can be found in paragraph 3.4.2, page 40 and table 17, page 41.

RECOMMENDATIONS

According to the mission statement and vision, the Isala Klinieken wants to provide compassionate and safe care, wants to lead the way with continuously improving quality of care and innovations and be leading in training the health care professionals of the future (Isala, 2013). This research offers the Isala Klinieken a guide to pursue this mission while developing a TNW. A thematic nursing ward increases flexible bed use in the Isala Klinieken and therefore reduces cost. However it is requiring flexible use of staff. To staff nurses more flexible and guaranteeing current outcome, the current knowledge and skills of nurses have to be increased. The exact measures and to what extend the knowledge and skills of nurse needs to be increased depends on the exact care need of the patients and the available skills and knowledge of the nurses. The measures also depend on the nurse staffing strategy of the nursing wards. To determine the detailed measures the following recommendations are made.

Hospital vision on nursing care

Develop a vision on nursing care which describes the role of nurses in the organization and their contribution to the mission, vision and core values of the Isala Klinieken. According to the framework of hospital planning and control from (Hans, 2011) figure 1, this vision has to be translated from the strategic level to the tactical level.

Determine the care need on the TNW

The specific care need of patients have to be determined using nurses' knowledge of and experiences with the different patient groups. This must result in a detailed overview of the available care needs.

Inventory of nurses' knowledge and skills

An inventory is required to gain insight in the personal knowledge and skills of all nurses (also agency nurses). Map all education, certification, skills and knowledge (knowledge can be measured by online testing) of the nurses. This must result is a list of knowledge and skills of all individual nurses.

Compare patients care need and available nursing knowledge and skills

Compare the patients care need with the available nursing knowledge and skills. For every ward can be determined whether the available nurse knowledge and skills is sufficient to provide the desired level of patients care. The desired level of care depends on the developed vision on nursing care and nurse staffing strategy.

Determine which measures are required to provide the desired level of care

Determine which measures have to be taken to secure that the available nursing skills and knowledge is satisfying the patients care need. The exact measures to secure nurses' knowledge and skills are based on the previous recommendations. Measures can be taken regarding every nurse variable and nurse work environment variable.

Integrate the model in the hospitals' quality system

The developed model has to be included in the hospitals' quality systems. The model can be used to gain insight in the nursing care process at the nursing wards and can be used to improve current outcome at all nursing wards and not only for TNW's. How the model has to be applied is explained in appendix 9, page 62.

PREFACE

I present to you my master thesis, the final assignment of the study Health Sciences, a master program of the Faculty of Management and Governance of the University of Twente.

This thesis was challenging and interesting from the introduction until the fine tuning of the report. The research question, how nurses can be staffed at a thematic nursing ward while maintaining quality, safety, and patient and nurse satisfaction, is interesting and complex at the same time. The development of a constructive method to answer the research question and executing this method was quite a challenge. The literature search and the development of the model were interesting. Peddling through a large amount of literature, analyzing the influence of an input variable on an outcome variable took a considerable amount of time but displaying these influences out in the model felt like visualizing the nursing care process. It was reassuring that the influences from the model was not only a reflection of literature but was recognized by TNW practices and Isala managers.
Hopefully, this research offers the Isala Klinieken an opportunity to improve quality, safety patient and nurse satisfaction throughout the hospital. This research can be also be used for a consedered implementation of TNW's and to lead the way in improve the nursing care process by applying the model and developing targeted measures.

I thank my supervisors for guiding me through this thesis. Bernd van den Akker and Wendela Hingst from the Isala Klinieken. Bernd your passion for your work, your enthusiastic and inspiring way of sharing your experience and expertise and also your constructive feedback makes you a valuable supervisor. Wendela Hingst, thank you for investing your precious time. Wineke van Lent and Jeannette van Manen from the University of Twente. Thank you for the invested time to provide feedback during meetings or by email.
I thank all Isala employees from the quality and safety department, operation management, the RvE managers and managers of the nursing ward for their contribution. I thank Dianne Hendriks from Deventer Ziekenhuis, Alletta Meelker, Joanne Bouwma and Ciska Linders from Nij Smellinghe, Brenda Snijder from Antonie van Leeuwenhoek and Danielle Vervoort from Havenziekenhuis for the inspiring interviews.

Last but not least, I thank my family, friends and especially my husband Andert for the endless support and feedback during these months.

Usha Olsman Willems
Zwolle, July 2013

1. INTRODUCTION

1.1 DEVELOPMENT IN HEALTH CARE

Health care and health care organizations are subject to continuous development and improvement. Patients are becoming more demanding and more empowered. Patient satisfaction has become an important part of the quality and safety policy. Demographic, technologic and socioeconomic changes demand adjustments of traditional health care organizations (WHO, 2013). The Dutch population is aging rapidly. Increase of co- and multi morbidity changes the health care demand. Increase of severe and complex diseases requires more intensive and multidisciplinary treatment. Another development is the enormous rise of costs of health care. When the predicted increase of costs continues and the expected shortage of nurses will be become reality (VWS, 2013), hospitals will not only have to provide the same care with less resources but provide more complex care with less resources. There is an estimated 40-60% waste through in-efficiency (WHO 2013). The 'productive ward', developed by the NHS (National Health Service), equips ward leaders and teams to improve the ward environment systems and processes. These wards focus on improving quality and safety and therefore have the potential to make financial savings by eliminating waste and making processes more efficient. Hospitals need to integrate their work to improve quality and patient-centeredness and to increase the efficiency of care delivery. Nurses and other front-line staff must play key roles (Needleman, 2009). Patient costs were a reduced with greater RN (registered nurse) staffing as RNs have higher knowledge and skill levels to provide more effective nursing care as well as reduce patient resource consumption.
Mathematic approaches contribute to improve more efficient use of (declining) resources and reducing costs. This efficient capacity utilization can be improved by using mathematic models that can predict variability in demand and at the same time results in an increase of productivity of nurses and quality of care (Kortbeek, 2012). In order to cope with the increasing complexity of patients care needs hospitals should to free themselves from the rigid specialty culture (Molema, 2009). Current medical practice is specialty focused but it should be organized around medical conditions and care cycles (Porter, 2007). The complexity and variety in demand requires a flexible use of resources. Variety in resources creates capacity for reactive decision making to match supply to actual demand. Elective beds should no longer be specialty labeled in order to create greater bed aggregates that are more flexible and can admit different patient types. A hospital that ensures this has at its disposal more generally labeled resources and cross-skilled staff with varying work contracts and who share decision authority can create a structure where supply is matched to demand. Such a structure exceeds the current more functionalistic and rigid structures in hospitals (Molema, 2009).
In conclusion reducing costs is not similar to reducing resources but can be achieved by reducing variability and increasing resource flexibility. For instance creating flexible bed use and efficient capacity utilization which requires abandoning specialty based medicine.

1.2 PROBLEM DESCRIPTION

ISALA KLINIEKEN

The Isala Klinieken in Zwolle is the largest tertiary care hospital in the Netherlands with 1000 available beds and 5300 fte. Annually 502.000 outpatients and 95.000 in patients are treated by 262 specialists and 600 fte of nurses. The 1000 beds of the Isala Klinieken are spread over a large numbers of specialty orientated nursing wards. Nursing care processes at the nursing wards are monitored by outcome indicators and staff- and patient satisfaction as part of the continuous quality improvement policy of the hospital.
The Isala Klinieken is also confronted with the developments in healthcare and is seeking solutions. Currently, the relocation into the new built hospital provides the hospital an opportunity to solve practical relocation issues and simultaneously act on developments in health care by considering to increase the flexibility of bed use. The layout of the new hospital raised problems of locating the current nursing wards in the new building. The current nursing wards cannot be moved into the new building one on one. Specialist and RvE managers (Resultaat Verantwoordelijke Eenheid, managers responsible for a hospital unit) are involved in the discussion about the most effective use of the building. Some specialists are currently cooperating in outpatient care or in multidisciplinary teams and prefer to continue and enhance their cooperation at the nursing wards. For instance the multidisciplinary theme 'living and motion' where specialist form cardiology, lung and rheumatology are working together to treat and mobilize their patients. This resulted in the proposal by the specialists and RvE managers to combine nursing wards into multispecialty nursing ward, called a Thematic Nursing Ward (TNW).

DEFINING THEMATIC NURSING WARDS

Thematic nursing wards deliver care for multiple patient groups from different specialties. Thematic nursing wards abandon the traditional specialty based wards where a single specialty ward is accommodated with a single patient group. Nursing care is provided by nurses with patient group specific nursing skills, for instance due to specializing into the single patient group of the ward or due to professional experience with a single patient group at the nursing ward. Combining single specialty wards result in two or more patients groups being treated by a nursing staff that is experienced with one patient group and inexperienced with the other patient group(s). This is a potential threat to the quality of the nursing care and to nurse satisfaction. The hospital wants to develop countermeasures to deal with the possible threats when creating thematic nursing wards.

Nurse staffing is the process of determining and providing an acceptable number and mix of nursing personnel to produce a desired level of care to meet the patient's demands, Davao (2010). Medline, Scopus and Web of Science were searched but no literature was found that describes staffing nurses on nursing wards with multiple patient groups. This research focuses on the primary goal of nurse staffing namely producing the desired level of care. Therefore factors that influence the nursing care process on the nursing ward and subsequently outcomes such as mortality and patient satisfaction are determined. This research does not address the exact number of nurses at a ward.

POSITIONING THE PROBLEM IN THE ORGANIZATION

Several organizational departments are involved in hospital design and development of a TNW. The framework of hospital planning and control from Hans et al (2011) shows the following involvement of TNW development.

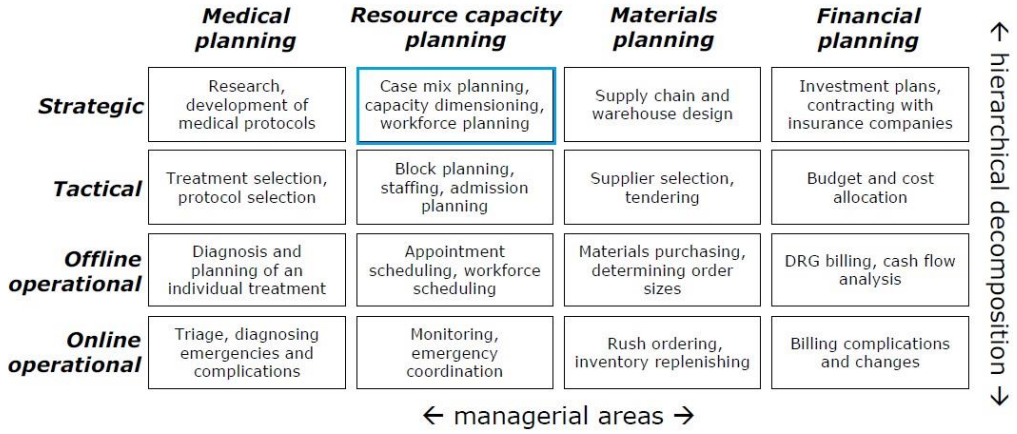

Fig. 1 Example application of the framework for health care planning and control to a general hospital

The development of thematic nursing wards belongs to the strategic level of the hierarchical decomposition. The strategic level concerns general structural decisions that are part of mission statement and vision of the hospital. Development of a TNW is not only a result of practical issues but it is also a result of acting on developments in health care. The relocation of nursing ward and the employment of the nurses belong to the managerial area of resource and capacity planning. Resource capacity planning addresses the dimensioning, planning, scheduling, monitoring and control of renewable resources, in this case the nursing staff.

The cross point 'strategic level' and 'resource capacity planning area' concerns case mix planning, capacity dimensioning, and work force planning. Case mix planning concerns the combination of patient groups, in the hospital is the combination based on suggestions from the specialist and managers. The capacity dimensioning concerns the employment of the nurses at these thematic wards, the objective of this research. In the hospital the nursing staff consists of nurses that are contracted by a nursing ward and nurses that are temporary staffed through an external nurse agency or through the internal nurse agency called I-Flex.

Workforce planning is not taken into account in this research. The hospital, together with other hospitals, investigates work force planning and the determination of nurse patient ratio's based on capacity data.

Although specialists and RvE managers suggested the development of thematic nursing wards, it does not involve the medical planning area of 'research, development of medical protocol' at this point.

1.3 Problem definition

The hospital is considering to increasing the flexibility of bed use by combining wards into thematic nursing wards. The effect that cross-functional wards have on the organization of staff and their quality of work is unknown (Molema, 2009). Therefore the hospital is seeking the scope of possible consequences for nurses staffing, quality, safety and patient- and nurse satisfaction. The hospital has no mission statement and vision on nursing care and the nursing staff and has no nurse staffing strategy. Organizing the nursing staff depends on the patient case mix and the skill mix of the nursing staff. The patient case mix classifies types of patients, for instance by the severity of their illness, which determines the patients need. The skill mix of the nursing staff (mix of education, skills, number and position) must be sufficient for the actual care needs of patients to provide the necessary care (Blegen, 2008). At a TNW the patient case mix that determines the patient need is changing and also the skill mix of the nursing staff is changing this requires reorganization of the nursing staff.

1.4 Theoretical framework

The influence of a TNW on outcome is unknown and models for staffing nurses at a TNW are absent. This research focuses on the primary goal of nurse staffing namely producing a desired level of care. Nursing care is provided by nurses at the nursing ward. Nurses are the cornerstones of hospitals and the hospitals most costly and valuable resources; their efficiency and effectiveness are central to any effort to maximize patient safety or minimize cost (Hendrich et al. 2008). Staffing nurses influences patient outcome. Health care organizations, who invest in educated nursing staff, manage their workforces effectively and shape positive environments for the practice of nursing have healthier, more satisfied nurses, and show more favorable patient outcomes (Aiken, 2011). To gain insight in the nursing care process the input factors that influence the nursing care process and subsequently the outcome are determined in this theoretical framework.

The nursing care process

The nursing care process is accomplished by the daily activities of the nurses on the wards. The nursing care process on a nursing ward consists of three components: input, process and outcome (Donabedian, 1980). Input influence the process and delivers outcome as shown below in a framework from (Hall, 2012) in figure 2.

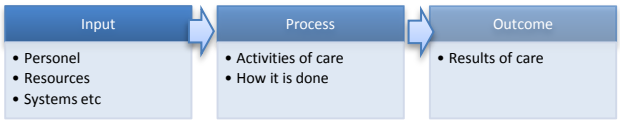

Figure 2. Three components of health care delivery.

Input

Input or sometimes referred to as structure, refers to the setting how the health care is being delivered. Including adequate facilities and equipment, qualification of care providers, administration structure and operations of programs (Donabedian, 2005). The input of the nursing care process can be determined by several factors from the following dimensions

- Personnel refers to the available nursing staff. Nurse variables refer to the education, experience, skills and knowledge of the nursing staff (Schubert, 2008). There is often variety of the nursing staff which can be determined by nurse variables, skill mix, nurse patient ratio and the nurse work environment. Specific skill mix and nurse patient ratios are excluded from this research.
- Resources refer to the available equipment, ward and other material related parts (Hall, 2012) and these are not included in this research.
- Systems related factors are commonly organizational related such as management, policy priorities, culture and climate (Donabedian, 2005) and are not included in this research.
- The nursing work environment refers to work settings organizational characteristics that either facilitate or constrain professional nursing practice (Lake, 2007) such as staffing, development opportunities and support.

This research addresses the following input variables that are described in paragraph 1.4.1.

1. Nurse variables
2. Nurse work environment variables

OUTCOME

The outcome of the nursing care process can be determined by the following dimensions.

- Quality and safety, refers to the outcome of nursing care and is used to determine whether or not the provided care had the intended result and if the patient was safe and not harmed during the treatment (IOM,2001), (Bartels, et al 2007). Quality is determined by the similarity of criteria of care (care need) and the received (actual) care (Donabedian, 1980). Patient safety can be described as the absence of the chance to (physically or mentally) harm a patient when deviating from the professional standardized treatment by health care providers or by shortcoming of the health care system (Nivel, 2009). Quality and safety indicators reflect the quality and safety of the care process
- Patient satisfaction refers to the satisfaction patients experience with the delivered care and is therefore part of quality and safety outcome (Kramer 2008). The term patient satisfaction is difficult to capture and difficult to measure. A patient's expression of satisfaction or dissatisfaction is a judgment on the quality of hospital care in all of its aspects (Torcson, 2005). Patient satisfaction is the comparison between real experience and expectation (Powers and Bendall, 2004). Patient experience can be considered a valid quality performance indicator from patient perspective (Torcson, 2005), (Muranthe, 2010). The importance of patient satisfaction is the compliance and improved persistence (Dias Barbosa, 2012). Patient satisfaction on an individual level results in greater compliance with care and more likely to follow the doctors' instruction, this will lead to beneficial changes in health and less misuse of health care (Chow, 2009). Next to the fact that satisfied patients comply better with treatment and follow advice, patient satisfaction could be some kind of outcome measure of the delivered care, (Verbeek, 2007).
- Nurse (or job) satisfaction refers to the amount of satisfaction nurses experiences from their work (Kettel, 2002). Nurse satisfaction is important because nurses are the biggest group of staff in the hospital. The costs of educating and replacing nursing staff are high therefore staff satisfaction should be of great concern for hospitals (Kettel, 2002). Nurse shortage and retaining is not only an international problem but also a national problem in the Netherlands. The Dutch ministry of Health Care (Volksgezondheid, Welzijn &Sport) acknowledges this problem and the prediction of shortage of more than 12.000 nurses in the near future. High nurse satisfaction, leads to better patient care, higher patient satisfaction and loyalty to the health care provider, which ultimately leads to better financial performances (Peltier, 2009).

This research addresses the following outcome variables which are described in paragraph 1.4.2.

1. Quality and safety
2. Patients satisfaction
3. Nurse satisfaction

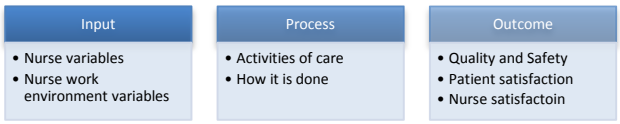

Figure 3. Selected input and outcome variables.

1.4.1 INPUT OF THE NURSING CARE PROCESS

The following paragraph describes the following input variables: nurse variables and nurse work environment variables that are influencing the nursing care process.

A. NURSE VARIABLES

To staff nurses effectively on a nursing ward, insight in the variety and potential of the nursing staff is required. Nurse variables reflect variety among nurses on several areas due to variation in (Smalenberg, 2008):

- Demographics (e.g. age, gender)
- Education
- Additional certification or training
- Professional experience

Demographic variation (e.g. age, gender and marital status) is not included in this research. Variation in education occurs because there are two different levels of nurse education, level 4 MBO and level 5 HBO bachelor in the Netherlands (VWS, 2013). After becoming a licensed nurse, a nurse can acquire additional certification from an accrediting organization. Certification is labeled 'validation of cognitive knowledge

(Kendall-Gallagher & Blegen, 2009). Variety of professional experience is due to the different work experiences and obtained knowledge and skills of nurses. Difference in type of education, additional training and professional experience results in a variety of available nursing skills and knowledge (Crisp and Taylor, 2005). This variety in skills and knowledge is expected to increase when nursing wards are combined but furthermore nurses become responsible for unfamiliar patient groups. The skills and knowledge of the nursing staff have to be sufficient to guarantee or improve the outcome. Outcome is not only a concern for the hospital but also for the nurses themselves. Even though a nurse is licensed, a nurse is by law responsible to be skilled in performing their nursing tasks for which they are accountable (VWS, 2013).
Nurse variables that influence the outcome of the care process are shown in table 1. This research takes the variety of skills of the nursing staff in general into account as shown in the table below.

Nurse variables		
Indicator	**Description**	
Demographics	Age, gender, status	Excluded from this research
Nurse education	Type of education to become a licensed nurse	
Nurse certification	Additional education or training resulting in certification	
Nursing skill and knowledge	Clinical knowledge and skills gained through nursing experience	

Table 1. Nurse variables. Source (Schubert, 2008); (Kendall-Gallagher and Blegen, 2009).

B. NURSE WORK ENVIRONMENT VARIABLES

The nurse work environment refers to organizational characteristics that either facilitate or constrain professional nursing practice (Lake, 2007). A professional practice environment supports nurses to function at the highest scope of their clinical practice, to work effectively in an interdisciplinary team of caregivers and to mobilize resources quickly (Lake, 2007). The American Association of Colleges of Nursing's (AACN) developed 'Hallmarks of the Professional Practice Environment' (ANA, 2002) a comprehensive set of characteristics that permit nurses to practice to their full potential. These hallmarks are continuously adjusted throughout the years. The result was a list of essentials of magnetism (Kramer, 2008) that became well known and used in nursing care and was later endorsed by the Joint Commission (2010).

- Participation in decision making
- Patient focused care
- Sufficient staffing
- Recognition and support
- Working with clinical competent colleagues
- Autonomy
- Professional development opportunities
- Nurse physician relations

Patient focused care and participation in decision making are mainly organization related and excluded from this research. As described before sufficient staffing, the number of nurses per shift, per patient or per ward is not taken into account. Recognition and support refers to the organizational and direct support for the nursing staff, for instance counseling staff, providing opportunities for growth, procuring and allocating resources and facilitating a highly professional staff to work together (Kramer, 2004). Working with clinical competent colleagues is providing nurses the ability to work with other clinical competent colleagues. Clinical competence is perceived by nurses as the presence of an educational degree or additional specialty certificates (Kramer, 2004). Autonomous nursing care is the ability of a nurse to assess and provide nursing actions as appropriate for patient care based on competence, professional expertise and knowledge (ANA, 2013).
Professional development opportunities are opportunities provided by the organization to support and provide nurse education, certification or training to enhance their skills and personal development (ANA, 2013).
Nurse Physician relations refer to the collaborative working relation with mutual respect, based on the premise that all members of the health care team make essential and meaningful contributions in the achievement of clinical outcomes (ANA, 2013). Physicians depend on the ongoing observations and assessments of nurses. When physicians recognize their need for the assessments and knowledge that only nurses can provide then collegial relationships will flourish (Kramer, 2004). Patients benefit from good nurse physician relationships and nurses work stress and retention will decrease (Kramer, 2008). These indicators are described below in table 2.

Nurse work environment	Work settings characteristics that facilitate professional nursing practice	
Indicator	**Description**	
Participation in decision making	Nurses having a voice and ability to participate in organizational or clinical decisions	Excluded from this research
Sufficient staffing	Sufficient number of nurses per shift to deliver excellent care, adequate staffing, work pressure, nurse patient ratio, administrative activities	Excluded from this research
Patient focused care	Organization-wide to a values-driven, patient-focused culture. Nurses convey a strong sense of advocacy and support for the staff and patient	Excluded from this research
Recognition and support	Support from direct manager and management	
Working with clinical competent colleagues	All colleagues have a high level of competence, high trained and well experienced to deliver excellent care, partially linked to staffing	
Autonomy	To assess and provide nursing actions as appropriate for patient care based on competence, professional expertise and knowledge	
Professional development opportunities	The personal and professional growth and development of staff by formal education, professional certification, and career development	
Nurse physician relations	Positive work relationships and inter professional relations. Collaborative decision making and clinical and social support	

Table 2. Nurse work environment indicators; Source: Lake (2007); Schubert (2008), Kramer (2008), ANA (2010), Joint Commission (2010).

1.4.2 Outcome of the nursing care process

The following section describes outcome variables, quality, safety, patient and nurse satisfaction of the nursing care process.

A. Quality and safety

Nurses provide care to patients and therefore influence the outcome of the health care process. The influence of nursing care on patient outcomes has been studied since years. Patient outcomes are considered nurse sensitive when they improve as result of increased levels (quantity or quality) of nursing care and are called nurse sensitive outcome indicators (ANA, 2010). Nurse sensitive outcomes are pressure ulcer, skin injuries as result of pressure at same location; falls, patients that fall during their stay; critical incidents, unexpected incidents that might have been prevented by adequate observations and actions; failure to rescue, patients that die after an adverse event; medication error, error with type, dose or admittance of medication; nosocomial infections, infections acquired during treatment, namely urinary tract, respiratory tract, peripheral IV infiltration, ventilator associated pneumonia or wound infections (ANA, 2010), (National Quality forum NQF, 2013). Nurse sensitive indicators are distinct and specific to nursing and differ from medical indicators of care quality (National Quality forum NQF, 2013), (Sangster-Gormley, 2009), (ANA, 2010). The nurse sensitive outcomes are described below in table 3.

Quality and Safety	Patients should not be harmed during treatment	
Indicator	**Description**	**Measurement**
Pressure ulcer	Skin injury and underlying tissue usually over a bony prominence, as a result of pressure, sometimes in combination with shear	% patients with pressure ulcers per year
Falls	Any patient fall with or without consequences	% patients falls per year
Critical incidents	Unexpected critical patient incidents, which might have been prevented through appropriate measures (mortality)	% patients that endure incidents per year
Failure to rescue	Hospital deaths after adverse events	% patients that die after adverse events
Medication Error	Medications administered at the wrong time, in the wrong dose and/or to wrong patient with or without consequences	Number of errors per year
Nosocomial infections	Hospital-acquired infections, e.g. urinary tract, respiratory tract, peripheral IV infiltration, ventilator associated pneumonia or wound infections experienced by patients	% patients with nosocomial of infections per year

Table 3. Nurse sensitive quality and safety indicator. Source National Quality forum (2013), American Nursing Association (2013).

B. Patient satisfaction

Patient satisfaction is used as an outcome measure to measure the satisfaction of patients with the nursing care process. Measuring patient satisfaction is complex because of the subjective nature of this concept which is affected by individuals' expectations, needs or desires. Muranthe (2010). The Nivel developed a Dutch Consumer Quality Index (CQi-index) a hospital admittance patient satisfaction survey based on the US CAHPS (Consumer Assessment of Healthcare Providers and Services) and Quote, (QUality Of care Through the patients' Eyes) the Dutch NVZ-survey for hospital satisfaction and the Dutch Hospital comparing survey from the Consumentenbond/NIVEL (Nivel 2009). The Dutch Consumer Quality Index (CQi-index) is national standard

for measuring quality of care from a patient perspective. The following indicators are used in the CQI admission procedure, discharge and aftercare, patient autonomy, satisfaction with nursing care, medical care, overall care and satisfaction with provided information (CQI-Hospital, 2012). Indicators of patient satisfaction are

- Admission procedure
- Discharge and aftercare
- Patient autonomy
- Nursing care, Medical care, Overall care
- Information

The admission procedure, discharge and after care and patient autonomy are not taken into account in this research because of their limited relation with the nursing care process (US CHAPS, 2012), (CQI-Hospital, 2012). Satisfaction with nursing care refers to the satisfaction with personal nursing care and to the communication with and information from nurses (Chow, 2006). Satisfaction with medical care refers to the perceived care from physicians and communication with and explanation with physicians. Sometimes patient satisfaction refers to nurse physician communication (Kutney-lee, 2009). Satisfaction with overall care refers to the satisfaction during admittance at the ward (Chow, 2006), (US Chaps, 2012), (CQI-Hospital, 2012). Satisfaction with information refers to the approachability of the nursing staff and physicians at the ward (CQI-Hospital, 2012).

Satisfaction with nursing care, medical care, overall care and the provided information have a direct link with the nursing staff (Chow, 2006), (Kutney-lee, 2009), (Kleefstra, 2012) and are described below in the table 4.

Patient satisfaction	Comparison between real experience and expectation	
Indicator	**Description**	
Admission procedure	Information provided by nurse upon admission, Reception at the ward	Excluded from this research
Discharge and aftercare	The way information was transferred (to GP, etc.) Information provided regarding further treatment The timing of discharge from hospital	Excluded from this research
Patient autonomy	Patient's ability to participate in treatment decisions encouraged to be self-sufficient	Excluded from this research
Satisfaction with nursing care	Expertise of the nursing staff, The way nurses helped patients when asked for help and The way nurses treated patients	
Satisfaction with medical care	The way doctors and nursing staff get along, doctors' expertise	Excluded from this research
Satisfaction with overall care	Overall care nursing staff, medical staff supporting staff, and collaboration between them	
Satisfaction with information	Approachability of hospital staff in case of questions and information to patients and the clarity of information given by doctors	

Table 4. Patient satisfaction indicators; Source: Kleefstra (2012), US CHAPS (2012), Nivel (2009).

C. NURSE SATISFACTION

Nurse (or job) satisfaction is the satisfaction that nurses experience from their work. Nurse satisfaction is a multidimensional concept featuring personality traits and environmental factors. The relationship between work aspects and job satisfaction is important for occupational health practice, because working conditions can be managed (Roelen, 2006). Nurse satisfaction is often measured by a variety of nurse satisfaction tools. Indicators of nurse satisfaction are

- General nurse satisfaction
- Intent to leave

General nurse satisfaction is referring to nurse satisfaction with a range of factors that are commonly described as work environment factors. General nurse satisfaction is influenced by the chance on job related burnout. Job-related burnout is described by Maslach as a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment. Burnout is also influencing outcome, if nurse burnout rates were reduced by 10 percent, Pennsylvanian hospitals could potentially save $41 million associated with catheter-associated urinary tract infections and surgical site infections (Cimiotti, 2012). Burnout and job dissatisfaction predict nurses' intent to leave their job within a year (Aiken 2002). Intent to leave is the anticipation of leaving one's current position or the nursing profession in the near future (Larrabee, Janney, & Ostrow, 2003). Burnout is not used as a sole indicator or nurse satisfaction. The indicators of nurse satisfaction are described below in table 5.

Nurse satisfaction	Satisfaction nurses experiences from their work
Indicator	**Description**
General nurse of job satisfaction	Satisfaction with all aspects of nurse work environment
Intent to leave	Intent to leave current position, or nursing profession

Table 5. Nurse satisfaction variables. Source Schubert (2008), Kutney Lee (2013), (Aiken 2002).

The selected input variables (nurse variables and nurse work environment variables) and the selected outcome variables (nurse sensitive outcome, patient and nurse satisfaction) that are included in this research are displayed in figure 4 below.

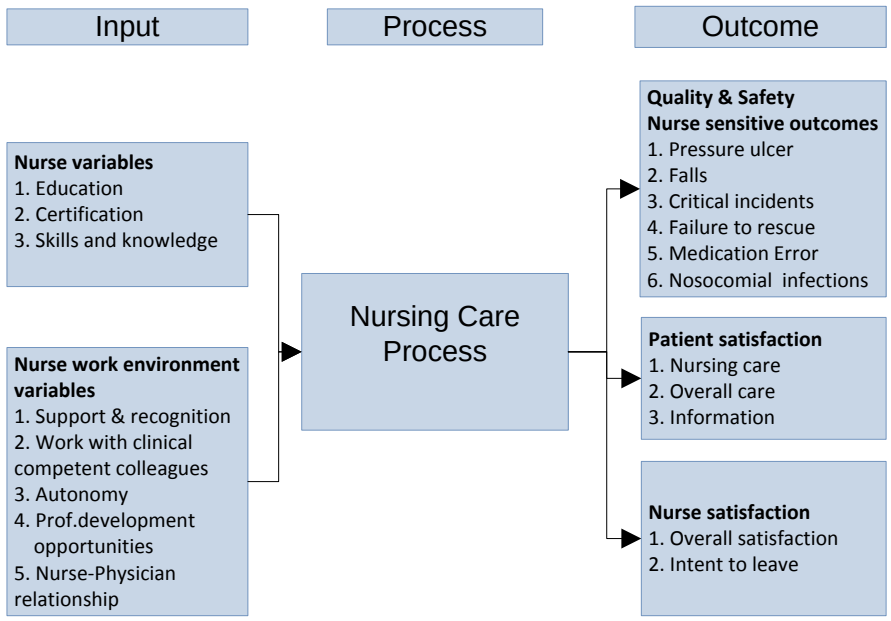

Figure 4. Overview of selected input variables and outcome variables.

1.5 Research question

Because of the lack of nurse staffing models for TNW's, the Isala Klinieken face the challenge of managing the nursing staff on a thematic nursing ward while guaranteeing or improving quality, safety and nurse satisfaction.

What measures are required to employ the current nursing staff at Thematic Nursing Wards in order to guarantee or improve current nurse sensitive outcomes, patient and nurse satisfaction?

1. Which nurse variables and nurse work environment variables influence nurse sensitive outcomes, patient and nurse satisfaction?
2. Which measures are taken by hospitals with a TNW in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction?
3. Which consequences is a TNW expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala?
4. Which measures are required in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction at a TNW in the Isala?

1.6 OUTLINE OF THE THESIS

Table 6 describes the outline of this thesis.

Chapter		
1	**Introduction**	This chapter describes the introduction, the theoretical framework and the research questions
2	**Method**	This chapter describes the method that is used to answer the research question Paragraph 2.1 Describes the method to answer research question 1 Which nurse variables and nurse work environment variables influence nurse sensitive outcomes, patient and nurse satisfaction? Paragraph 2.2 Describes the method to answer research question 2 Which measures are taken by hospitals with a TNW in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction? Paragraph 2.3 Describes the method to answer research question 3 Which consequences is a TNW expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala? Paragraph 2.4 Describes the method to answer research question 4 Which measures are required in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction at a TNW in the Isala?
3	**Results**	Paragraph 3.1 Describes the results of research question 1 Nurse variables and Nurse work environment variables that influence nurse sensitive outcomes, patient and nurse satisfaction Paragraph 3.2 Describes the results of research question 2 Measures taken by hospitals with a TNW in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction Paragraph 3.3 Describes the results of research question 3 Consequences a TNW is expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala Paragraph 3.4 Describes the results of research question 4 *Measures that required in order to guarantee or improve nurse sensitive outcomes,* patient and nurse satisfaction at a TNW in the Isala
4	**Conclusion and Recommendations**	This chapter describes the answers to the research question, the conclusion and the recommendations and implications for further research
5	**Discussion**	This chapter describes relevance and limitations of this research

Table 6. Outline of the thesis.

2. METHOD

In this research a model is developed and applied in order to answer the research questions. A systematic literature search is performed to determine how work environment variables and nurse variables influence nurse sensitive outcomes, patient and nurse satisfaction. Next this model is further validated with TNW practices. TNW practices are also asked if countermeasures are taken when developing a TNW. The model is applied in the Isala to determine if a TNW might have consequences for the current nurse sensitive outcomes, patients and nurse satisfaction and which measures are required to prevent possible consequences.

2.1 RESEARCH QUESTION 1

Which nurse variables and nurse work environment variables influence nurse sensitive outcomes, patient and nurse satisfaction?

This research focuses on nurse variables and work environment variables and their influence on nurse sensitive outcomes, patient satisfaction and nurse satisfaction outcomes. These variables are described in chapter 1.3 and summarized below in table 7. Independent variables are the nurse variables and the nurse work environment variables. Dependent variables are the outcome variables of quality, safety, patient and satisfaction.

Outcome		Quality safety						Patient satisfaction			Nurse satisfaction		
Input		1. Pressure ulcer	2. Falls	3. Critical incidents	4. Failure to rescue	5. Medication Error	6. Nosocomial infections	1.Nursing care	2. Overall care	3. Information	1. Overall satisfaction	2. Intent to leave	
Nurse variables	1. Education												
	2. Certification												
	3. Skills and knowledge												
Nurse work environment	1. Recognition and support												
	2. Working with clinical competent colleagues												
	3. Autonomy												
	4. Professional development opportunities												
	5. Nurse physician relations												

Table 7. Overview of selected input and output variables from chapter 1.3.

2.1.1 SYSTEMATIC LITERATURE SEARCH

A literature search is performed to assess the influence of these nurse variables and nurse work variables on the selected outcome. A model is developed to show how specific input variables influence specific outcome variables. To answer this research question the following steps will be taken.

a. Literature search 1 to determine the influence of nurse variables on nurse sensitive outcomes, patient and nurse satisfaction
b. Literature analysis 1 to determine which nurse variables influence nurse sensitive outcomes, patient and nurse satisfaction
c. Literature search 2 to determine the influence of nurse work environment variables on nurse sensitive outcomes, patient and nurse satisfaction
d. Literature analysis 2 to determine which nurse work environment variable influence nurse sensitive outcomes, patient and nurse satisfaction
e. The influence of the nurse variables and nurse work environment variables on nurse sensitive outcomes, patient and nurse satisfaction is displayed in a model.

A. LITERATURE SEARCH ON NURSE VARIABLES

The goal of this search is to determine the influence of nurse variables on the outcome of nursing care. The literature search is performed by using online the databases: Web of Science and Medline (Pubmed). Key words are used to search in Web of Science and Mesh terms are used to search in Pubmed and are added in appendix 1. Key words and Mesh terms are based on the variables from the theoretical framework. The search strategy is added in appendix 2. Articles are selected based on inclusion criteria. These criteria consist of presence of one of the mentioned nurse variables (education, training, skill or knowledge) in combination with quality, safety, patient or nurse satisfaction outcome. Articles are excluded when published before 2000 or in a language other than English as shown in table 8 below.

Search 1	
Inclusion criteria	1. Articles are selected when describing one or more of the input variables education, certification, additional training, nursing skill knowledge 2. Describing their influence on outcome variables pressure ulcers, falls, critical incidents, failure to rescue, medication error, nosocomial infections, patient and nurse satisfaction.
Exclusion criteria	1. Publicized before 2000 2. Language other English

Table 8. Inclusion and exclusion criteria literature search 1.

B. LITERATURE ANALYSIS ON NURSE VARIABLES

When an article describes one of the selected nurse variables (independent variables) and their influence on one of the outcome variables (dependent variables) or vice versa, this is noted in table 9.
When an increase of an independent variable results in an increase of a dependent variable this is noted with a +
When an increase of an independent variable results in an decrease of a dependent variable this is noted with a -
When an increase of an independent variable results in an increase of dependent variables in general this is noted with a G+.
The row of the table represents the dimension nurse variables (independent variables) education, certification, skills and knowledge. The columns represent the outcome dimensions quality and safety, patient satisfaction and nurse satisfaction (dependent variables).The nature of the influence and the source are explained. For an example see table 9 below.

Outcome		Quality safety						Patient satisfaction			Nurse satisfaction		Influence	Source
		1. Pressure ulcer	2. Falls	3. Critical incidents	4. Failure to rescue	5. Medication Error	6. Nosocomial infections	1.Nursing care	2. Overall care	3. Information	1. Overall satisfaction	2. Intent to leave		
	1. Education	+											Higher education has a positive influence on % falls	Estabrooks, 2013

Table 9. Example of literature analysis.

C. LITERATURE SEARCH ON WORK ENVIRONMENT VARIABLES

The goal of this search is to determine the influence of nurse work environment variables on the outcome of nursing care. The literature search is performed by using the online databases Web of Science and Medline (Pubmed). Key words that are used to search in Web of Science and Mesh terms that are used to search in Pubmed are described appendix 3. These key words and Mesh terms are based on the variables from the theoretical framework. The search strategy is described in appendix 4. Articles are selected based on inclusion criteria. These criteria consist of presence of one of the mentioned nurse work environment variables (autonomy, clarity, leadership, professional development opportunities recognition, teamwork) in combination with nurse sensitive outcomes, patient or nurse satisfaction. Articles are excluded when published before 2000 or in a language other than English as shown in table 10 below.

Search 2	
Inclusion criteria	1. Articles will be selected describing nurse work environment variables, based on chapter 1.3: recognition by management, competent colleagues, autonomy, development opportunities, nurse physician relationships 2. Describing the influence on one of the outcome indicators pressure ulcers, falls, critical incidents, failure to rescue, medication error, nosocomial infections, patient and nurse satisfaction
Exclusion criteria	1. Publicized before 2000 2. Language other English

Table 10. Inclusion and exclusion criteria literature search 2.

D. LITERATURE ANALYSIS ON WORK ENVIRONMENT VARIABLES

When an article describes one of the selected nurse work environment variables (independent variables) and their influence on one of the outcome variables (dependent variables) or vice versa, this is noted.
When an increase of an independent variable results in an increase of a dependent variable this is noted with a +
When an increase of an independent variable results in an decrease of a dependent variable this is noted with a -
When an increase of an independent variable results in an increase of dependent variables in general this is noted with a G.
The row of the table represents the dimension nurse work environment variables (independent variables) recognition and support; working with clinical competent colleagues; autonomy, professional development opportunities and nurse-physicians relationship. The columns represent the outcome dimensions quality and safety, patient satisfaction and nurse satisfaction (dependent variables).The nature of the influence and the source are explained.

E. DESIGN MODEL

Nurse variables and work environment variables and their influence on nurse sensitive outcomes, patient and nurse satisfaction are displayed in a model. The model displays which nurse variables and nurse work environment variables influence nurse sensitive outcomes, patient and nurse satisfaction. The model also displays if the nurse variables and nurse work environment variables increases or decreases nurse sensitive outcomes, patient and nurse satisfaction.

2.1.2 VALIDATING MODEL WITH TNW PRACTICES

The model is validated by hospitals that already have a TNW. Respondent are selected and an expert interview is performed and analyzed.

A. RESPONDENT SELECTION

Due to absence of a list of hospitals with thematic nursing ward the respondents search is conducted by searching Dutch hospital websites for nursing wards with more than one specialty. Criteria for inclusion are determined and used to select respondents. The results of the selection in shown in table 11 below. Nursing wards are contacted by phone and the goal of the research, the goal of the interview and the required data are explained. The interviews require a manager responsible for the outcome of the nursing ward and the nursing staff and who is willingly to participate. Eleven respondents were approached, the numbers of respondents included in this research is five.

Selection criteria TNW practices					
The hospital has to be located in the Netherlands	**Deventer**	**Drachten**	**Drachten**	**Rotterdam Havenziekenhuis**	**Antonie van Leeuwenhoek**
The hospital can be a general, specialty, or academic hospital	**General (Top Clinical)**	**General**	**General**	**General**	**Specialty**
The thematic nursing wards must contain at least two patients groups, treated by corresponding specialist and nurses	**Orthopedic, plastic surgery, general surgery**	**Long- cardio**	**Orthopedic Gynecology Maternity**	**Surgery orthopedic Gynecology Urology KNO**	**Gastro enterolgy Urology Gynecology**
Preferably in the years before the patients the thematic ward were treated on a single specialty ward	**yes**	**Yes**	**Yes**	**partially**	**no**
The thematic nursing ward must exist at least one year	**Yes 2**	**Yes 3**	**Yes 3**	**Yes**	**Yes**
Among the nurses there must different education, specialization and experience before working on a thematic ward	**yes**	**yes**	**Yes**	**yes**	**yes**
If possible thematic wards with different combinations of patient groups are selected	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
The interviews requires a manager who is responsible for the outcome of the nursing ward	**Manager nursing ward**	**Manager nursing ward**	**Manager nursing ward**	**Teamleader**	**Teamleader**

Table 11. Respondents selection criteria and results.

B. INTERVIEW WITH TNW PRACTICES

An expert interview with the selected respondents is performed to determine whether or not the TNW practices recognize the input variables and their influence on outcome variables, as mentioned in the model. Respondents are also asked if the model displays variables that have only a little or no influence on their outcome. They are also asked if there are other variables besides the variables mentions in the model that are influencing their outcome variables. The topic list can be found in appendix 5. The interview is semi structured, with closed questions to answer the determined questions and open questions to explore experiences, measures and results (Baarda, 2000), (Baarda, 2007). It is an expert interview with a manager responsible of the TNW. A data recorder is used to record the interview for analysis.

C. ANALYZING THE INTERVIEWS

The interviews are analyzed by determining

1. Whether or not respondents recognize the influence each input variables has on outcome as displayed in the model. Which influences are recognized and which influences are not recognized.
2. Input variables that have, according to the respondents, no influence on outcome variables are described.
3. Input variables, other than the variables from the model, that have a 'moderate or considerable' influence on outcome variables on a TNW are described and added to the model. This analysis will continue in research question 3.
4. Comments from the respondents that refer to this research will be described.

The results of these interviews are an overview of the extend of recognition of the input variables by the TNW practices, variables that have no or little influence on outcome and other variables that influence outcome variables.

2.2 RESEARCH QUESTION 2

Which measures are taken by hospitals with a TNW in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction?

2.2.1 INTERVIEWS WITH TNW PRACTICES

A. RESPONDENT SELECTION

The respondents selected to answer this research question are the same as the respondents selected regarding research question one, respondents from the five TNW practices.

B. INTERVIEW WITH TNW PRACTICES

The selected respondents are interviewed to determine if the TWN practices are taking countermeasures to guarantee or improve outcomes and what the results of these measures are. The topic list can be found in appendix 6. The interview is semi structured, with closed questions to answer the determined questions and open questions to explore experiences, measures and results (Baarda, 2000), (Baarda, 2007). It is an expert interview with a manager responsible of the TNW.

C. ANALYZING THE INTERVIEWS

The interviews are analyzed to determine

1. Which measures regarding nurse variables and nurse work environment variables are taken by the TNW practices in order to guarantee or improve nurse sensitive outcomes, patient satisfaction and nurse satisfaction?
2. What are the results of these measures?
3. Measures that have a moderate or considerable result will be taken into account in this research.
4. Measures that have little or no influence will also be described.
5. Other comments will be described.

The results of these interviews are an overview of measures taken by the TNW practices and their results on outcome.

2.3 RESEARCH QUESTION 3

Which consequences is a TNW expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala?

The developed model is discussed with stakeholders from the Isala Klinieken who are responsible for quality and safety outcome and nurse satisfaction on the nursing wards (i.e. managers of the nursing ward, or hospital departments). Based on the input variables of the model, possible consequences and countermeasures will be discussed. To answer these research questions the respondent selection, interviews with Isala respondents and analysis of the interviews is described.

2.3.1. INTERVIEW WITH ISALA STAKEHOLDERS

A. RESPONDENT SELECTION

To determine which stakeholder has to be approached to answer this research question a stakeholder analysis is performed (Brugha, 2000). Information from the hospitals organization chart and by approaching the stakeholders provided input for this stakeholder analysis. Stakeholders that are involved in quality & safety policy, in staff satisfaction and in nurse staffing and the stakeholder analysis are shown in table 12 below. The involved stakeholders are described below the table.

		Importance of stakeholder			
		Unknown	Little of no influence	Some importance	Significant importance
Influence of stakeholder	Significance influence			A B	
	Some influence			C*	
	Little influence			D E	
	Unknown influence	F G			

Table 12. Stakeholder analysis.

* Selected respondents: the nurse managers from the nursing ward.

Stakeholders involved in quality & safety policy in the Isala

The involvement in quality and safety policy reaches from the bedside to the board of directors. Every stakeholder has their own responsibility to execute quality and safety policy

A. Chief Operation Officers
   Three COO's cooperate with the two members of the board of directors. Each COO's is responsible for multiple RvE's. An RvE consists of one or two specialties and is responsible for all organizational parts concerning the delivery of health care at the outpatient clinics and the nursing wards.
B. RvE manager
   There are 33 RvE's and every RvE is controlled by a manager who is responsible for delivered health care, which is measured by quality, safety and patient satisfaction indicators.
C. Manager of the nursing ward
   The manager of the nursing ward is responsible for nurse staffing and the nursing care process on the ward.
D. Nurses of the nursing ward
   The nurses are responsible for the nursing care process of the patients at the nursing ward. Also indirect patient activities as developing nurse standards and nurse innovations can be part of the nursing activities.
E. Senior advisor quality and safety and patient satisfaction
   The department of quality and safety provides a senior advisor who advises the RvE manager and chairman on quality and safety outcome, processes en interventions. A second advisor from the quality and safety department advises on patient satisfaction outcome, measurement and improvement.

Stakeholders involved in staff satisfaction in the Isala

The stakeholders described above, A,B,C,D. The following stakeholders are not responsible for staff satisfaction and therefore not selected for interviews.

F. Human resources
   Human resources are responsible for hiring nurses from internal and extern agencies. HR collect information about staff satisfaction and the reason a nurse leaves the hospital during the exit interview.
G. Occupational health services
   The occupational health services department investigates staff satisfaction by an annual survey among hospital staff.

Stakeholders involved in nurse staffing

B. RvE managers who are responsible for nurse staffing in general.
C. Nurse managers at the nursing ward who are responsible for the nursing care process and the nurses that deliver the care. The nurse manager is responsible for the nurses that deliver the care and the composition of the team in case of variety in skills and expertise.

Result of stakeholder analysis

COO's have significant importance and influence but because their limited knowledge of the specific input variables on the nursing ward compared to the RvE manager and the manager of the nursing ward, COO's are not selected for the interviews. RvE managers and the managers of the nursing ward have both influence and importance but managers of the nursing ward have more knowledge of the nurses at the nursing ward and are therefore selected for an interview.

- Selected respondents in this research are the nurse managers from the nursing ward. In this research the managers of the Orthopedic nursing ward and from the Surgery ward are selected because of their proposed combination in a TNW.

B. INTERVIEW WITH ISALA MANAGERS

The goal of the interview is to determine possible consequences or opportunities of a thematic nursing ward on nurse sensitive outcomes, patient and nurse satisfaction by using the model and the experiences from TNW practices. Managers of the nursing wards are asked if they recognize the input variables and their influence on outcome variables, as mentioned in the model. The managers are asked to describe possible consequences a thematic nursing ward is expected to have on nurse sensitive outcomes, patient and nurse satisfaction.
The interview is semi structured, with closed questions to answer the determined questions and open questions to explore possible measures (Baarda, 2000), (Baarda, 2007). The interview requires the manager of the nursing ward of the proposed TNW. If the manager gives permission, a data recorder is used to record the interview for analysis. The topic list can be found in appendix 7.

C. ANALYZING THE INTERVIEWS

The interviews are analyzed to determine

1. Whether or not Isala managers recognize the influence each input variables has on outcome as displayed in the model. Which influences are recognized and which influences are not recognized.
2. Model adjustments. Input variables, other than the variables from the model, that have a 'moderate or considerable' influence on outcome variables on a TNW are described and added to the model. This is combined with results of validating the model with TNW practices as described in 2.1.2.
3. Which consequences or opportunities are expected regarding the nurse variables and nurse work environment variables that influence nurse sensitive outcomes, patient satisfaction and nurse satisfaction?
4. Other comments will be described.

The results of these interviews are an overview of the extent of recognition of the input variables by the Isala managers and their expected consequences of each variable on outcome.

2.4 Research Question 4

Which measures are required in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction at a TNW in the Isala?

2.4.1. Interview with Isala stakeholders

a. Respondent selection

The respondents selected for this interview are the same respondents from the previous question, the Isala managers of the nursing wards that are proposed to combine in a TNW. The manager of the Orthopedic nursing ward and the manager of the Surgery nursing ward.

b. Interview with Isala managers

The goal of the interview is to determine which measures are considered required to act on possible consequences or opportunities in order to maintain or improve outcome after implementing the TNW.
The manager is asked to describe for every measure the expected results on outcome. The expected influence on outcome is rated on a 5 point scale -- / - / N / + / ++. The feasibility of the measure is rated on a similar 5 point scale. The time the measure is expected to take is rated on a 3 point scale 0 / + / ++. The cost are rated on a 3 point scale - - / - / 0.
The Isala managers are also asked to comment on the measures taken by the five TNW practices.
The interview is semi structured, with closed questions to answer the determined questions and open questions to explore possible measures (Baarda, 2000), (Baarda, 2007). The interview requires a manager of the nursing ward of the proposed TNW. If the manager gives permission, a data recorder is used to record the interview for analysis. The topic list can be found in appendix 8.

c. Analyzing the interviews

The interviews are analyzed to determine

1. For every variable, measures will be described that are considered necessary by the managers to maintain or improve outcome.
2. The expected results on outcome variables of these measures are rated on a 5 point Likert scale --/-/n/+/++. A considerable negative influence (- -) moderate negative influence (-) influence , no influence (N), moderate positive (+) or considerable positive (++) influence.
3. The expected feasibility of the measures are rated on a 5 point Likert scale --/-/n/+/++. Considerably unfeasible (- -) low feasibility (-), neutral (N), moderate feasible (+) or considerable feasible (++).
4. The time the measure is expected to take is rated on a 3 point scale 0 / + / ++. No extra time (0), some amount time < 6 months (+), considerable amount of time > 6 months (++)
5. The expected cost of the measures are rated on a 3 point scale - - / - / 0. Considerable amount of costs >500€/nurse (- -), moderate amount of cost <€500/nurse (-) or no cost (0).
6. Measures that have a moderate or considerable result will be taken into account in this research.
7. Measures that have little or no influence will also be described.
8. Comments from the managers are describes.

The result of the interview is an overview of measures that are considered required by the manager in order to maintain or improve outcome on the nursing ward when being combined in a TNW. The expected results on outcome, feasibility, duration and cost and expected influence on outcome of these measures are also described.

3. RESULTS

This chapter describes the results of the literature search and interviews in order to answer the research questions. First, the results of the literature search describe how nurse variables and work environment variables influence the nurse sensitive outcomes, patient and nurse satisfaction outcome. These influences are displayed in a model. The results of validating the model by TNW practices are described. Second, measures taken by TNW practices in order to guarantee or improve outcome are describes and also the results of these measures. Third, the results of the interviews with the managers of the nursing ward in the Isala are described. The recognition of the influences and the consequences a TNW is expected to have on outcome is described. Finally measures are described that are required in order to guarantee or improve outcome including the expected results, feasibility, duration and costs.

3.1 NURSE VARIABLES AND NURSE WORK ENVIRONMENT VARIABLES THAT INFLUENCE NURSE SENSITIVE OUTCOME, PATIENT AND NURSE SATISFACTION

3.1.1 SYSTEMATIC LITERATURE SEARCH

The first systematic literature search about the influence of nurse variables on outcome variables resulted in 1311 articles. After inclusion and exclusion criteria 121 abstracts and articles are read. 37 articles were included in this research. The second systematic literature search about the influence of nurse work environment variables on outcome variables resulted in 887 articles. After inclusion and exclusion criteria 283 abstracts and articles are read and 98 articles are included in this research. The search results are shown in table 13 below.

Search 1	Search 2
1311	887
121 abstracts or articles read	283 abstracts or articles read
37 articles selected	98 articles selected

Table 13. Result number of articles from literature search.

This paragraph describes for every nurse variables its' influence on nurse sensitive outcomes, nurse and patient satisfaction according to the literature. A + means that an increase of the nurse variable results in an increase of the outcome variable. A - means that an increase of the nurse variable results in an decrease of the outcome variable. G- means an increase of the nurse variable results in a decrease of outcome variables in general. G+ means an increase of the nurse variable results in an increase of outcome variables in general.
A decrease of intent to leave is displayed with a – but is in fact a positive result.

A. INFLUENCE NURSE VARIABLES ON NURSE SENSITIVE OUTCOME, PATIENT AND NURSE SATISFACTION

This paragraph describes the results of the literature search and analysis of the influence of the nurse variables (i.e., education, certification and skills and knowledge) on nurse sensitive outcomes, patient and nurse satisfaction.

1. EDUCATION

The influence of education on outcome is commonly described in general instead of a single outcome variable. Higher education, like a baccalaureate degree (BSN) is positively influencing patients outcome and safety in general and specifically the nurse sensitive outcomes pressure ulcer, failure to rescue and medication error (Estabrooks, 2013), (Sales, 2008), (Kirwan, 2013), (Blegen, 2013), (Kendall, 2011), (Jordan, 2011), (Aiken, 2009), (Clarke,2008), (Friese, 2009), (Estabrooks, 2005). An increase in percentage of nurses with a baccalaureate degree (BSN) improves nurse satisfaction. A 10% increase of BSN nurse's increases satisfaction with factor 1.10-1.13 (You, 2013). Nurses with a baccalaureate degree (BSN) are communicating better with patients and less likely to leave than nurses without a degree (Fitzpatrick, 2010), (Kounenou, 2011).

Influence on outcome variables

- + Nurse sensitive outcomes pressure ulcer, failure to rescue and medication error
- + Patient satisfaction: overall care and communication
- + Nurse satisfaction: - intent to leave

2. Certification

The nurse variable certification or additional training influences patient safety in general and influences the rates of pressure ulcers, failure to rescue and medication errors (Hiser, 2006), (Lyons, 2012), (Wilkerson, 2011) (Drankerd, 2010), (Petrova, 2010), (Zulkowski, 2008), (Biancofiori, 2007), (Wedge, 2005). Certified nurse's tend to be more satisfied than non-certified nurses (Schroeter, 2012), (Ritter, 2011).

Influence on outcome variables

- + Nurse sensitive outcomes pressure ulcer, failure to rescue and medication error
- + Nurse satisfaction

3. Skill and knowledge

The extent of nurses' skill and knowledge influences patient outcome in general (Lyons, 2012), (Tait, 2010), (Samiwiro, 2010), (Brady, 2009). Having minor experience influences falls (Lui, 2012) and medication error (Fasolini, 2012), (Unver, 2012). More experience can reduce mortality (Tourangeau, 2005) and can reduce intent to leave (Li, 2008).

Influence on outcome variables

- +G Patient outcome in general
- + Nurse sensitive outcomes: falls, medication error, mortality
- + Nurse satisfaction: - intent to leave

B. Influence nurse work environment variables on nurse sensitive outcome, patient and nurse satisfaction

This paragraph describes the results of the literature search and analysis of the influence of the nurse work environment variables (i.e., recognition and support, working with clinical competent colleagues, autonomy, professional development opportunities and nurse physician relationship) on nurse sensitive outcome, patient and nurse satisfaction.

1. Recognition and support

Recognition and support by management reduces risk of adverse events in general and nurses perception of the role of manager influences patient satisfaction (Duboi, 2013), (Boev, 2012). Recognition by management influences job satisfaction (Wang, 2012), (Bakker, 2010), (Garon, 2009), (Badr, 2010), (Lee, 2008), (Hong, 2012). Support from management positively influences outcome, job satisfaction and reduces intent to leave (Hinno, 2010), (Millisen, 2005).

Influence on outcome variables

- +G Nurse sensitive outcomes in general
- + Patient satisfaction
- + Nurse satisfaction: job satisfaction, - intent to leave

2. Working with clinical competent colleagues

Working with clinical competent colleagues, sometimes referred to as team member effectiveness, is positively related to medication errors (Fasolino, 2012), (Kilner, 2011). Nurses cooperation increases patient satisfaction and reduces intent to leave (O'Leary, 2012), Millisen, 2005), (Hong, 2012).

Influence on outcome variables

- + Nurse sensitive outcomes: medication error
- + Patient satisfaction
- - Nurse satisfaction: intent to leave

3. Autonomy

Autonomy increases patient and nurse satisfaction and reduces intent to leave (Papathanassoglou, 2012), (DeCola, 2010), (Bacon, 2009), (Garon, 2009), (Hong, 2012) (Heikkinen, 2009), (Millisen, 2005), (Kee, 2005), (Duffield, 2009), (Zurmehly, 2008).

Influence on outcome variables

- + Patient satisfaction
- + Nurse satisfaction
- + Nurse satisfaction: - intent to leave

4. Professional development opportunities

Professional development opportunities have a positive influence on nurse satisfaction (Wang, 2012), (Hauk, 2011), (Ritter, 2010), (DiMattio, 2010), (Bakker, 2010), (Aiken, 2008), (Zurmehly, 2008), (Hallin, 2007).
Reasons for intent to leave are lack of opportunities for development (Boumans, 2008). Absence of advancement opportunities and study leave are related to burnout (Klopper, 2012).

Influence on outcome variables

- + Nurse satisfaction: overall satisfaction, - intent to leave

5. Nurse physician relationship

Good nurse physician relationship improves patient outcome and staff satisfaction (Bogaert, 2009), (Millisen, 2005) (Bacon, 2009), (Garon, 2009), (Kee, 2005), (Hong, 2012). Improved nurse physician relationship reduces 30day mortality (Estabrooks, 2011) and reduces medication error (Monoljovic, 2008). A one point increase in rating the nurse physician relationship results in a 2,5 fold increase in job satisfaction (Bruyneel, 2009).

Influence on outcome variables

- + G Patient outcome in general
- + Nurse sensitive outcomes: medication error, mortality
- + Nurse satisfaction: job satisfaction

Influence of nurse work environment in general on outcome variables

In general better work environment improves general safety outcome and is associated with staff satisfaction (Lui, 2012), (Kelly, 2011), (Aiken, 2011) (Patrician, 2010) (Aiken, 2011) (Clarke, 2008) (Kirwan, 2013), (Flyn, 2012), (Squires, 2010) (Friese, 2009) (You, 2013), (Mark, 2003), (Bacon, 2009).
Work environment variables influence job satisfaction (Millisen, 2005). The odds patients dying in better environments 14% lower than in poor ones (Aiken, 2009).

Influence on outcome variables

- +G Nurse sensitive outcome in general
- + Nurse sensitive outcome: mortality, medication error
- + Patient satisfaction with nursing care
- + Nurse satisfaction: job satisfaction and intent to leave

c. Development of the model according to the literature

The literature search and analysis resulted in a considerable amount of articles and after analysis independent variables and their influence on dependent variables were described. All input variables (independent) influence one or more of the outcome (dependent) variables. Literature indicates that nurse variables mainly influence the nurse sensitive outcomes pressure ulcers, falls, failure to rescue, medication error, nosocomial infections. Certification and skills and knowledge mainly influence nurse satisfaction.
Nurse work environment variables mainly influence patient and nurse satisfaction. Nurse work environment in general influence critical incidents, failure to rescue medication error and nurse satisfaction.
An overview of independent variables and their influence on dependent variables according to the literature search are displayed in the model below in table 14.

Output	variables	Quality safety Nurse sensitive outcome							Patient satisfaction			Nurse satis-faction		Description influence	Reference
Input variable		1. Pressure ulcer	2. Falls	3. Critical incidents	4. Failure to rescue	5. Medication Error	6. Nosocomial infections	General	1.Nursing care	2. Overall care	3. Information	1. Overall nurse satisfaction	2. Intent to leave		
Nurse vari-ables	1. Education	+			+	+				+				Higher education, BSN, positively influence patients outcome and safety in general and 1,4,5	(Estabrooks,2013) (Sales,2008) (Kirwan,2013) (Blegen, 2013) (Kendall, 2011), (Jordan, 2011) (Aiken, 2009), (Clarke,2008), (Friese, 2009), (Estabrooks, 2005)
											+			Increase in BSN improves satisfaction (10% BSN increase, satisfy increase factor 1.10-1.13)	(You, 2013)
													-	Nurse with BSN better information	(K Kounenou, 2011)
														Nurse with BSN less likely intent to leave	(Fitspatrick, 2010), (Hong, 2012)
	2. Certification	+				+	+							Certification, or additional training influences patient safety in general and 1,4,5	(Hiser, 2006), (Lyons, 2012), (Wilkerson, 2011) (Drankerd, 2010) (Petrova, 2010) (Zulkowski, 2008) (Biancofiori, 2007), (Wedge, 2005)
												+		Certificated nurses, higher satisfaction than non-certificated	(Schroeter, 2012), (Ritter, 2011)
	3. Skills and knowledge	+			+	+	+							Skill and knowledge influences patient outcome	(Lyons, 2012), (Tait, 2010), (Samiwiro, 2010), (Brady, 2009)
			+*			+*								Less experience influences falls	(Lui,2012)
												+		Less experience influences medication error,	(Fasolini, 2012), (Unver,2012)
													-	Experiences reduces intent to leave	(Li, 2008)
					+									More experiences can reduce mortality	(Tourangeau, 2005)
Nurse work environ ment	1. Recognition and support								+					Role of manager influences patient satisfaction	(Duboi, 2013), (Boev,2012)
								G+				+	-	Recognition influences job satisfaction	(Wang, 2012), (Bakker, 2010), (Garon,2009), (Badr, 2010), (Lee, 2008), (Hong, 2012)
												+		Support management influence outcome, job satisfaction intent to leave	(Hinno, 2010), (Millisen, 2005)
	2. Working with clinical competent colleagues								+				-	Physician, nurses cooperation trust increase patient satisfaction and reduces intent to leave	(O'Leary,2012), Millisen, 2005), (Hong, 2012)
						+								Team member effectiveness positive related to medication incidence	(Fasolino, 2012), (Kilner, 2011)
	3. Autonomy												-	Autonomy reduces intent to leave	(Papathanassoglou, 2012), (DeCola, 2010), (Bacon, 2009), (Garon, 2009) , (Hong, 2012)
												+	-	Autonomy increases satisfaction	(Heikkinen, 2009), (Millisen, 2005), (Kee, 2005), (Duffield, 2009), (Zurmehly,2008)
	4. Professional development opportunities											+		Development opportunities influence job satisfaction	(Wang, 2012), (Hauk, 2011), (Ritter, 2010), (DiMattio,2010), (Bakker, 2010), (Aiken, 2008) (Zurmehly,2008), (Hallin, 2007)
												+*		Advancement opportunities related to burnout	(Klopper, 2012)
													-	Opportunities for development relate to ITL	(Boumans, 2008)
	5. Nurse physician relations							G+				G+		Better N-PH relation improves patient outcome and staff satisfaction	(Bogaert, 2009), (Millisen, 2005) (Bacon, 2009), (Garon, 2009), (Kee, 2005) , (Hong, 2012)
												+		1pint increase N-PH rel. 2,5 fold increase job satisfaction	(Bruyneel, 2009)
					+									Better N-PH relation reduces 30day mort	(Estabrooks, 2011)
						+								Better N-PH relation reduces medication error	(Monoljovic, 2008)
	General			+	+	+			+			G+	G-	Better work environment associated with staff satisfaction	(Lui, 2012), (Kelly,2011), (Aiken, 2011) (Patrician, 2010) (Aiken, 2011) (Clarke, 2008)
								G+					-	General work environment improves general safety outcome	(Kirwan, 2013), (Flyn, 2012), (Squires, 2010) (Friese, 2009) (You,2013), (Mark,2003), (Bacon, 2009)
								G+				G+		Work environment variables influence job satisfaction	(Millisen, 2005)
					+			G+						The odds patients dying in better environments 14% lower than in poor ones	(Aiken, 2009)

Table 14. Model that displays input variables and their influence on outcome variables. The influence is describes and the source. Result literature analysis. + Increase of the independent variable increases the dependent variable. – Decrease of the independent variable decreases the dependent variable.
G+ means an increase of the nurse variable results in an increase of outcome variables in general. G- means an increase of the nurse variable results in an decrease of outcome variables in general. *literature describes an decrease of the input variable that results in an decrease of the outcome variable.
This model is also added in appendix 9.

3.1.2. RESULTS OF VALIDATING THE DEVELOPED MODEL WITH TNW PRACTICES

This paragraph describes the results of validating the model with the ive selected TNW practices. Five respondents are selected and interviewed that are Deventer Ziekenhuis, Nij Smellinghe (two respondents), Havenziekenhuis and Antonie van Leeuwenhoek.

RESPONDENT SELECTION

Respondents selected for interviews for validating the model are shown below in table 15.

Selection criteria TNW practices					
The hospital has to be located in the Netherlands	**Deventer Deventer Ziekenhuis**	**Drachten Nij Smellinghe**	**Drachten Nij Smellinghe**	**Rotterdam Havenziekenhuis**	**Amsterdam Antonie van Leeuwenhoek**
The type of hospital can be a general, specialty, or academic hospital	**General (Top Clinical)**	**General**	**General**	**General**	**Specialty**
The thematic nursing wards must contain at least two patients groups, treated by corresponding specialist and nurses	**Orthopedic General – plastic-trauma surgery, KNO**	**Long- cardio**	**Orthopedic Gynecology Maternity**	**Surgery Orthopedic Gynacology Urology - KNO**	**Gastro enterolgy Urology Gynecology**
Preferably in the years before the thematic ward patients were treated on a single specialty ward	**yes**	**Yes**	**Yes**	**partially**	**no**
The TNW must exist at least one year	**Yes 2**	**Yes 3**	**Yes 3**	**Yes 5**	**Yes 11**
Among the nurses there must different education, specialization and experience before working on a thematic ward	**yes**	**yes**	**Yes**	**yes**	**yes**
If possible thematic wards with different combinations of patient groups are selected	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
The interviews requires a manager responsible for the outcome of the ward	**Manager nursing ward**	**Manager nursing ward**	**Manager nursing ward**	**Team leader**	**Team leader**

Table 15. Respondent selection criteria and selection.

INTERVIEW WITH TNW PRACTICES

All five respondents recognize the influence that input variables have on outcome variables as displayed in the model. No input variable is considered to have little or no influence on the outcome. No additional variables are mentioned that should to be added to the model. The result of the interviews for every input variable is described below.

A. RECOGNITION INFLUENCE NURSE VARIABLES ON OUTCOME BY TNW PRACTICES

This paragraph describes the recognition of the influence of nurse variables on outcome variables by TNW practices.

1. EDUCATION

The positive influence of a baccalaureate degree (BSN) on nurse sensitive outcome, patient and nurse satisfaction according to the model is recognized by all respondents. Nurses are educated at two levels, level four MBO and level five HBO but in practice the different levels of education are only utilized by Deventer Ziekenhuis. Nij Smellinghe, Antonie van Leeuwenhoek and Deventer Ziekenhuis prefer to focus on personal abilities due to the lack of differentiation of nurses' education levels.

Recognition of influence education on outcome variables

- All respondents.

2. CERTIFICATION

The influence of additional certification on outcome variables is recognized by Nij Smellinghe, Antonie van Leeuwenhoek and Deventer Ziekenhuis. Certification is considered important by all respondents except Havenziekenhuis, according to this hospital specific skills and knowledge can be acquired through demonstrations by other nurses.

Recognition of influence certification on outcome variables

- Deventer Ziekenhuis.
- Nij Smellinghe (both respondents).
- Antonie van Leeuwenhoek.

3. SKILL AND KNOWLEDGE

The influence of skills and knowledge on outcome is recognized by all respondents. Skills and knowledge have to be sufficient to secure the patient needs which are considered very important. The respondents expect that acknowledging and managing the differences in skills and knowledge has a positive influence on the nurse sensitive outcomes and nurse satisfaction.

Nij Smellinghe, Deventer Ziekenhuis and Antonie van Leeuwenhoek gain insight in all skills and knowledge when making an inventory of the personal abilities of each nurse. Nurses with considerable skill and knowledge of one of the patient groups are appointed as senior nurses and share their knowledge with other nurses.

Recognition of influence skills and knowledge on outcome variables

- All respondents.

B. RECOGNITION INFLUENCE NURSE WORK ENVIRONMENT VARIABLES ON OUTCOME BY TNW PRACTICES

This paragraph describes the recognition of the influence of nurse work environment variables on outcome variables by TNW practices.

1. RECOGNITION AND SUPPORT

Recognition and support and their influence on outcome is recognized and considered important by all respondents. Antonie van Leeuwenhoek considers this variable to be most important because of its positive influence on nurse satisfaction and therefore indirect positively influences nurse sensitive outcome and patient satisfaction.

Recognition of influence recognition and support on outcome variables

- All respondents, considered to be the most important variable by Nij Smellinghe.

2. WORKING WITH CLINICAL COMPETENT COLLEAGUES

Working with clinical competent colleagues and its influence on outcome is recognized and considered important by all respondents. The respondents consider it to be their duty to secure nurses' clinical competence.

Recognition of influence clinical competent colleagues on outcome variables

- All respondents.

3. AUTONOMY

The influence of autonomy on outcome is considered important and requires more attention according to the respondents. Deventer Ziekenhuis recognizes autonomy more in HBO-nurses than in MBO-nurses. Autonomous working is not only limited to the nursing care at the ward but also exceeds the nursing ward. Nij Smellinghe considers autonomy to be important. Antonie van Leeuwenhoek considers autonomy to be important at the ward and throughout the hospital.

Recognition of influence autonomy on outcome variables

- All respondents, considered most important variable by Antonie van Leeuwenhoek.

4. PROFESSIONAL DEVELOPMENT

Professional development is recognized and supported by all respondents and the possibilities of providing development opportunities are considered to be the result of the mission statement and vision of the hospital.

Recognition of influence development on outcome variables

- All respondents.

5. NURSE PHYSICIAN RELATIONSHIP

Nurse -physician relationship and its influence is recognized and considered important by all respondents.

Recognition of influence nurse physician relation on outcome variables

- All respondents.

3.1.3 SUMMARY NURSE VARIABLES AND NURSE WORK ENVIRONMENT VARIABLES THAT INFLUENCE NURSE SENSITIVE OUTCOMES, PATIENT AND NURSE SATISFACTION

The literature search revealed that the nurse variables and nurse work environment variables that influence outcome variables are education, certification, skills and knowledge, support and recognition, working with clinical competent colleagues, autonomy, professional development and nurse physician relationships. The influence of input variables on outcome variables is recognized and considered important for the nursing care process by the TNW practices.

3.2 Measures taken by TNW practices in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction

This paragraph describes the measures taken by TNW practices in order to guarantee or improve their outcome and describes the results of these measures.

3.2.1 Interview with TNW practices which measures are taken

Respondent selection

The respondents selected for these interviews are the five TNW practices that were also selected to answer research question one.

Interview with TNW practices

The five respondents from TNW practices explain which measures are taken in order to guarantee or increase their outcome. The results of the measures are described, yet not all results could be supported by valid data. The respondents consider all taken measures necessary and explain that their measures are inextricably linked to the vision and strategy of nurse staffing of the hospital. The respondents are convinced that improving nurse satisfaction subsequently improves nurse sensitive outcomes and patient satisfaction.

A. Nurse variable measures

This paragraph describes the measures taken by TNW practices regarding the nurse variables.

1. Education

Deventer Ziekenhuis applies differences in education, skills and knowledge in the team by distinguishing and using three levels of nurses which improves nurse satisfaction. Level one consists of senior nurses, HBO educated nurses with additional certification and considerable work experience at the ward. Level two consists of 'kern team nurses' HBO with additional certification of one of the patient groups. Level three consists of HBO or MBO nurses, without additional certification. These nurses acquire patient group specific skills and knowledge by working with level one and level two nurses. The hospital strives for a 60%HBO - 40%MBO mix and stimulates and facilitates MBO nurses to become HBO nurses and hires more HBO than MBO nurses. This improves nurse sensitive outcomes (no supporting data), patient and nurse satisfaction.
Nij Smellinghe, Antonie van Leeuwenhoek and Deventer Ziekenhuis make in inventory of personal abilities to establish in detail the available knowledge and expertise of the nursing staff. After determining the required level of knowledge of the staff this list is used to take measures at an individual level.

Measures taken and result

- 60%HBO-40%MBOnurses. Stimulate and facilitate MBO nurse to become HBO nurses and hire more HBO-nurses to improve all outcome variables.

2. Certification

Havenziekenhuis does not consider additional certification or nurses to be necessary. Nurse can learn from working and teaching each other.
Deventer Ziekenhuis distinguishes three levels of nurses and facilitates certification only for nurses from level one and two to secure providing patient group specific care. Level three nurses provide mainly general care and therefore need no additional certification.
Nij Smellinghe facilitates certification per patient group. Half of the nursing staff is certified in one patient group and half of the staff is certified in another patient group. At the same time nurses have to become experienced with the other patient group by working with them. The hospital also mandates baby resuscitation certification for nurses from the orthopedic ward to enable them to assist nurses from the maternity ward. These measures improves outcome (no supporting data), patient and nurse satisfaction.
The Antonie van Leeuwenhoek decides that certification is mandatory for nurses before being employed at the ward. This measures increase autonomy, patient and nurse satisfaction according to the respondents.

Measures taken and result

- Stimulating and facilitating certification per patient group. Certify one half of the nursing staff in one patient group and the other half in another patient group. This improves all outcome variables.
- Certifying two or three levels of nurses, senior and 'kernteam' nurses.
- Stimulating and facilitating certification of all nurses in all patient groups or mandate certification.

3. Skill and knowledge

Havenziekenhuis nurses can make an appeal to the knowledge of nurses at the outpatient clinics if needed. Deventer Ziekenhuis utilizes differences in skills and knowledge in the team by using three levels of nurses. Level one consists of senior nurses, HBO nurses with additional certification and considerable working experience at the ward. Level two consists of HBO nurses with additional certification of one of the patient groups. Level three nurses, consists of HBO or MBO nurses without additional certification. These nurses acquire patient group specific skills and knowledge by working with level one and level two nurses. Applying these differences within a team improves nurse sensitive outcomes (no supporting data), patient and nurse satisfaction.

Nij Smellinghe appoints nurses with considerable skills and knowledge of a patient group as senior nurses to share their knowledge with other nurses. This improves nurse satisfaction

Antonie van Leeuwenhoek determines nurses' personal abilities to gain insight in available skills and knowledge of individual nurses. The hospital couples experienced with un experienced nurses during their training. This improves nurse satisfaction.

Measures taken and result

- Make an appeal to skills and knowledge of nurses elsewhere in the hospitals.
- Use personal ability lists to gain insight in skills and knowledge and opportunities to develop.
- Make experienced nurses senior nurses, this improves nurse satisfaction and feeling of autonomy.
- Staff three levels of nurses per unit to use variety in knowledge, in order to ensure knowledge and care including supporting staff, this improves all outcome variables.
- Couple experienced nurses with unexperienced nurses during training which improves nurse satisfaction.

B. Nurse work environment variable measures

This paragraph describes the measures taken by TNW practices regarding the nurse work environment variables.

1. Recognition and support

All respondent support their staff by listening to them and facilitate their needs whenever possible. Deventer Ziekenhuis supports the nurse counsel (Verpleegkundige AdviesRaad) and consults this counsel in order to discuss nurse related issues. Nij Smellinghe and Antonie van Leeuwenhoek currently initiate a nurse counsel in order to offer nurses a voice in hospital policy. This improves nurse satisfaction (no data available from other outcome variables).

Antonie van Leeuwenhoek explains that management and hospital board organize breakfast sessions with hospital staff to keep in touch. This increases organizational commitment and nurse satisfaction.

Measures taken and result

- Listening to the nurses and supporting the nursing staff improves nurse satisfaction.

2. Working with clinical competent colleagues

All respondents facilitate periodical clinical training session to improve skills and knowledge of the nurses. Havenziekenhuis considers clinical training important so nurses share their knowledge due to absence of additional certification.

Deventer Ziekenhuis, Nij Smellinghe and Antonie van Leeuwenhoek facilitate training and certification. They also facilitate nurses to become clinical competent in caring for unfamiliar patient groups. This increases autonomy and nurse satisfaction (no data available from other outcome variables). This is specified above by nurse variables certification and skills and knowledge.

Measures taken and result

- Stimulate and facilitated training, certification and gaining experiences with unknown patient groups this improves nurse satisfaction.

3. Autonomy

All respondent stimulate autonomy by listening and facilitating nurses to work autonomous. This improves nurse satisfaction and organizational commitment (no data available from other outcome variables).

Measures taken and result

- Listening to the nurses and facilitate autonomy, this improves nurse satisfaction.

4. Professional development

All respondents stimulate nurses in their professional development by facilitating attendance to seminars and symposia. Nurses can request additional training or clinical training if desired.
Deventer Ziekenhuis provides nurses additional training as much as possible next to two annual training days.
Nij Smellinghe and Antonie van Leeuwenhoek use the personal ability lists to provide individual training whenever possible. These measures improve nurse satisfaction and organizational commitment (no data available from other outcome variables).
Antonie van Leeuwenhoek explains that a solid foundation for additional training is necessary otherwise nurses will not apply the acquired knowledge.

Measures taken and result

- Provide nurses annually two training days, this improves nurse satisfaction.
- Provide requested training or education as much as possible this improves nurse satisfaction.
- Stimulate and facilitate nurses attend seminars and symposia this improves nurse satisfaction.

5. Nurse Physician relationship

The respondents stimulate this relationship by formal contact such as clinical training and will discuss possible improvement strategy if considered desirable by nurses or physicians.
Deventer Ziekenhuis and Nij Smellinghe stimulate and facilitate informal contact. This improves patient satisfaction and nurse satisfaction and reduces medication errors.

Measures taken and result

- Stimulated formal contact such as clinical training and informal contact this improves nurse satisfaction.

C. Recommendations from TNW practices

The following recommendations are made by the TNW practices.

1. The respondents strongly advice to include nurses in the development of thematic nursing wards. The nurses can identify threats to the nursing care process and suggest measures.
2. The respondents recommend making an inventory of the nurses' education, certification, skills and knowledge.
3. Targeted measures at an individual level can be made using this inventory in order to manage the nursing staff. Antonie van Leeuwenhoek underlines the role of the ward managers in the development of accurate protocols which are easy accessible for the staff to secure high standard of nursing care. There has to be a solid foundation of nursing care and of additional nurse training in order for nurses to apply their acquired skills and knowledge.
4. Nij Smellinghe recommends: 1. To prevent nosocomial infections, not only the nursing staff but also supporting staff should be made aware of and be trained in preventing cross infections. 2. Some patient groups bring along emotions or noises, for instance the noises lung patients make can be unknown and unpleasant for other patients and the emotions of acute cardiac patients differ from emotions of chronic (lung) patients. Patients should be educated about other patient conditions and emotions or separate them, if possible, to increase patient satisfaction.

3.2.2 Summary measures taken by TNW practices

Measures taken by the TNW practices regarding nurse variables are

1. Increasing nurses' level of education. Increase the proportion of HBO-nurses.
2. Increasing the number of nurses' certification. Partial, half or whole nursing staff.
3. Using difference in skill and knowledge within the nursing team. Senior and 'kernteam' / 'schil' nurse.
   These measures improve outcome, patients and nurse satisfaction of the TNW practices.

Measures taken by the TNW practices regarding nurse work environment variables are

1. Supporting the nursing staff by listening to nurses need and facilitate whenever possible.
2. Stimulate and facilitate personal development (e.g., training or attending symposia).
   These measures improve nurse satisfaction and are considered to subsequently improve the nurse sensitive outcomes and patient satisfaction of the TNW practices.

The measures taken by the TNW practices are inextricably linked to the mission statement and vision of the hospital which are specified for nursing care and the nursing staff and translated to a nurse staffing strategy. The respondents recommend to make an inventory of the nurses' education, certification, skills and knowledge. This is the first step to manage the nursing staff at an individual level. Measures taken by the TNW practices and their results are summarized below in table 16.

Output		Quality safety							Patient satisfaction			Nurse satis-faction		Influence according to literature and recognized by TNW	Measures by TNW	Result measures according to the TNW
		1. Pressure ulcer	2. Falls	3. Critical incidents	4. Failure to rescue	5. Medication Error	6.Nosocomial infections	General	1.Nursing care	2. Overall care	3. Information	1. Overall nurse satisfaction	2. Intent to leave			
Input																Overall no data was available to measure results of measures on the nurse sensitive outcomes
Nurse variables	**1. Education**	+			+	+				+	+		-	Higher education, BSN, positively influence outcome and safety in general and 1,4,5 Increase in BSN improves satisfaction (10% BSN increase, satisfy increase factor 1.10-1.13) Nurse with BSN give better information Nurse with BSN less likely intent to leave	Focus on personal abilities (NS,DZ,AVL) Strive for 40%MBO-60%HBO nurses (DZ) Facilitate MBO nurses to become HBO nurses (DZ)	Improved patient and nurse satisfaction
	2. Certification	+				+	+					+		Certification, or additional training influences patient safety in general and 1,4,5 Certificated nurses, higher satisfaction than non-certificated	Facilitate certification when possible (NS) Facilitated certification mandatory before employment on ward (AVL) Mandatory training related to patient groups (baby resuscitation, radiation) (NS, AvL)	Improved nurse satisfaction
	3. Skills and knowledge	+	+ *		+ +	+ + *	+					+	-	Skill and knowledge influences patient outcome Less experience influences falls Less experience influences medication error, Experiences reduces intent to leave More experiences can reduce mortality	Personal ability score list to gain insight in abilities and opportunities to grow (NS, DZ, AVL) Make experienced nurses senior nurses (NS) Staff trained and experienced nurse with one patient group together with a nurse trained and experienced with another patient group (NS) Staff three levels of nurses per unit to act on variety in knowledge, in order to ensure knowledge and care (DZ) including supporting staff (AVL) Couple inexperienced with experience nurses (AVL)	Improved autonomy and satisfaction
Nurse work environment	**1. Recognition and support**							G +	+			+ +	-	Role of manager influences patient satisfaction Recognition influences job satisfaction Support management influence outcome, job satisfaction intent to leave	Higher management and board support the nursing staff by organizing mutual breakfast sessions to discuss all issues (AVL) Nurse managers actively support the nursing staff (NS,DZ,AVL)	Improved nurse satisfaction
	2. Working with clinical competent colleagues					+			+				-	Physician, nurses cooperation trust increase patient satisfaction and reduces intent to leave Team member effectiveness positive related to medication incidence	Facilitating certification and training,(all) gain insight in and use the differences in skill knowledge (NS,DZ,AVL) During training or trainee ship nurses are coupled with an experienced nurse. (AVL)Weekly clinical training session (all)	Improved autonomy and nurse satisfaction
	3. Autonomy											+	- -	Autonomy reduces intent to leave Autonomy increases satisfaction	Support and facilitate autonomy by listening and act on needs (al)	Improved nurse satisfaction
	4. Professional development opportunities											+ + *	- -	Development opportunities influence job satisfaction Advancement opportunities related to burnout Opportunities for development relate to ITL	Individual wishes and needs are facilitated as much as possible (all) Nurses working with all patient groups on a ward (NS, DZ, AVL) Stimulate, facilitate nurses to attend symposia and master classes (all)	Improved nurse satisfaction
	5. Nurse physician relations				+ +			G +				G + +		Better N-PH relation improves patient outcome and staff satisfaction 1pint increase N-PH rel. 2,5 fold increase job satisfaction Better N-PH relation reduces 30day mort Better N-PH relation reduces medication error	Facilitate and stimulate both formal and informal contact to improve this relation and secure easy access (all)	Improved nurse satisfaction positive influence on medication error (AVL,DZ)

Table 16. Summary of influence of input variables on output and the measures taken by the TNW practices and their result.
NS= Nij Smellinghe ziekenhuis, DZ= Deventer ziekenhuis, AVL= Antonie van Leeuwenhoek, HZ= Havenziekenhuis.

3.3 Consequences a TNW is expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala

This paragraph describes the consequences a TNW is expected to have on current nurse sensitive outcome, patient and nurse satisfaction in the Isala.

3.3.1 Interviews with Isala managers from the orthopedic and surgery ward

Result respondent selection

A Stakeholder analysis was used and resulted in selecting managers or the nursing wards as respondents for this interview. The managers of the orthopedic and surgery nursing wards are selected because their wards are supposed to be combined in a proposed TNW.

Result interview Isala managers

The managers recognized the influences that input variables have on outcome variables. A TNW is expected to have consequences for all outcome variables. By using the model expected consequences of every nurse variable and nurse environment variable is described.

A. Nurse variables and their expected consequences at a TNW

This paragraph describes the expected consequences of a TNW regarding the nurse variables.

1. Education

Orthopedic ward

The influence of the nurse variable education on outcome variables as displayed in the model is recognized. The percentage MBO-HBO nurses is currently 75%-25%. The manager of the ward manager prefers to focus on personal abilities rather than to focus on nurses' level of education. This is not expected to change at a TNW.

- At a TNW there are no consequences expected.

Surgery ward

The influence of the nurse variable education on outcome is as displayed in the model recognized and considered important. The percentage MBO-HBO nurses is 83%-17% but the manager prefers a percentage of 20%MBO-80% HBO nurses to meet the complex care need, besides the development of a TNW.

Expected consequences

- At a TNW the % of MBO-HBO nurses is the same, which is expected to decrease all outcome variables.

2. Certification

Orthopedic ward

Certification is considered very important for the outcome on the ward and all nurses followed an orthopedic training. This training is developed and provided by the Isala Academy (the hospital's knowledge center for education and research). At a TNW negative consequences on all outcome variables are expected because of insufficient specific knowledge of unknown patients group. Lack of specific knowledge makes it difficult to, for instance recognize clinical deterioration which is an important part of nursing care. Specific knowledge of the patient group is required to provide quality of care.

Surgery ward

Certification is considered very important and all nurses followed the surgical training. Specific knowledge of future patients group is required for providing quality of care. At a TNW lack of specific knowledge of patient group and lack of recognition of critical signs is expected to increase adverse events, failure to rescue and mortality rates. Patient and nurse satisfaction are expected to decrease.

Expected consequences

- At a TNW lack of certification is expected to negatively influence all outcome variables.

3. Skill and knowledge

Orthopedic ward

The influence of skill and knowledge on outcome variables is recognized and considered important. The skills and knowledge of the nurse vary at this ward, some nurse's work for more than 30 years at the ward. Not only training but also experiences improves recognition of clinical deterioration and is considered especially important at a surgical ward. At a TNW nurses are inexperienced in working with the new patient group. At a TNW lack of these skill and knowledge are expected to negatively influence all outcome variables.

Surgery ward
Skills and knowledge and their influence on outcome are recognized by the manager and are considered to be very important. Skill and knowledge vary at this ward, some nurse work for almost 20 years at the ward some nurses for only a year. Lack of nursing care routine and ward routine is a threat to outcome variables. Lack of knowledge of medication admittance is expected to increase medication errors and adverse events. Experience at the ward improves recognition of clinical deterioration, yet recently graduated nurses might have other knowledge present. It takes up to thee year to become experienced at a surgery ward.
Expected consequences

- At a TNW lack of skills and knowledge of all patient groups is expected to negatively influence all outcome variables.

B. Nurse work environment variables and their expected consequences at a TNW

This paragraph describes the expected consequences of a TNW regarding the nurse work environment variables.

1. Support and recognition

Orthopedic ward
The influence of support and recognition on outcome variables is recognized by the manager. Recognition by the hospital board was valued when the orthopedic ward perceiving highest score on patient satisfaction in the Isala. When a TNW is developed no change in support is expected that might influence outcome variables.
Surgery ward
Support and recognition is only experienced from direct management. This is not expected to improve when a TNW is developed but it is affecting nurse satisfaction and organizational commitment. No solutions are suggested by the stakeholders.
Expected consequences

- At a TNW there are no consequences expected.

2. Working with clinical competent colleagues

Orthopedic ward
The influence of working with clinical competent colleagues is recognized and considered important. At a TNW it's expected that nurses become less competent which will decrease patient and nurse satisfaction.
Surgery ward
Working with clinical competent colleagues is considered important. At a TNW, nurses who are inexperienced with a patient group might rely too much on experiences nurses. This is expected to decrease nurse satisfaction.
Expected consequences

- At a TNW nurses are not clinical competent when caring for an unfamiliar patient group and this is expected to decrease patient and nurse satisfaction.

3. Autonomy

Orthopedic ward
Autonomy is considered to be important. A TNW is not expected to have consequences for nurse autonomy.
Surgery ward
The manager recognizes the role of autonomy and considers it to be important. A TNW is expected to have a negative influence on autonomy. Nurses are facing unknown patient groups and this might undermine their feeling of autonomy.
Expected consequences

- At a TNW nurses caring for unfamiliar patient groups might reduce nurse feeling of autonomy. This is expected to have a negative influence on patient satisfaction, nurse satisfaction and indirect the nurse sensitive outcome

4. Professional development

Orthopedic ward
The influence of professional development on outcome is recognized and important for nurses. Working at a TNW with multiple patient groups can be considered a professional development but only as the nurses' desire for training is sufficient. This is described above at certification.

Surgery ward

The manager recognizes the influence of professional development opportunities on nurse satisfaction. At the ward the turnover of HBO nurse is high because of the limited development positions at the wards. A TNW might provide more positions that are desired by HBO nurses and improve nurse satisfaction.

Expected consequences

- A TNW may provide development possibilities. This is expected to improve nurse satisfaction.

5. NURSE-PHYSICIAN RELATIONSHIP

Orthopedic ward

Nurse-physician relationship and its influence on outcome is recognized and considered important. A TNW is expected to have consequences for nurse satisfaction. The trust and cooperation needs time to develop.

Surgery ward

Nurse-physician relationship is considered important and could be improved at this ward. When a TNW is developed this relationship might become a threat to outcome, nurse autonomy and nurse satisfaction. New relations and trust have to be developed and this is expected to take some time.

Expected consequences

- At a TNW new nurse-physician relations have to be developed. This is expected to decrease nurse sensitive outcomes, autonomy and nurse satisfaction.

C. OTHER EXPECTED CONSEQUENCES OF A TNW BY ISALA MANAGERS

Other expected consequences of a TNW by the manager of the orthopedic ward:

At a TNW nurse satisfaction is expected to decrease. Internal motivation of nurses to perform their job is considered important. When reorganizing the nursing staff nurse's motivation is expected to decrease and subsequently nurse satisfaction.

3.3.2. SUMMARY INTERVIEW ISALA MANAGERS ORTHOPEDIC AND SURGERY WARD

The managers recognized the influences that input variables have on outcome variables. The managers expect that working with unfamiliar patient groups is going to have a negative influence on all outcome variables. Lack of specific knowledge of the patient groups hinders nurses to provide the current level of nursing care. A TNW is expected to decrease the current nurse sensitive outcomes, patient satisfaction and nurse satisfaction.

3.4 Measures required in order to guarantee nurse sensitive outcomes, patient and nurse satisfaction at a TNW in the Isala

This paragraph describes the measures required in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction in the Isala. The managers of the orthopedic and surgery ward are interviewed.

3.4.1 Interview with Isala managers of the orthopedic and surgery nursing ward

Result respondent selection

The respondents from research question three are selected and interviewed. Managers of the orthopedic and surgery nursing wards are selected because their wards are supposed to be combined in a proposed TNW.

Result interview Isala managers

Due to absence of a nurse staffing strategy, or description of desired level of care, the measures described are based on the experiences and the goals of the managers. When managers want to increase education or knowledge, they use their experience and goal to determine the extent of the increase. A hospital wide vision on nursing care and nurse staffing strategy is required to place the measures in perspective according to the managers.

A. Nurse variables and their expected consequences at a TNW

This paragraph describes the expected consequences of a TNW regarding the nurse variables.
By using the developed model, for every nurse variables and nurse work environment variable required measures are described in order to guarantee current outcome.

- The expected results of these measures are rated on a 5point scale - -/-/n/+/++.
  a considerable negative influence - - , moderate negative influence - , no influence (N), moderate positive influence (+) considerable positive (++) influence.
- The expected feasibility of the measures is rated on 5point scale - -/-/n/+/++.
  Considerably unfeasible (- -) low feasibility (-), neutral (N), moderate feasible (+) or considerable feasible (++).
- The time the measure is expect to take is rated on a 3point scale 0 / + / ++.
  No extra time (0), small amount time (+), considerable amount of time (++)
- The expected cost of the measures are rated on a 3 point scale - - / - / 0.
  Considerable amount of costs >€500/nurse (- -), moderate amount of cost <500€/nurse (-) or no cost (0).

A. Nurse variables and required measures

This paragraph describes the required measures regarding the nurse variables in order to guarantee or improve outcome variables.

1. Education

Measures considered required by the manager orthopedic ward

-

Measures considered required by the manager surgery ward

The proportion of MBO nurses and HBO nurses is 83%MBO-17%HBO yet 20%MBO-80%HBO is currently desired to improve outcome variables. When TNW is developed this proportion should become the standard. Educating MBO nurses to become HBO nurses can be an option but is not expected to be feasible because it takes a considerate amount of time and money. Hiring more HBO nurses is an option but HBO nurse prefer development positions which are currently limited at the ward which makes hiring HBO nurses less feasible.
At a TNW development options are expected to become available and hiring HBO nurses might be an effective measure to improve all outcome variables. Hiring HBO nurses is expected to be less feasible, it is expected to take small amount of time and a moderate amount of costs.

Measure and the expected result, feasibility, time and costs

- Facilitate MBO-nurse to become HBO-nurses: nurse sensitive outcome +; feasibility -; time+; cost -
- Hire more HBO-nurses, improve all outcome variables, feasibility+-, time--, cost -

2. Certification

Measures considered required by the manager orthopedic ward

When the Isala is developing a TNW, all nurses should be mandated to be trained in all patients groups: trauma, gastroenterology, plastic and general surgery. The expected results are a considerable improvement of the nurse sensitive outcomes, an average improvement of patient satisfaction and a considerable improvement for nurse satisfaction. The Isala academy is developing nurse trainings specified for these patient groups. Feasibility and duration for training nurses in all these patients groups is expected to be average and the costs are expected to be considerable with an expected € 150per nurse per training.

Measure considered required by the manager surgery ward

When developing a TNW, all nurses needs to be trained in all patients groups: surgery, orthopedic, trauma, gastroenterology and vascular surgery. Training the nurses expected to be feasible and requires average investments of time and money. The Isala academy develops training for nurses focused on these patient groups and these trainings are expected to be €150 per nurse per training. The expected results are a considerable improvement for the nurse sensitive outcomes, patient satisfaction and nurse satisfaction.

- Certify all nurses for all patient groups: nurse sensitive outcomes +; patient satisfaction +; nurse satisfaction++; feasibility +; time+; cost €150,-/nurse/training

3. Skill and knowledge

Measure considered required by the manager orthopedic ward

At a TNW nurses need to be trained in all patients groups and must also become experienced in working with the patient group. The expected results are an average improvement of the nurse sensitive outcomes and patient satisfaction and a considerable improvement for nurse satisfaction.

Measure considered required by the manager surgery ward

At a TNW, next to being trained in all patients groups, nurses must become experienced with all the patient groups. This is expected to influence all outcome variables considerably. The results and feasibility are expected to be considerable and a small amount of time and cost.

Hire experiences nurses or couple experienced nurses with less experienced nurses to improve outcome variables. Hiring nurses is less feasible than coupling nurses. But coupling nurses may decrease nurse satisfaction of the experienced nurse.

- Increase nurses' experiences new patient groups: nurse sensitive outcome ++; patient satisfaction ++; nurse satisfaction++; feasibility+ +; time+; cost-
- Hire experienced nurses: : nurse sensitive outcomes ++; patient satisfaction ++; nurse satisfaction++; feasibility -; time++; cost0
- Couple experienced nurses with less experienced nurses: nurse sensitive outcome ++; patient satisfaction ++; nurse satisfaction++; feasibility ++; time0; cost0

B. Nurse work environment variables and required measures

This paragraph describes the required measures regarding the nurse work environment variables in order to guarantee or improve outcome variables.

1. Support and recognition

Measure considered required by the manager orthopedic ward

Nurses have to be informed and involved in development of a TNW. Nurses can contribute by explaining the needs of patient groups and measures to guarantee current outcome.

Measure considered required by the manager surgery ward

Involve nurses in the development of a TNW but first acknowledge the role of nurses in the hospitals vision of providing the best quality of care.

- Inform nurses: nurse sensitive outcome ++; patient satisfaction ++; nurse satisfaction++; feasibility+ +; time+; cost 0
- Involve nurses in the development of a TNW: nurse sensitive outcome ++; patient satisfaction ++; nurse satisfaction++; feasibility+ +; time+; cost0

2. Working with clinical competent colleagues

Measure considered required by the manager orthopedic ward

Possible negative consequences can be prevented by the training as described by the nurse variable certification. This is expected to increase nurse satisfaction considerably. Also clinical training has to be facilitated. Both measures are expected to be feasible, with average investment of time and costs.

Measure considered required by the manager surgery ward

Clinical competence should be secured by facilitating the training as described by the nurse variable certification. Also periodical clinical training has to be facilitated. This is expected to increase nurse satisfaction considerably and this is expected to be feasible, requiring average time and costs when Isala specialist are providing the training. Managers have to secure available knowledge per shift when scheduling nurses.

- Facilitate certification or training: nurse satisfaction++; feasibility ++; time+; cost+
- Facilitate clinical training: nurse satisfaction++; feasibility ++; time n/+; cost 0/+
- Secure knowledge per shift: nurse satisfaction++; feasibility ++; time 0; cost 0

3. Autonomy

Measures considered required by the manager orthopedic ward

-

Measure considered required by the manager surgery ward

Managers should listen to the nurses' needs and facilitate training whenever possible as described before. This is expected to reduce negative influence on nurse, patient satisfaction and indirect all outcome.

- Support the nursing staff, certify is needed: nurse satisfaction++; feasibility ++; time 0; cost 0/-

4. Professional development

Measure considered required by the manager orthopedic ward

Attendance to symposia and master classes should be stimulated and facilitated. This is expected to improve nurse satisfaction and indirectly improve all outcomes. This is expected to be feasible with average investment of time and costs.

Measure considered required by the manager surgery ward

Making an inventory of nurses' personal abilities and needs would be an appropriate start for managers to gain insight in knowledge of the nursing staff. From there on personal development plans can be established. Also attendance to symposia and master classes should be stimulated and facilitated. This is expected to improve nurse satisfaction and indirectly improve all outcomes. This is expected to be feasible with average investment of time and costs.

- Facilitate certification or training: nurse satisfaction++; feasibility ++; time+; cost+
- Facilitate attendance symposia: nurse satisfaction++; feasibility ++; time n/+; cost -

5. Nurse-physician relationship

Measure considered required by the manager orthopedic ward

Managers must be aware of the importance of this relationship and support this relationship by organizing informal or formal contact moments. This is expected to be feasible with a small investment of time and costs.

Measure considered required by the manager surgery ward

Managers must be aware of this process and support this relationship if necessary. This is expected to be feasible and with a small investment of time and costs. Summary of the results are shown in table 17.

- Monitor and support the relationship: nurse sensitive outcomes ++; patient satisfaction ++; nurse satisfaction++; feasibility++; time+; cost0

Required measures concerning other variables

Nurses hired through an agency, such as the I-flex nurses, are considered a huge threat to all outcomes by the ward managers and therefore a high priority problem. Agency nurses are considered to be a clinical incompetent colleague, lack of knowledge and experience of the patient group and ward routine decrease outcome, patient satisfaction nurse satisfaction. The following measures are considered high priority independently of the development of a TNW:

- Train and divide internal and external agency nurses in surgery and non-surgery groups.
- Include at least one month experience on a surgical ward before employed

Results: nurse sensitive outcomes ++; patient satisfaction ++; nurse satisfaction++; feasibility++; time++; cost --

C. Comment Isala managers on measures taken by TWN practices

The comments of Isala managers on the measures taken by the TNW practices in order to guarantee or improve outcome are described.

Measure 1. Increasing nurses' level of education. More HBO-nurses.

According to the manager of the surgery ward this measure is required not only at a TNW but on every ward in order to improve outcome variables.

Measure 2. Increasing the number of nurses' certification. Partial, half of whole nursing staff.

Certifying all nurses is considered necessary on a ward with diverse patient groups who need specific care. This is expected to positively influence all outcome variables. When partially certifying the nursing staff, certified nurses may feel responsible for the patients that are cared for by non-certified staff. This is expected to reduce both patient and nurse satisfaction.

Measure 3. Using difference in skill and knowledge within the nursing team.

Both managers would like to utilize the differences in skills and knowledge within the teams.

Measure 4. Supporting the nursing staff by listening to nurses need and facilitate when possible.

During the development and implementation of a TNW the managers consider this to be very important.

Measure 5. Stimulate and facilitate personal development by training or attending symposia.

Currently both managers are stimulating and facilitating personal development and want to increase this.

Comment: Make an inventory of nurses' skills and knowledge and use this to take targeted measures.

Both managers wanted to make this inventory but had no time to do so. They would like to be facilitated to make an inventory and use this to manage the nursing staff at an individual level.

D. Model adjustments

Possible adjustments of the model are described.

Respondents from the TNW practices and Isala recognized all influences of input variables on outcome variables as displayed in the model. They did not mention additional input or outcome variables beside the model. Deventer Ziekenhuis and Antonie van Leeuwenhoek refer to the outcome variable organizational commitment as part of nurse satisfaction. Therefore this variable is not added to the model.

None of the variables from the model are marked as having a few or no influence or outcome variables. Therefore no variables are being removed from the model. The following measures taken by respondent have a moderate or considerable result on outcome and are taken into account in this research.

3.4.2. Summary interview Isala managers Orthopedic and surgery ward

A vision on nursing care and strategy is required to determine the detail and extend of measures that are required to provide a desired level of care. An inventory is required to manage the nursing staff at an individual level.

Based on the current situation the required measures are increasing nurses' level of education, certification skills and knowledge in order to secure nurses' skills and knowledge of all patient groups. The required measures are based on the experiences and the goals of the managers. The following measures are required when combining the current Orthopedic and surgery wards into a TNW:

- Increase level of nurses' education, until 20%MBO-80%HBOnurses.
- Increase nurses certification. Certify nurses for all patient groups.
- Increase nurses skills and knowledge. Nurse need to become experienced in working with all patient groups. Facilitate attendance to symposia or clinical training.
- Increase education, certification and skills and knowledge of all agency nurses (including I-flex nurses).

All measures are expected to have a considerable positive influence on the outcome variables. The measures are considered to be feasible and vary in amount of time and costs. An overview is shown in table 17 below.

Variables	Recognition	Expected consequences	Measures	Expected results	Feasibility	Time	Costs
Nurse variables				--/-/N/+/++	--/-/N/+/++	0/+/++	--/-/0
1. Education Orthopedic	Yes MBO- HBO Now 75%-25%	Personal abilities	-				
Surgery	Yes important MBO- HBO Now 83%-17%	Threat to outcome indicators	Goal 20%mbo-80%hbo 1.Facilitate MBO nurse to become HBO nurse 2.Hiring more HBO nurses	Increase NSO +	1.- 2.+	1.++	1. -- 2.-
2. Certification Orthopedic	Yes important knowledge of patient groups all nurse had orthopedic training	Threat to all outcome indicators: Lack of specific knowledge reduces recognizing clinical deterioration	Mandatory for all nurses 1.Surgery 2.Trauma surgery 3 Gastroenterology 4 Plastic surgery	NSO + patient satisfaction + nurse satisfaction ++	1.+ 2.+ 3.+ 4.+	1.+ 2.+ 3.+ 4.+	€150/t/p €150/t/p €150/t/p €150/t/p
Surgery	Yes important knowledge of patient groups important all nurse on this ward had surgery training	Threat to all outcome indicators: Lack of specific knowledge and lack of recognition of critical signs increases adverse event, failure to rescue, mortality	Facilitate all nurses -Surgery -Gastroenterology -Orthopedic -Trauma surgery -(if necessary vascular certification also)	NSO ++ patient satisfaction ++ nurse satisfaction ++	1.+ 2.+ 3.+ 4.+ 5.+	1.+ 2.+ 3.+ 4.+ 5.+	€150/t/p €150/t/p €150/t/p €150/t/p €150/t/p €150/t/p -
3. Skills and knowledge Orthopedic	Variation 1 year to 35 yrs.	Less experiences might threaten outcome by lack of recognizing clinical deterioration	1.Working with all patient groups	NSO ++ patient satisfaction ++ nurse satisfaction ++	1.++	1.+	1.+
Surgery	Variation 1 year to 25 yrs. 3 years working on the ward nurses are considered experienced	Less general experiences might threaten outcome by lack of routine, but recently finishing the study might can also be advantage	1.Working with all patient groups 2. Couple inexperienced with experienced nurses. 3.Hiring experienced nurses	NSO ++ patient satisfaction ++ nurse satisfaction ++	1.++ 2.++ 3.-	1.+ 2.0 3.++	1.- 2.0 3.0
Other Orthopedic	I-flex nurses is already a threat to all outcome	Threat to all outcomes. Lack of knowledge and experience of patient group and ward decrease all outcome	1. Train and divide I-flex nurses in groups. 2.Gain experience on a ward before employed	NSO ++ patient satisfaction ++ nurse satisfaction ++	1.+ 2.++	1.++ 2.++	1.- - 2. - -
Surgery	I-flex nurses is already a threat to all outcome	Threat to all outcomes. Lack of knowledge and experience of patient group and ward decrease quality of care, patient satisfaction and NSO I-flex is not a clinical competent colleague	1. Train and divide I-flex nurses in surgery and non-surgery groups. 2.Include at least one month experience on a surgical ward before employed	NSO ++ patient satisfaction ++ nurse satisfaction ++	1.- 2.-	1.++ 2.++	1.- - 2.- -
Variables	**Recognition**	**Expected consequences**	**Measures**	**Expected results**	**Feasibility**	**Time**	**Costs**
Nurse work environment variables				--/-/N/+/++	--/-/N/+/++	0/+/++	--/-/0
1. Recognition and support Orthopedic	Yes Important	-					
Surgery	Yes Important Support from OL and RvE only not higher levels organization	No increase in organizational commitment or nurse satisfaction		Nurse satisfaction -			
2. Working with clinical competent colleagues Orthopedic	Yes Important	Pressure on nurses with experience with a patient group from nurses without experiences	1.Facilitate specialization 2.Offer clinical training 3.Working with experienced nurses	Trust in colleagues improves nurse satisfaction ++	1.See certification 2.++ 3.++	2.N 3.+	2.- 3.0
Surgery	Yes Important	Pressure on nurses with experience with a patient group from nurses without experiences	1.Facilitate additional training 2.peridocally clinical training 3.Ensure distribution of expertise when scheduling nurses at ward	Trust in colleagues improves nurse satisfaction ++	1..See certification 2.++ 3.++	2.N 3.0	2.- 3.0
3. Autonomy Orthopedic	Yes						
Surgery	Yes important	Working with unfamiliar patients groups reduces feeling of autonomy	1.Support and facilitate autonomy by listening and act on needs	Nurse satisfaction ++ Therefore NSO ++ patient satisfaction +	1.See certification		
4. Professional develop-ment opportuni-ties Orthopedic	Important	Need for additional training	1 Offer training 2 Symposia etcetera	nurse satisfaction ++ indirect NSO +	1.See certification 2. ++	2.0/+	2.-

Surgery	Important	Need for more additional training	1. Facilitating training need 2. Symposia etcetera	nurse satisfaction ++ indirect NSO +	1. See certification 2. ++	2.0	2.-
5. Nurse physician relations Orthopedic	Yes, Important	New relations / trust have to be developed	Managers must observe and act if needed	Nurse satisfaction N All NSO N patient satisfaction N	+	++	0
Surgery	Yes, Important Room for improvement	Thread to outcome/ nurse autonomy / satisfaction New relations / trust have to be developed	unknown	Nurse satisfaction ++ All NSO ++ patient satisfaction ++			
Other	Motivation of nurses is important	Might become unclear at a TNW	Listen to nurse and keep motivated	NS +	+	0	0
Other comment			**Measures**				
Orthopedic	Involve nurses in development TNW	Organizational commitment Nurse satisfaction	1. Inform nurses , be transparent 2. Ask nurses opinion, needs and solutions 3. Not too fast / too much	Nurse satisfaction ++ Therefore NSO ++ patient satisfaction +	1.+ 2.+ 3.+	0 0 0	0 0 0
Surgery	How do the nurses fit in the hospital mission and vision	Organizational commitment	As a group and individual	Nurse satisfaction ++ Therefore NSO ++ patient satisfaction +			
Surgery	Involve nurses in development TNW	Organizational commitment Nurse satisfaction	Ask for expected concerns, or flaws, how to secure excellent nursing care	Nurse satisfaction ++ Therefore NSO ++ patient satisfaction +			

Table 17. Overview of result interview with managers of the orthopedic and surgery wards.

4. Conclusion and Recommendations

This chapter describes the conclusion, recommendations and implications for further research.

Research question 1

Which nurse variables and nurse work environment variables influence nurse sensitive outcomes, patient and nurse satisfaction?

The results of the systematic literature search which is confirmed by TNW practices and Isala managers, reveal that the nurse variables (i.e. education, certification, skills and knowledge) and the nurse work environment variables (i.e. support & recognition, working with clinical competent colleagues, autonomy, professional development and nurse-physician relationships) influence one or more nurse sensitive outcomes, patient satisfaction and nurse satisfaction. The influence of each input variable on outcome variable(s) is displayed in table 14, page 27.

Research question 2

Which measures are taken by hospitals with a TNW in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction?

Measures taken by the TNW practices regarding nurse variables are:

1. Increasing nurses' level of education. Increase the proportion of HBO-nurses.
2. Increasing the number of nurses' certification. For part, half or whole nursing staff.
3. Using difference in skill and knowledge within the nursing team. Senior and 'kernteam' / 'schil' nurse.

These measures improve outcome, patients and nurse satisfaction of the TNW practices.

Measures taken by the TNW practices regarding nurse work environment variables are:

4. Supporting the nursing staff by listening to nurses' need and facilitate whenever possible.
5. Stimulate and facilitate personal development by facilitating training or attending symposia.

These measures improve nurse satisfaction and are considered to subsequently improve the nurse sensitive outcomes and patient satisfaction of the TNW practices.

The measures taken by the TNW practices are inextricably linked to the mission statement and vision of the hospital and specified for nursing care and the nursing staff, translated to a nurse staffing strategy. The respondents recommend making an inventory of the nurses' education, certification, skills and knowledge. Next the nursing staff can be managed at an individual level. Measures taken by the TNW practices and their results are summarized in table 16 page 33.

Research question 3

Which consequences is a TNW expected to have on current nurse sensitive outcomes, patient and nurse satisfaction in the Isala?

A TNW is expected to decrease the current nurse sensitive outcomes, to decrease patient satisfaction and decrease nurse satisfaction. Lack of specific knowledge of the patient groups hinders nurses to provide the current level of nursing care. An overview of expected consequences of a TNW on outcome variables is summarized in table 17 page 41.

Research question 4

Which measures are required in order to guarantee or improve nurse sensitive outcomes, patient and nurse satisfaction at a TNW in the Isala?

Managers use their own experience and goals to staff nurses at the ward. The hospital does not have a mission statement and vision on nursing care and the nursing staff. There is no nurse staffing strategy at the tactical level that for instance describes the desired level of nursing care. Also an inventory of available skills and knowledge of the nursing staff is not available. Therefore the detail and the extent of the measures that are required to employ the current nursing staff on a TNW cannot be determined.

Based on the current situation the required measures are increasing nurses' level of education, certification skills and knowledge in order to secure nurses' skills and knowledge of all patient groups. This is expected to improve nurse sensitive outcomes, patient and nurse satisfaction. These measures are considered to be feasible and vary in amount of time and costs. An overview can be found in paragraph 3.4.2, page 40 and table 17, page 41.

RECOMMENDATIONS

According to the mission statement and vision, the Isala Klinieken wants to provide compassionate and safe care, wants to lead the way with continuously improving quality of care and innovations and be leading in training the health care professionals of the future (Isala, 2013). This research offers the Isala Klinieken a guide to pursue this mission while developing a TNW.
A thematic nursing ward increases flexible bed use in the Isala Klinieken and therefore reduces cost. However it is requiring flexible use of staff. To staff nurses more flexible and guaranteeing current outcome, the current knowledge and skills of nurses have to be increased. The exact measures and to what extend the knowledge and skills of nurse needs to be increased depends on the exact care need of the patients and the available skills and knowledge of the nurses. The measures also depend on the nurse staffing strategy of the nursing wards. To determine the detailed measures the following recommendations are made.

1. HOSPITAL VISION ON NURSING CARE

Develop a vision on nursing care which describes the role of nurses in the organization and their contribution to the mission, vision and core values of the Isala Klinieken. According to the framework of hospital planning and control from (Hans, 2011) figure 1, this vision has to be translated from the strategic level to the tactical level into skill management. Skill management is a method of managing the workforce most optimal, by optimize patient outcomes while ensuring the most effective, flexible and cost-effective use of human resources (Dubois, 2009). For the offline operational level a nurse staffing strategy has to be developed in collaboration with all involved stakeholders. The different strategies used at TNW practices can serve as an incentive to translate skill management to ward level.

2. DETERMINE THE CARE NEED

Every proposed TNW should determine which patient groups are going be treated by the nursing staff. The patient groups and their specific care needs have to be determined. Besides focusing on meeting the clinical needs of their patients, hospitals seek to prevent errors and avoid inaccuracies that negatively impact the safety and quality of care. However, patients also have specific characteristics and nonclinical needs that can affect the way they view, receive, and participate in health care (Joint Commission, 2010). Nurses' experiences should be used to determine the exact care need of the different patient groups. The result is a detailed overview of the patients care needs.

3. INVENTORY OF NURSES KNOWLEDGE AND SKILLS

An inventory is required to gain insight in the personal knowledge and skills of all nurses (also for agency nurses). List all education, certification, skills and knowledge (knowledge can be measured by online testing) of the nurses. The result is a list of knowledge and skills of all individual nurses.

4. COMPARE PATIENTS CARE NEED AND AVAILABLE NURSING KNOWLEDGE AND SKILLS

Compare the patients care need with the available nursing knowledge and skills. For every ward can be determined whether the available nurse knowledge and skills is sufficient to provide the desired level of patient care. The desired level of care depends on the developed vision on nursing care and nurse staffing strategy.

5. DETERMINE MEASURES REQUIRED TO PROVIDE THE DESIRED LEVEL OF CARE

Determine which measures are required to secure that the available nursing skills and knowledge is satisfying the patients care need. The exact measures to secure nurses' knowledge and skills are based on the previous recommendations. Measures can be taken for every nurse variables and nurse work environment variables.

6. INTEGRATE THE MODEL IN THE HOSPITALS' QUALITY SYSTEM

The developed model has to be included in the hospitals quality systems. The model can be used to gain insight in the nursing care process at the nursing wards and can be used to improve current outcome at all nursing wards and not only for TNW's. How the model has to be applied is explained in appendix 9 page 62.

IMPLICATIONS FOR FURTHER RESEARCH

Implications for further research are:

1. Further research is required to determine the role of nurses and nursing care in health care. In case of the enormous rise of health care costs the role of nurses and nursing care has to be investigated. For instance the role of nurses in reducing costs by preventing or reducing adverse events, reducing length of stay.
2. In order to maximize the outcome of the nursing care process further research is necessary to determine the exact influence of in all possible input variables on all possible outcome variables. Including the variables that are excluded from this research.
3. Further research is required to collect data about measures taken in order to improve outcome variables. Measures that are taken at single specialty wards and also on thematic nursing wards. The exact influence of these measures on the outcome variables and the results of these measures have to be determined. Valid and reliable baseline measurements have to be developed. Detailed descriptions of the measures taken have to be collected and valid and reliable post tests have to be performed.
4. To determine the effect of measures that are taken a cost benefit analysis is required. Hospitals can use this analysis to decide which measures can be taken to maximize the outcome nursing care process.
5. Research is necessary to determine most effective differentiation of MBO and HBO nurses in health care organizations in the Netherlands. The two different levels of nurses are generally ineffectively utilized. The differentiations of the MBO and HBO nurses and their effective employment have to be determined and utilized by health care organizations.

5. DISCUSSION

This chapter describes the relevance and limitations of this research.

SCIENTIFIC RELEVANCE

1. The scientific relevance of this research is based on the development of a model that displays the influence input variables have on outcome variables. Previous research was limited by describing one or to input variables and their influence on one or two outcome variable. The developed model offers a unique overview of input variables and their influence on outcome variables which has not been seen before.
2. There is limited research available about TNW's and increasing the flexibility of the nursing staff and the consequences it may have on outcome. This research adds information that can be used in the discussion of flexible use of the nursing staff.

SOCIAL RELEVANCE

1. The results of this research can be useful for operation management in hospitals that want to increase the flexibility of bed use and nursing staff and are interested in developing TNW's.
2. This research provides a whole new approach to improve quality, safety patient and nurse satisfaction.
3. The model can be applied at every nursing ward. In times of reducing costs, increasing attention of patient safety, patient satisfaction and overall outcome this research can guide hospitals to take a closer look at nursing ward. The model can be used to improve outcome by influencing on or more variables. The model can be used to perform a baseline measurement, implement targeted measures in the continuous improvement strategy of a hospital.

LIMITATIONS

In this research several methods of data gathering are used, the limitations will be described.

1. Selected resources for the literature search are the online data bases PubMed (Medline) and Web of Science. Other online data bases were excluded in order to restrict the amount of literature. PubMed and Web of Sciences are covering a large amount of literature. It is not expected that using more online databases would provide other outcome of the literature search.
2. The literature search is performed by using key words and mesh terms. Key words from the search strategy can differ from the actual words used in the article. Also mesh terms are limited and can unintentionally result in an incomplete search result. Articles in PubMed are being indexed before becoming available in PubMed, during this indexing articles do not show up in searches, while they can be available in other databases. Selection bias might be a threat to internal validity (Babbie, 2010), (Shadish, 2002) but this is reduced by using two different databases and by using both key words and mesh terms. There was a lot of overlay in search results of both databases therefor it is not expected that using other search strategies would result in other results of the literature search.
3. Eleven TNW practices were approached and five were included in this research. Using five respondents for validating a model can be considered a few and could limit the external validity. However, both the recognition of the model and the measures taken by the six excluded respondents correspond with the recognition and the measures taken by the included respondents. Also the managers of the Orthopedic and Surgery nursing ward recognize the influences displayed in the model. It is not expected that including more TNW practices would influence the result of the validation.
4. The interview with the TNW practices is semi-structured and a topic list is used, allowing respondents to explain their experiences with the TNW. Respondents may have given other information when answering a question instead of talking freely. During the interviews all topics on list were addressed and summarized. It is not expected that a structured interview would have led to a different result.
5. The influence of measures taken by TNW practices on nurse sensitive outcomes could not always be supported by data. Due to absence of baseline measurement a pre-post comparison could not be made. Also the method of data collecting changed so pre-post data could not be compared. One TNW practice has always been a TNW which made pre-post comparison impossible. The nurse managers were working at the ward before it became a TNW. Although not all nurse sensitive outcomes could be supported with data, the due to the experience of the nurse managers at the TNW it is expected they could provide reliable answers.
6. The goal of the interview with the nurse managers in the Isala Klinieken is to determine possible consequences and measures when a TNW is established. Expectations are based on judgment and experiences of the stakeholders. Their opinions of the proposal of a new TNW can be considered a novelty and disruption effect, which can become a threat to construct validity (Shadish, 2002). Yet the recognition of the influence of input variables on outcome variables and the required measures are similar as from the TNW practices and therefore not expected to be a threat to construct validity.

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APPENDICES

APPENDIX 1

KEY WORDS AND MESH TERMS PER DATABASE FIRST LITERATURE SEARCH

Search 1 Input Nurse variables		
Key words	**Web of Science (and PubMed)**	**MesH terms in PubMed**
Nurse or Nursing	(nurse OR nursing) AND	"Nursing"[Mesh] OR "Nurses"[Mesh]
Education	(education) AND	"Education"[Mesh] OR "Education, Nursing, Graduate"[Mesh]
Certification	(certification) AND	"Certification"[Mesh]
Skills & knowledge	(skill OR knowledge) AND	"Clinical Competence"[Mesh]
Search 1a Nurse variables and Outcome Quality and safety		
Quality	quality	"Quality of Health Care"[Mesh])
Safety	Safety	"Patient Safety"[Mesh])
Pressure ulcer	pressure ulcer	"Pressure Ulcer"[Mesh]
Falls	Falls	"Accidental Falls"[Mesh]
Critical incidents	Critical AND incidents	"Hospital Mortality"[Mesh])
Failure to rescue	Mortality	"Hospital Mortality"[Mesh])
Medication Error	Medication AND error	"Medication Errors"[Mesh]
Nosocomial infections	Nosocomial AND infection	"Cross Infection"[Mesh]
Search 1b Nurse variables and Outcome Patient satisfaction		
Patient satisfaction	(patient AND satisfaction)	"Patient Satisfaction"[Mesh])
Search 1c Nurse variables and Outcome nurse satisfaction		
Nurse satisfaction	(nurse AND satisfaction)	"Personal Satisfaction"[Mesh] OR "Job Satisfaction"[Mesh])

APPENDIX 2

SEARCH STRATEGY PER DATABASE FIRST LITERATURE SEARCH

Searches	Search string
Search 1a Web of Science	(nurse OR nursing) AND education AND (additional OR training OR certifcat*) AND (ulcer OR fall OR medication AND error OR nosocomial OR infections OR mortality OR (failure AND rescue)) AND PUBYEAR > 1999 AND (LIMIT-TO(LANGUAGE, "English")
Search 1a Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Education"[Mesh] OR "Education, Nursing, Graduate"[Mesh]) AND ("Clinical Competence"[Mesh] OR "Certification"[Mesh]) AND ("Pressure Ulcer"[Mesh] OR "Accidental Falls"[Mesh] OR "Medication Errors"[Mesh] OR "Cross Infection"[Mesh] OR "Hospital Mortality"[Mesh]) AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])
Search 1b Web of Science	(nurse OR nursing) AND education AND (additional OR training OR certifcat*) AND (patient AND satisfaction)) AND PUBYEAR > 1999 AND (LIMIT-TO(LANGUAGE, "English")
Search 1b Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Education"[Mesh] OR "Education, Nursing, Graduate"[Mesh]) AND ("Clinical Competence"[Mesh] OR "Certification"[Mesh]) AND "Patient Satisfaction"[Mesh] AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])
Search 1c Web of Science	(nurse OR nursing) AND education AND (additional OR training OR certifcat*) AND (nurse AND satisfaction)) AND PUBYEAR > 1999 AND (LIMIT-TO(LANGUAGE, "English")
Search 1c Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Education"[Mesh] OR "Education, Nursing, Graduate"[Mesh]) AND ("Clinical Competence"[Mesh] OR "Certification"[Mesh]) AND "Job Satisfaction"[Mesh] AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])

APPENDIX 3

KEY WORDS AND MESH TERMS PER DATABASE SECOND LITERATURE SEARCH

Search 2a		
Key words	Web of Science and Pubmed	MesH terms in Pubmed
Nurse or Nursing	(nurse OR nursing)	"Nursing"[Mesh] OR "Nurses"[Mesh])
Work or practice environment	(work OR practice) AND environment	"Workplace/organization and administration"[Mesh] OR "Workplace/standards"[Mesh])
This refers to the variables:		
Recognition and support	Support	No mesh terms
Working with clinical competent colleagues	Competent AND colleagues	No mesh terms
Autonomy	Autonomy	"Professional Autonomy"[Mesh]
Professional development opportunities	Development	"Staff Development"[Mesh]
Nurse physician relations	Nurse-physician	"Physician-Nurse Relations"[Mesh]
Search 1a Nurse work environment and Outcome Quality and safety		
Quality	quality	"Quality of Health Care"[Mesh])
Safety	Safety	"Patient Safety"[Mesh])
Pressure ulcer	ulcer	"Pressure Ulcer"[Mesh]
Falls	Falls	"Accidental Falls"[Mesh]
Critical incidents	Critical AND incidents	"Hospital Mortality"[Mesh])
Failure to rescue	Mortality	"Hospital Mortality"[Mesh])
Medication Error	Medication AND error	"Medication Errors"[Mesh]
Nosocomial infections	Nosocomial AND infection	"Cross Infection"[Mesh]
Search 1b Nurse variables and Outcome Patient satisfaction		
Patient satisfaction	(patient AND satisfaction)	"Patient Satisfaction"[Mesh])
Search 1c Nurse variables and Outcome nurse satisfaction		
Nurse satisfaction	(nurse AND satisfaction)	"Personal Satisfaction"[Mesh] OR "Job Satisfaction"[Mesh])

APPENDIX 4

SEARCH STRATEGY PER DATABASE SECOND LITERATURE SEARCH

Searches	Search string
Search 2a Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Workplace"[Mesh] OR "Professional Autonomy"[Mesh] OR "Staff Development"[Mesh] OR "Physician-Nurse Relations"[Mesh]) AND ("Pressure Ulcer"[Mesh] OR "Accidental Falls"[Mesh] OR "Medication Errors"[Mesh] OR "Cross Infection"[Mesh] OR "Hospital Mortality"[Mesh]) AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])
Search 2b Web of Science	(nurse OR nursing) AND (work OR practice AND environment) AND (patient AND satisfaction)) AND PUBYEAR > 1999 AND (LIMIT-TO(LANGUAGE, "English")
Search 2b Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Workplace"[Mesh] OR "Professional Autonomy"[Mesh] OR "Staff Development"[Mesh] OR "Physician-Nurse Relations"[Mesh]) AND "Patient Satisfaction"[Mesh] AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])
Search 2c Web of Science	(nurse OR nursing) AND (work OR practice AND environment) AND (nurse AND satisfaction)) AND PUBYEAR > 1999 AND (LIMIT-TO(LANGUAGE, "English")
Search 2c Pubmed	("Nurses"[Mesh] OR "Nursing"[Mesh]) AND ("Workplace"[Mesh]) AND ("Professional Autonomy"[Mesh] OR "Staff Development"[Mesh] OR "Physician-Nurse Relations"[Mesh]) AND "Job Satisfaction"[Mesh] AND (("2000/01/01"[PDAT] : "2013/12/31"[PDAT]) AND English[lang])

APPENDIX 5

INTERVIEW WITH TNW PRACTICES RESEARCH QUESTION 1

TOPIC LIST

Model

- Introduction interview
- Development of TNW
- The model describes influences of input variable on outcome variables. Do you recognize each of these influences?
- Are there variables that have only a few or no influence on outcome variables? Which?
- Are there other input variables that influence outcome? Which? How would you considere their influence on outcome?

APPENDIX 6

INTERVIEW WITH TNW PRACTICES RESEARCH QUESTION 2

TOPIC LIST

Measures

- Which measures regarding nurse variables and nurse work environment variables are taken in order to guarantee or improve nurse sensitive outcomes, patient satisfaction and nurse satisfaction?
- What are the results of these measures?
- Do you have comments or advice regarding the measures?

APPENDIX 7

INTERVIEW WITH ISALA MANAGERS OF ORTHOPEDIC WARD AND SURGERY WARD
RESEARCH QUESTION 3

TOPIC LIST

Model

- The model describes influences of input variable on outcome in general. Do you recognize these influences?
- Do you expect that these input variables indeed influence the output when a TNW is implemented? How?
- Do you expect other input variables are going to influence outcome when a TNW is implemented? Which?
- Do you expect other outcome variables that are going be influenced when a TNW is implemented? Which?
- Do you have comments or advice regarding the model?

APPENDIX 8

INTERVIEW WITH ISALA MANAGERS OF ORTHOPEDIC WARD AND SURGERY WARD

RESEARCH QUESTION 4

TOPIC LIST

Measures

- Which measures related to input variables are required in order to maintain or improve outcome
- Can you estimate the results of these measures -- / - / Neutral / + / ++
- Can you estimate the feasibility of these measures -- / - / Neutral / + / ++
- Can you estimate the time these measures require ? non / average / considerable 0 / + / + +
- Can you estimate the cost of these measures? non / average / considerable 0 / - / - -
- TNW practices initiated measures. What is your comment
- Do you have comments/advice?

APPENDIX 9

APPLYING THE MODEL

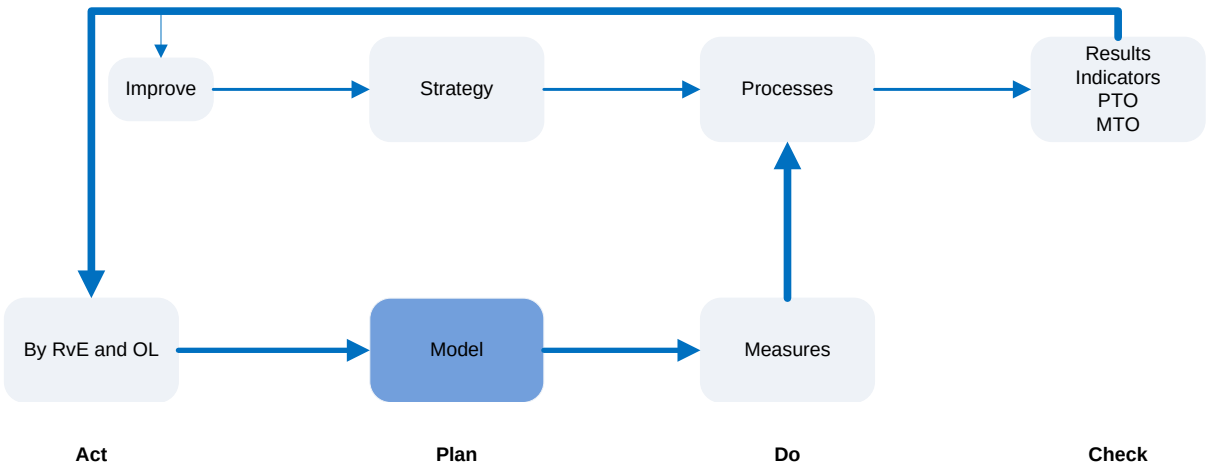
Applying the model in a hospital quality system is described in this appendix.

GOAL

The goal of applying the model is to improve outcome by taking targeted measures. The model gives insight in the influence of input variables on outcome of the nursing care process on the nursing ward. Applying the model is valuable for the entire ward.
Per ward is to be determined which outcome needs improvement, the model provides insight which specific input variable(s) influence the outcome of interest. Next is to decide which measures to take in order to improve outcome. Results are measured and provide input in the continuous improvement circle of quality of care.

REQUIREMENTS

The model can be applied to every nursing ward. Applying the model required access to outcome and also requires the RvE managers and managers of the nursing ward.
The hospital uses the INK model as their quality system and the model can be integrated in the INK model as shown below in figure 3.



APPLYING THE MODEL AT A NURSING WARD CAN BE DONE AS FOLLOWS

1. Collect data from all outcome variables that are mentioned in the model.
2. Determine which outcome variable(s) need(s) to be improved.
3. Check the model to determine which input variable(s) influences the outcome variable(s) of interest.
4. Determine which countermeasure(s) are taken to influence the outcome. Measures from TNW practices can be used for inspiration or a literature search or best practice search.
5. Describe in detail the chosen measure(s), the expected duration and cost.
6. Perform a baseline measurement of all outcome variables.
7. Implement the countermeasures.
8. Monitor the result by periodical testing the outcome variables and compare to the baseline measurement and start again.

Output		Quality safety							Patient satisfaction			Nurse satis-faction		Influence	Reference
Input		1. Pressure ulcer	2. Falls	3. Critical incidents	4. Failure to rescue	5. Medication Error	6. Nosocomial infections	General	1.Nursing care	2. Overall care	3. Information	1. Overall nurse satisfaction	2. Intent to leave		
Nurse variables	1. Education	+			+	+				+	+		-	Higher education, BSN, positively influence patients outcome and safety in general and 1,4,5 Increase in BSN improves satisfaction (10% BSN increase, satisfy increase factor 1.10-1.13) Nurse with BSN better information Nurse with BSN less likely intent to leave	(Estabrooks,2013) (Sales,2008) (Kirwan,2013) (Blegen, 2013) (Kendall, 2011), (Jordan, 2011) (Aiken, 2009), (Clarke,2008), (Friese, 2009), (Estabrooks, 2005) (You, 2013) (Kounenou, 2011) (Fitspatrick, 2010), (Hong, 2012)
	2. Certification	+				+	+					+		Certification, or additional training influences patient safety in general and 1,4,5 Certificated nurses, higher satisfaction than non-certificated	(Hiser, 2006), (Lyons, 2012), (Wilkerson, 2011) (Drankerd, 2010) (Petrova, 2010) (Zulkowski, 2008) (Biancofiori, 2007), (Wedge, 2005) (Schroeter, 2012), (Ritter, 2011)
	3. Skills and knowledge	+	+*		+	+	+							Skill and knowledge influences patient outcome Less experience influences falls	(Lyons, 2012), (Tait, 2010), (Samiwiro, 2010), (Brady, 2009) (Lui,2012)
						+*								Less experience influences medication error	(Fasolini, 2012), (Unver,2012)
					+							+	-	Experiences reduces intent to leave More experiences can reduce mortality	(Li, 2008) (Tourangeau, 2005)
Nurse work environ-ment	1. Recognition and support							G+	+			+	-	Role of manager influences patient satisfaction Recognition influences job satisfaction Support management influence outcome, job satisfaction intent to leave	(Duboi, 2013), (Boev,2012) (Wang, 2012), (Bakker, 2010), (Garon,2009), (Badr, 2010), (Lee, 2008), (Hong, 2012) (Hinno, 2010), (Millisen, 2005)
	2. Working with clinical competent colleagues								+				-	Physician, nurses cooperation trust increase patient satisfaction and reduces intent to leave	(O'Leary,2012), Millisen, 2005), (Hong, 2012)
						+								Team member effectiveness positive related to medication incidence	(Fasolino, 2012), (Kilner, 2011)
	3. Autonomy												-	Autonomy reduces intent to leave	(Papathanassoglou, 2012), (DeCola, 2010), (Bacon, 2009), (Garon, 2009) , (Hong, 2012)
												+	-	Autonomy increases satisfaction	(Heikkinen, 2009), (Millisen, 2005), (Kee, 2005), (Duffield, 2009), (Zurmehly,2008)
	4. Professional development opportunities											+		Development opportunities influence job satisfaction	(Wang, 2012), (Hauk, 2011), (Ritter, 2010), (DiMattio,2010), (Bakker, 2010), (Aiken, 2008) (Zurmehly,2008), (Hallin, 2007)
												+*		Advancement opportunities related to burnout	(Klopper, 2012)
													-	Opportunities for development relate to ITL	(Boumans, 2008)
	5. Nurse physician relations							G+				G+		Better N-PH relation improves patient outcome and staff satisfaction 1pint increase N-PH rel. 2,5 fold increase job satisfaction	(Bogaert, 2009), (Millisen, 2005) (Bacon, 2009), (Garon, 2009), (Kee, 2005) , (Hong, 2012) (Bruyneel, 2009)
					+									Better N-PH relation reduces 30day mort	(Estabrooks, 2011)
						+								Better N-PH relation reduces medication error	(Monoljovic, 2008)
	General			+	+			G+				G+	G	Better work environment associated with staff satisfaction	(Lui, 2012), (Kelly,2011), (Aiken, 2011) (Patrician, 2010) (Aiken, 2011) (Clarke, 2008)
						+		G+	+				+	General work environment improves general safety outcome	(Kirwan, 2013), (Flyn, 2012), (Squires, 2010) (Friese, 2009) (You,2013), (Mark,2003), (Bacon, 2009)
								G+				G+		Work environment variables influence job satisfaction	
					+									The odds patients dying in better environments 14% lower than in poor ones	(Millisen, 2005)(Aiken, 2009)

Model that displays input variables and their influence on outcome variables. The influence is describes and the source. Result literature search and validation. + Increase of the independent variable increases the dependent variable. – Decrease of the independent variable decreases the dependent variable.

G+ means an increase of the nurse variable results in an increase of outcome variables in general. G- means an increase of the nurse variable results in a decrease of outcome variables in general. *literature describes a decrease of the input variable that results in a decrease of the outcome variable.