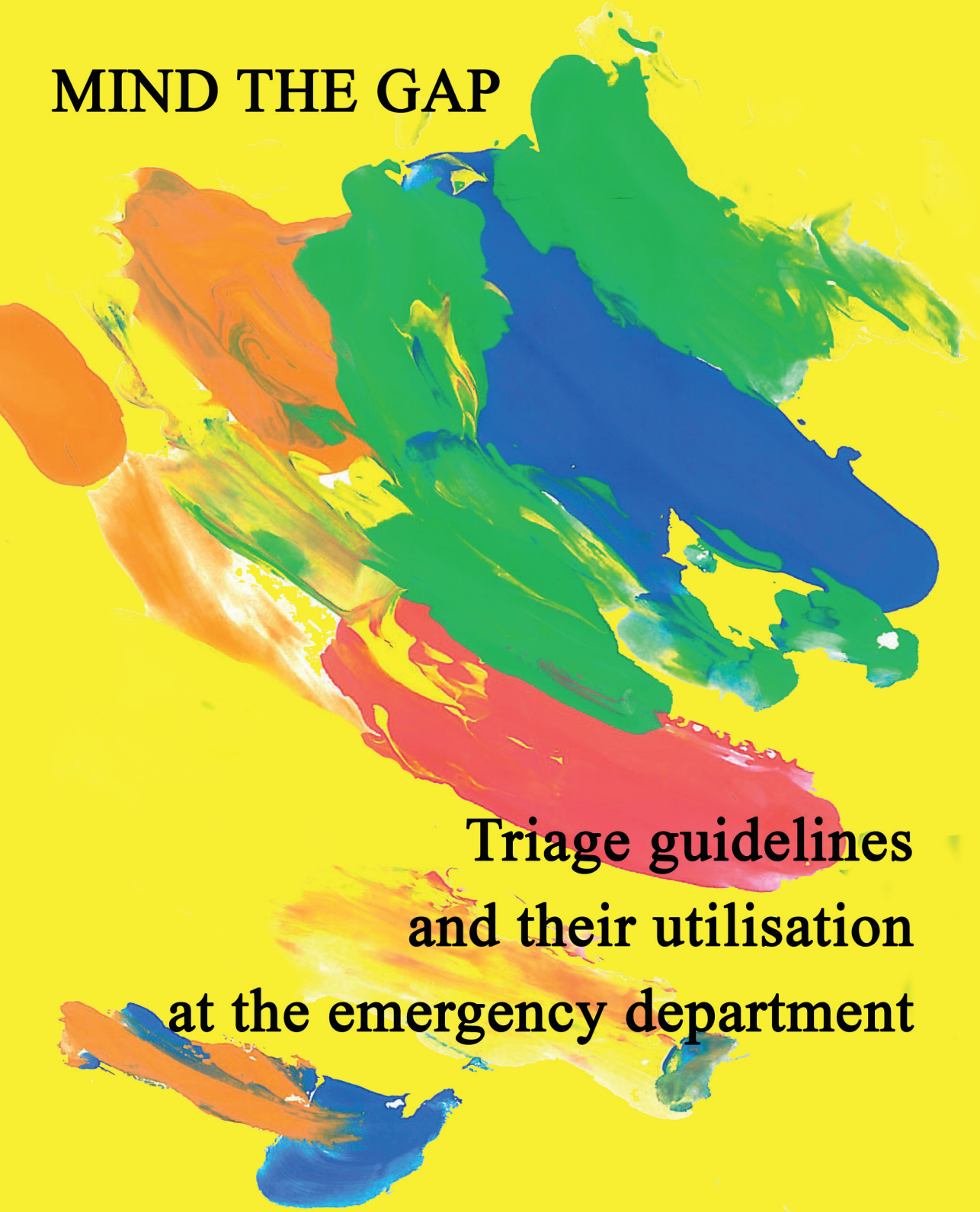
MIND THE GAP



Triage guidelines and their utilisation at the emergency department

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"If you change the way you look at things, the things you look at change"
Wayne W. Dyer

Contents

Introduction

CHAPTER 1

Introduction

In 2004, the Dutch Institute for Healthcare Improvement (CBO) and the Dutch Society of Emergency and Accident Nurses (NVSHV) developed a guideline for systematic triage in emergency departments (EDs).[1-2] In 2008, the guideline had to be revised as appointed in the 2004 guideline. This was the starting point for this thesis, and led to a set of research questions.
This chapter starts with background information on subjects related to this thesis, namely: evidence-based nursing practice and research utilisation, guidelines, triage and implementation. Then the aims, research questions and outline of the thesis will be described.

Evidence-based nursing practice and Research Utilisation
Over the past few decades, nurses were increasingly expected to understand and conduct research, and to base their decisions in practice on the evidence from research. Nurses in different settings increasingly adopt evidence-based practice (EBP).[3] EBP is the conscientious use of the best available evidence in making clinical decisions about patient care.[3-4] EBP encloses five steps, namely: 1) translating a problem into clinical questions that are answerable with research evidence, 2) systematically searching for relevant evidence, 3) appraising and synthesising the evidence, 4) integrating the evidence into practice, and 5) evaluating the effectiveness of interventions.[3] Not only the best available evidence, but clinical expertise, patient preferences and circumstances, as well as awareness of the clinical setting and available resources are important aspects in making the best clinical decision.[3]
Within the literature, the term research utilisation (RU) is also often used. The terms EBP and research utilisation are used synonymously sometimes.[3] RU is defined as 'that process by which specific research-based knowledge (science) is implemented in practice'.[5] The difference between RU and EBP is that RU begins with the research itself, whereas EBP begins with a clinical question.[3]
One way to promote EBP or RU is through the use of guidelines.[6]

Guidelines
A guideline is a set of systematically developed statements, based on scientific evidence, clinical expertise, patients' preferences, and available resources.[7] Guidelines include specific practice recommendations and prescriptions for EBP decision making. They also address all aspects relevant to a clinical decision in which the benefits and risk are taken into account, and they are developed based

on consensus of researchers and experts. Not only literature is a resource incorporated in guidelines, contextual factors are also taken into account.[3]
Guidelines help health care givers and patients to decide what the appropriate health care is for specific clinical circumstances. Furthermore, guidelines support that all health care givers perform health care in the same way. Therefore, guidelines are important tools to improve the uniformity and quality of care.[8]
Although the existence of clinical practice guidelines suggests that health care settings should use them as guidelines that are based on the latest evidence based knowledge, literature points out that this does not occur automatically.[8] Implementation of guidelines is a difficult process which needs specific attention. In this thesis the focus is on a guideline related to triage in emergency departments.

Triage

More and more patients visit hospital emergency departments (EDs), with urgent and non-urgent problems.[1] In the Netherlands, several explanations have been brought up with regard to overcrowding EDs, such as people bypassing the general practitioner (GP) and going straight to the ED and the proportional rise in the ageing population.[1,9] Overcrowded waiting rooms result in people needing care urgently without being treated in time.[10] Prioritising patients according to urgency of need for medical assessment is one possibility to overcome this problem. This is referred to as triage.[9,11-13]
The term triage comes from the French verb 'trier' meaning to separate, sort, shift or select, and was applied to the sorting of military casualties.[14-15] Triage is a process of decision-making to prioritise treatment and needs of patients in ED based on clinical urgency. Triage is defined as the classification of patient acuity that characterises the degree to which the patient's condition is life-threatening and whether immediate treatment is needed to alleviate symptoms.[16] Triage nurses classify patients on the basis of their need for medical attention: patients with the highest medical needs will be treated first. Based on the classification, doctors need to see patients within the given urgency codes (Table 1).[9,17-19]

Triage systems

Worldwide, different triage systems are used. Systems most commonly used are the Australasian Triage Scale (ATS, Australia, New Zealand, Hong Kong and Belgium), the Canadian Emergency Department Triage and Acuity Scale (CTAS, Canada), the Emergency Severity Index, also known as the Boston
System (ESI, United States) and the Manchester Triage System (MTS, United Kingdom).[20-25] All these triage systems include assessment of the patient's most

important complaint, combined with a physical examination, leading to an urgency rating. This rating indicates the length of time a patient can wait safely before being seen by a doctor.[26]

In 2007, Dutch EDs used only the MTS or the ESI.[9] The MTS is a five-level system and developed in 1997 by the Manchester Triage Group.[27] The MTS is an algorithm consisting of 52 flow charts relating to the condition of the patient. The flow charts contain six key discriminators (life threatening, haemorrhage, pain, level of consciousness, temperature and acuteness). The key discriminators in the flow charts indicate the level of urgency.[11] The ESI also is a five-level triage acuity rating system which was developed in 1995 in Boston.[28] The ESI has an algorithm with 4 decision points that directs triage nurses to assign patients into ESI level 1 (most acute) to ESI level 5 (least resource intensive).[16] The ESI is divided in three steps. Step one recognises life-threatening situations and step two high-risk situations. Within step three, nurses determine what resources patients need.[16,28] The MTS and ESI both have a good to excellent inter- and intra-rater reliability and a high validity.[29-34]

Table 1 Triage guideline proposed urgency codes related to target times[9,11]

Urgency code	Target times
Immediate	Directly seen by a doctor
Very urgent	Medical care within 10 minutes
Urgent	Medical care within 60 minutes
Standard	Medical care within 120 minutes
Non-urgent	Medical care within 240 minutes

Triage guideline

In 2004, a Dutch guideline for triage in EDs was developed.[1-2] The triage guideline recommended an update of the guideline within every four years. Therefore, we revised the triage guideline in 2008. For the revision, we included literature on triage till 2007 and took an important development in consideration, the ongoing development of a Dutch triage system (the NTS). The NTS is a triage system specifically designed for a chain of acute health care settings: the emergency medical dispatch, the general practitioners care and the EDs. The NTS can contribute to an unequivocal triage and support the cooperation between the different partners as all partners use in this chain the same triage system.[35] The NTS is a combination of the MTS, the national telephone guidelines and the

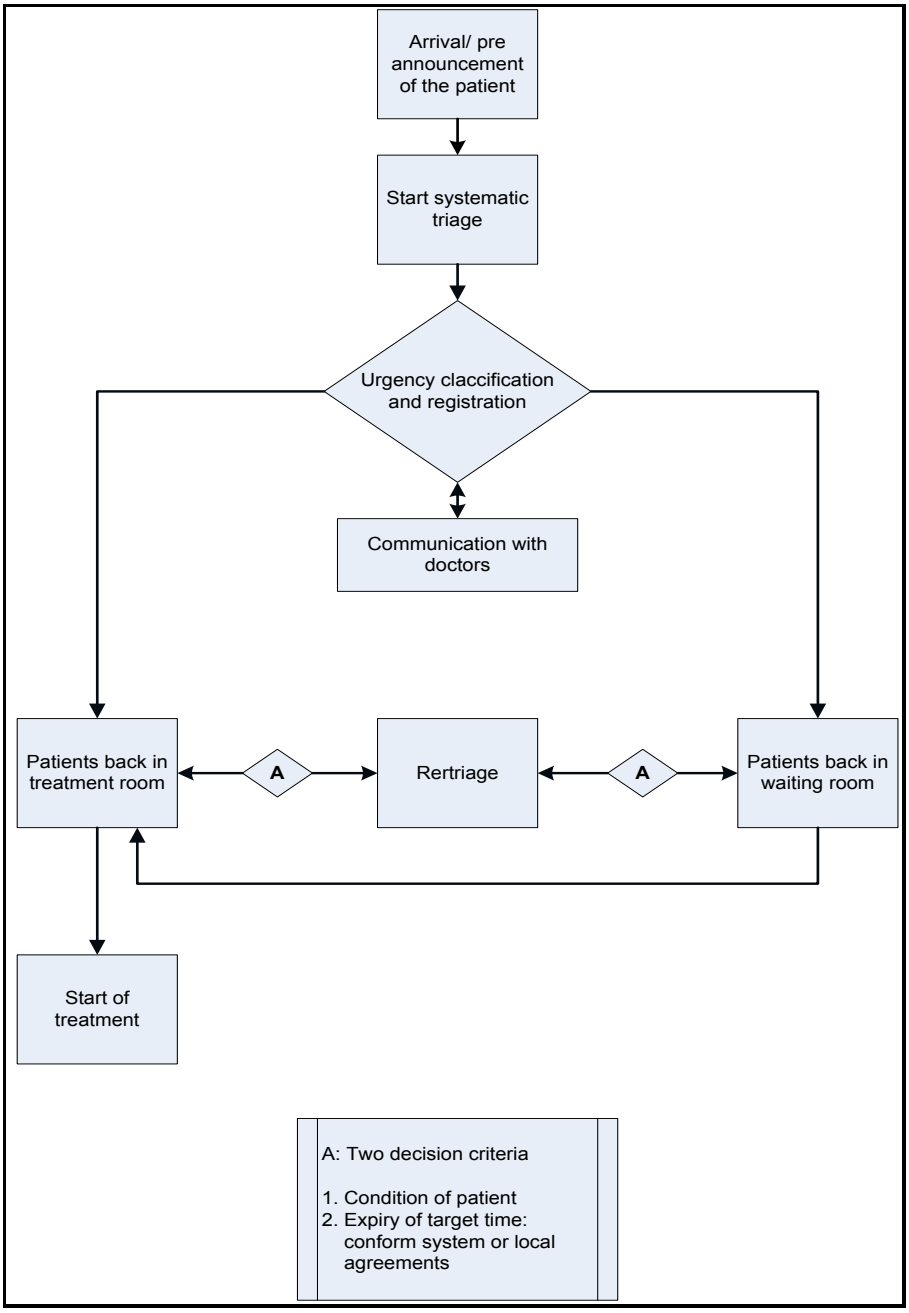
national standard for the emergency medical dispatch. The NTS is a five-level triage system with 56 flow charts. After a pilot in 2008 till 2009, the NTS was tested to be valid and reliable.[35]

The 2004 guideline specifically recommended the use of the MTS, whereas the 2008 guideline recommends any triage system that has a high reliability and validity and is suitable for the Dutch context. This could be the MTS, the ESI, the NTS (as soon as it has been tested to be reliable and valid) or another valid and reliable triage system. Another difference between the two guidelines is that the 2008 guideline incorporated research based implementation strategies and activities for triage.

The primary aim of the 2008 guideline is to promote and standardise triage performed by ED nurses. This involves that all patients receive an urgency code within ten minutes after arrival (triage time) and that patients are seen by the doctor within time according to the urgency code, also described as target times (Table 1). Figure 1 summarises the process of triage, from arrival at the ED until patients are seen by the doctor. A further aim of the triage guideline is to increase patient satisfaction, as patients will be seen by a nurse soon after arrival at the ED and will be informed on the time to wait for a doctor. Then, patients feel safe to wait in the waiting room.[9]

The 2008 triage guideline consists of three main parts. The first part is related to systematic triage. It describes the definition of triage, the population of patients who should be triaged, the process of triage, and competences of ED nurses who perform triage. The second part is related to triage systems. In this part, minimal requirements for triage systems and triage systems which are appropriate for the Dutch context are described. The third part provides recommendations on how to implement triage using the guideline. Recommendations are based on international literature, findings gained from national questionnaires, and focus groups or in-depth interviews amongst ED-nurses, administrators and doctors working in different EDs in the Netherlands. Main recommendations of the guideline are: the use of a systematic approach for implementation, usage of strategies based on factors hindering or promoting the implementation, triage training for ED nurses, and informing doctors on triage purposes and procedures. Furthermore, the presence of an ICT-board, ICT-system, triage room, and triage workgroup responsible for the implementation of triage is recommended.

Figure 1. Process of triage



Implementation

Effective implementation ensures guideline adherence in practice resulting in improved patient outcomes.[36]

A stepwise approach to implementing guidelines is recommended to encourage guideline uptake. Implementation can be described as a planned process and systematic introduction of innovations and/or changes of proven value. The aim is that innovations and/or changes are given a structural place in (professional) practice, in the organisation or in health care structures.[37]

Implementing change, getting research into practice and improving the quality of patient care are complex, difficult, and demanding processes,[38] which do not follow prescribed and linear paths.[39] The use of research findings in practice remains difficult. In the literature, this is also referred to the gap between research evidence and its use in practice: even when the evidence is clear, it does not necessarily get used. As a result, patients often do not receive the best or optimal care. In some cases, the care provided is even dangerous.[40-43]

Different factors hinder or promote the implementation of guidelines. These can be classified in factors related to the innovation (e.g. complexity of the guideline, presence of clear scientifically based knowledge, involvement of the target group during the development of the guideline), the individual professional (e.g. experience and knowledge, age), the social context (e.g. support, familiarity and agreement with the guidelines among professionals, openness to change) and the organisation (e.g. training, personnel, workload, access to research related resources, time).[44-46] For successful implementation, it is suggested that an assessment of the expected barriers and facilitators is performed. Different methods can be used to identify potential facilitators and barriers. There is no standard approach to perform this.[43]

Based on the identified barriers, specific strategies should be selected to overcome the barriers.[41] Implementation studies often fail to select strategies tailored to the problems, resulting in unsuccessful implementation.[43] Furthermore, literature is not unequivocal which strategies are actually effective to overcome the expected barriers.[43] Implementation strategies which showed some to modest effects are educational meetings and outreach visits, the use of local opinion leaders, audit and feedback, computerised decision support, and reminders.[41,43,47-49] However, there is lack of clear evidence which strategy is the most effective to implement guidelines.[50] Also, it is suggested that multi-faceted strategies increase guideline implementation, although literature is unequivocal on this. Also which combination are most effective remains unclear.[41,50]

Education is a strategy often used.[45] The effectiveness of education can be increased when education has the following characteristics: a longer duration, a need assessment prior to the education, active participation, a voluntary character and the use of opinion leaders.[45]

Implementation models

Many models have been developed to implement innovations successfully (e.g. the Diffusion of Innovations Theory, the PARIHS framework, the Stetler Model, the Iowa Model or Implementation of Change).[3,42,51] These models offer frameworks for designing and implementing innovations in practice. Each model has its own perspective on how to translate innovations into practice. However, several steps or procedures are similar in all models.[3,41,51]

In this thesis we use two models: the Promoting Action on Research Implementation in Health Services (PARIHS) and the model of Implementation of Change. Therefore these models are briefly discussed.

In 1998, the PARIHS framework was first presented.[52] The PARIHS framework implies that the quality of evidence, context and facilitation and the interaction between them are fundamental to research uptake.[52-53] The implementation of research findings is expected to succeed under three conditions: when evidence is scientifically strong; the context is open to change; and where facilitation of change is appropriate.[54]

Grol and Wensing (2005) developed a model for effective implementation in which they integrated several change models.[41] Within this model they developed an approach that guides users through a series of different steps in order to accomplish improvement in practice.[42] The first step is the development of a concrete proposal for change in clinical practice. In the second step, users should analyse the target group and identify barriers or facilitators for change. The third step is linking activities to the facilitators and barriers for change. The fourth step is the development and implementation of an implementation plan. The fifth en final step is continuous evaluation or monitoring based on indicators.[41]

Aims of the thesis

As mentioned before, implementation of clinical practice guidelines does not always occur in nursing practice. Different studies examined which individual factors influence EBP/RU. However, studies that examined factors related to the context had been less often performed. Understanding which contextual factors improve nursing RU may support organisations in creating environments that facilitate the uptake of evidence in nursing practice. This could promote the implementation of guidelines. Therefore, the first aim of this thesis was to investigate which contextual factors influenced EBP/RU.

After the first study, we focussed on the subject triage, as a guideline for triage for Dutch EDs existed since 2004 and revision was required. We wanted to evaluate the adherence to the 2004 triage guideline in the Netherlands. This guideline was disseminated by post to all EDs without extra guidance for implementation. We wanted to explore if and to what degree EDs used the triage guideline in practice following the dissemination. Furthermore, we were interested which factors influenced the implementation of the 2004 guideline. This would give information on the degree to which regular guideline dissemination would lead to the use of the triage guideline in practice and provide more detailed information on strategies or activities which could contribute the implementation of the 2008 triage guideline. Also, this knowledge would be integrated in the 2008 guideline.
We wanted to investigate whether an interactive educational program given to ED nurses, would contribute the implementation of the 2008 triage guideline. We were not only interested in the effect of adherence to the guideline recommendations as a result of the interactive educational program, but as well in the processes that occurred during implementation at EDs. This could give more detailed explanations of the results related to the guideline adherence.
Since triage has to benefit the patients, the last aim of this thesis was to investigate whether patient experiences would actually improve when EDs perform triage according to the guideline recommendations, as the 2008 triage guideline supposes. Patient experiences are important aspects to measure the quality of provided care and therefore more and more frequently measured.[55]

This led to following overall research questions:

1. Which contextual factors in health care organisations are associated with research utilisation in nursing?
2. What is the degree of adherence to the 2004 guideline ‘Triage in emergency departments’ at Dutch hospitals three years after its dissemination?
3. Which factors influenced the implementation of the 2004 guideline ‘Triage in emergency departments’ in EDs in the Netherlands?
4. What is the effectiveness of an interactive educational program on adherence to the 2008 triage guideline recommendations?
5. What did ED nurses experience as factors hindering the implementation of the 2008 guideline ‘Triage in emergency departments’ and which actions did they undertake to overcome these problems?
6. Does triage lead to an improvement in the patient’s experience of given care?

Outline of the thesis

This thesis contains nine chapters. Following this introduction (*chapter 1*), we performed a systematic literature review on the relationships between contextual factors and RU in nursing, examining the strength of these relationships, and mapping the contextual factors to the Promoting Action on Research Implementation in Health Services model (PARIHS) of research implementation (*chapter 2*).

The study in *chapter 3* evaluated the adherence to the recommendations of the 2004 guideline 'Triage in emergency departments' in Dutch EDs three years after its dissemination. This study had a cross-sectional descriptive design. Ward managers and triage nurses at all EDs in the Netherlands (n = 108), received a questionnaire that was based on the recommendations and performance indicators of the guideline. Results from this study gave insight in the adherence to the guideline amongst Dutch EDs.

Chapter 4 describes a qualitative study in which we identified factors that influenced the implementation of the 2004 guideline 'Triage in emergency departments'. We used questionnaires and performed focus groups and in-depth interviews amongst nurses, ward managers and doctors working in EDs across the Netherlands. Based on the results, we developed tailored strategies for the implementation of triage guidelines.

Chapter 5 includes a cluster randomised control trial in which we implemented the 2008 guideline 'Triage in emergency departments'. Eight EDs received an interactive educational program using Grol's implementation model on how to implement triage (the intervention group). Nine EDs received the guideline by post (standard dissemination), but received no extra education how to implement the guideline (the control group). We examined the effect of the interactive educational program by measuring the adherence to recommendations of the guideline, before, one month and seven months after the program.

In *chapter 6* we describe factors influencing the implementation of the 2008 triage guideline in different EDs and which actions they undertook to overcome obstacles. This qualitative descriptive study is part of the larger randomised control trial study (*chapter 5*). This study consisted of 34 in-depth interviews amongst ED nurses from 17 different EDs. We analysed whether there were similarities or differences between the intervention group (n=8 EDs) and control group (n=9 EDs) related to the influencing factors and performed actions.

In the final study we examined patient experiences associated with triage (*chapter 7*). As we assumed that patient experiences would be different at EDs which

implemented triage, we compared experiences of patients before triage was implemented with patients' experiences after implementation of triage in 15 Dutch EDs. We used a questionnaire based on the Consumer Quality Index. Patients visiting the EDs were invited to participate during two weeks in October 2008 (before implementation) and November 2009 (after implementation).

Chapter 8 is an overall discussion on the main results from the six studies. We discuss methodological considerations of the studies, and formulate recommendations for practice and future research.

We end with a (English and Dutch) summary in *chapter 9*.

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Assessing the relationships between contextual factors and research utilisation in nursing: systematic literature review

CHAPTER 2

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Aim. This paper reports a systematic literature review examining relationships between contextual factors and research utilisation in nursing, examining the strength of these relationships and mapping the contextual factors to the Promoting Action on Research Implementation in Health Services model of research implementation.

Background. Health care organisations have long struggled with how to improve clinical care outcomes. Understanding which contextual factors enhance nursing research utilisation may support organisations in creating environments that facilitate the uptake of evidence in nursing practice to improve these outcomes.

Methods. A search of five electronic bibliographic databases and a manual search of specific journals were conducted for studies that were published in English and examined contextual factors as independent variables and research utilisation as the dependent variable from the perspective of nurses working in clinical practice. The studies were assessed for quality of design, sample, measurement and statistical analysis.

Results. Ten papers met the search criteria. Six contextual factors were identified as having a statistically significant relationship with research utilisation, namely the role of the nurse, multi-faceted access to resources, organisational climate, multifaceted support, time for research activities and provision of education. The contextual factors could successfully be mapped to the dimensions of context in the Promoting Action on Research Implementation in Health Services framework (context, culture, leadership), with the exception of evaluation.

Conclusion. The strength of the relationship between the six contextual factors and research utilisation by nurses is still largely unknown as (a) few studies were found of sufficient quality because of methodological limitations and (b) the results in reviewed studies were mixed. More robust methods in future work would yield a better understanding of the full impact of contextual factors on nurses' use of research.

Introduction

Although research produces important health care knowledge, research utilisation investigators argue that the use of this knowledge is not reflected in the care that patients receive.[1-5] Estabrooks (1998) refers to this dilemma as a gap between what is known and what is done.[6] Implementing change, getting research into practice and improving the quality of patient care are complex, difficult and demanding processes,[7] which do not follow prescribed and linear paths.[8] In nursing, research utilisation has been proposed as the use of research findings in any and all aspects of one's work as a registered nurse.[6] Titler *et al.* (1994) described research utilisation as the process of using research findings in practice, encompassing the dissemination of scientific knowledge, critique of studies, synthesis of findings, determination of applicability of findings, application or implementation of findings into practice and evaluation of the practice change.[9] In this study, research utilisation is conceptualised as being indirect (using research to influence thinking at a general level) and direct (the application of research in clinical practice).[10]

Various individual, organisational and contextual factors have been suggested to influence research utilisation in health care.[3,11,12] Traditionally, inquiry into the dissemination and use of research findings in nursing has focused on individual determinants of research utilisation. In a systematic review of the research literature on individual determinants, factors such as beliefs and attitudes, education, information-seeking and professional characteristics were found to be associated with research utilisation.[12] Less attention has been paid to the role of organisations and context in facilitating research use in practice.[3,7,11,12] Rogers (1995) claimed that in many cases an individual cannot implement new ideas before the organisation has formally adopted them.[13] Many researchers claim that contextual factors are important in predicting research utilisation.[1,4,14] This focus on contextual factors is reflected in the multidimensional Promoting Action on Research Implementation in Health Services (PARIHS) framework, initially presented by Kitson *et al.* (1998) and later modified by Rycroft-Malone *et al.* (2002).[15,16]

The PARIHS framework suggests that the quality of evidence, context and facilitation and the interplay among them are fundamental ingredients to promote research uptake. The implementation of research findings is expected to flourish under three conditions: when evidence is scientifically strong; the context is open to change; and where facilitation of change is appropriate.[17] McCormack *et al.* (2002) further delineated the context dimension of the PARIHS framework as the

environment or setting in which research is to be implemented and suggested that context has four components: context, culture, leadership and evaluation.[18]
Because of growing awareness of the importance of contextual factors for the implementation of research into practice, our research group decided to investigate if and how this relationship has been explored in studies in the nursing field. The context element of the PARIHS framework, as described by McCormack *et al.* (2002), was used as an underlying theoretical structure for this study.[18]

Aim

The aim of this study was to systematically review the literature on studies reporting a relationship between contextual factors and research utilisation by nurses in clinical practice.
The following research questions guided the review:

- Which contextual factors in health care organisations are associated with research utilisation in nursing?
- What is the strength of the evidence for each of the contextual factors related to research utilisation?
- Can the review findings be mapped to the dimensions of context in the PARIHS framework?

Search methods

Search strategy

The systematic review search strategy was guided by a preliminary literature review that revealed that several contextual factors had an association with research utilisation in nursing (Table 1). This informed the selection of inclusion criteria for the online search of electronic bibliographic databases CINAHL, MEDLINE, Healthstar, Psyc-INFO and Cochrane library. An overview of the search strategy is given in Table 2. A manual search of selected journals, websites and research institutes was completed based on our knowledge of the literature and anticipated sources of research in this field (Table 3).

Table 1 Contextual factors identified by an initial literature review [1,4,9,19-27]

Time
Access to research and resources
Leadership
Authority
Culture
Structure
Support
Incentives
Skills/education
Size of the hospitals
Professionalism
Internal and external communication
Presence of an innovation champion (facilitator)

Table 2 Search strategy for databases

CINAHL, MEDLINE, Healthstar & PsycINFO	
OR	AND
Research utilisation or utilization*	Professional practice†
Knowledge utilisation or utilization*	Professional practice, research based†
Evidence-based practice*	Professional practice, evidence based†
Diffusion of innovation†	Guidelines*
	Barriers*
	Organisation‡ or organization*‡
	Factors*
	Determinants*
	Nurs*‡
	Research or innovation or evidence or knowledge or technolog‡§
	Utilis‡ or transfer‡ or implement‡ or disseminat‡ or diffuse‡§
Cochrane Library	
Research utilisation or utilization	
Knowledge utilisation or utilization	
Evidence-based practice	
Professional practice	
Guidelines	
Barriers	
Organisation‡ or organization‡	

*Keyword; †Subject heading;‡Truncated search term; §Keyword limited to title.

Table 3 Manual search strategy

Journals (1995–2005)	Image – The Journal of Nursing Scholarship International Journal of Nursing Journal of Advanced Nursing Journal of Clinical Nursing Journal Nursing Management Journal of Nursing Administration The Journal of Evidence Based Nursing Nursing Research http://ebn.bmjjournals.com/: Evidence Based Nursing Online http://www.harcourt-international.com/journals/ebhc/: Evidence Based Health care
Websites	http://www.hsurc.ca: Health Services Utilization and Research Commission http://www.fhc.mcmaster.ca/nru: Nursing Effectiveness Utilization and Outcomes Research Unit http://fpb.case.edu/HirshInstitute/: the Sarah Cole Hirsh institute http://www.ahrq.gov/: Agency for Health care Research and Quality http://www.york.ac.uk/healthsciences/centres/evidence/cebn.htm: Centre for Evidence Based Nursing, University of York
Websites of Research institutes	Knowledge Utilization Studies in Practice (KUSP) Center for Knowledge Transfer Knowledge Utilization Utilisation des Conaissances (KUUC) Royal College of Nursing Institute Health Information Research Unit, McMaster University Evidence Based Practice Centers Health Organization Change
Websites of authors	Estabrooks CA, Funk SG, Parahoo K, Titler MG

Inclusion criteria

Papers in English, published up to March 2005, that met the following inclusion criteria, were reviewed: the study population consisted of nurses working in clinical practice; papers had to report primary research; studies reporting a measure or analysis of the relationship between contextual factors and research utilisation, where in studies with a quantitative design research utilisation was operationalized as the dependent variable and contextual factors as independent variables.

Screening

After removal of duplicates the first two authors reviewed 1294 titles from the search of electronic bibliographic databases. A total of 292 titles met the inclusion criteria. Another 20 titles were found through the manual search for a total of 312 titles retained. Available abstracts for these titles were then screened using the inclusion criteria. An abstract was rejected if it failed to meet one of the criteria. Of the 110 abstracts that met the inclusion criteria, full manuscripts were retrieved for screening. Of these 110 abstracts, 27 were excluded as they reported use of the Barrier Scale[19], but with no measurement of research utilisation. Twenty-two studies on the implementation of clinical practice guidelines were also excluded as they did not report a relationship between contextual factors and the use of research-based guidelines. Forty-one papers were excluded because of lack of clarity in the methods or results, specifically the measurement of research use or contextual factors. One paper was not available within the time limit for this review and was, therefore, excluded. The 19 studies that remained were assessed for methodological quality.

Quality assessment

The 19 studies that met the inclusion criteria were assessed for methodological strength using two quality assessment tools. The first was the Quality Assessment and Validity Tool for Correlation Studies adapted from an instrument used in three published systematic reviews.[12,28,29] All 16 quantitative studies were assessed using this tool. The instrument used 13 questions to evaluate the design, sample, measurement and statistical analysis, for a total of 14 possible points. Twelve questions were of dichotomous answer format ('yes' = 1, 'no' = 0). One exception was when contextual factors were measured by self-report; the study received a score of zero on that question. Whereas, when the contextual factors were measured by independent observation, the study received a score of two. Studies scoring 0–4 were rated as low quality, those scoring 5–9 were rated as medium quality and those scoring 10–14 were rated as high quality studies.

The second tool was the Quality Research Appraisal Checklist,[30] which was used to evaluate the three qualitative studies. This instrument used 41 evaluation criteria for a total score between 0 and 123 points. Studies with a score of 0–41 points were rated as low quality; those with a score of 42–82 points were rated as medium quality; and those with a score of 83–123 points were rated as high quality.

Data extraction

Following the quality assessment, 10 studies remained for data extraction. Figure 1 illustrates the search and retrieval process.

The following data were extracted from the 10 studies in the final inclusion group: author, journal, research questions/purpose, study design, subjects, sample, analysis, instrument, validity, reliability, research utilisation measure, contextual factors, relationship, results and discussion or recommendations. The characteristics of these included studies are reported in Table 4.

Four expert researchers in the research utilisation field were approached to provide feedback on the search strategy and the list of included studies. All four supported the process used and identified no gaps or omissions. To achieve reliability in every phase of assessment, the first two authors collectively read one-third of the titles, abstracts and studies. Consensus was effectively achieved in most cases in determining if a study was included or excluded. When there was disagreement, the articles were re-reviewed and discussed and the opinion of others in the research group was sought leading to an agreement in the end.

Figure 1 Search and retrieval process

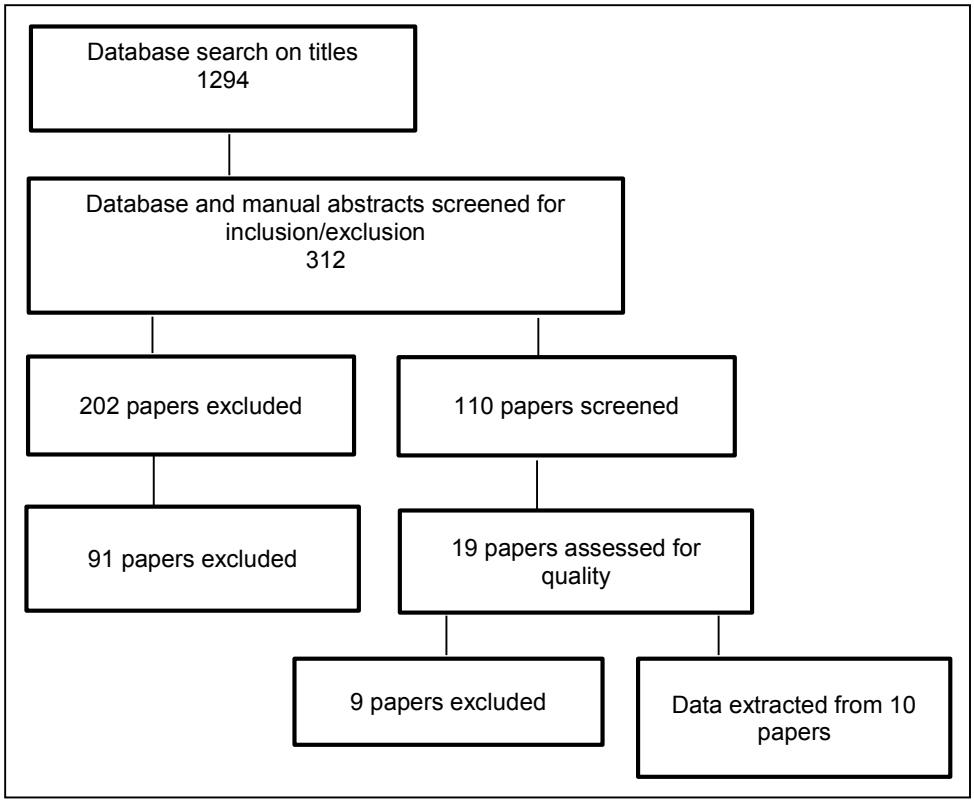


Table 4 Characteristics of included studies

Author(s) and year	Participants/ sample	Framework/ theoretical model	Design	Instrument	Scoring	Reliability	Validity
Butler (1995)[31]	Registered Nurses (staff nurses), N = 541 Leadership nurses (N = 59)	Not specified	Cross-sectional survey	The Research Survey[32] questionnaire, 20-item scale	Binary response ('yes' or 'no') 5-point Likert scale (strongly disagree to strongly agree)	α = 1 (value): 0.74 2 (confidence): 0.82 3 (support): 0.68	Not reported
Champion and Leach (1989)[33]	Staff nurses in community hospitals (N = 59)	Not specified	Correlation study	Research Utilisation Questionnaire (RUQ) Support: 7 items Availability: 8 items Attitude: 21 items Research Utilisation: 10-item scale	5-point Likert scale (strongly disagree to strongly agree)	Overall α = 0.92	Content validity
Hatcher and Tranmer (1997)[22]	Registered Nurse Members of Nursing Advisory Committee Educators and staff nurses (N = 350)	Not specified	Correlation study	Research Utilisation Questionnaire [33] Support: 7 items Availability: 8 items Attitude: 21 items Research Utilisation: 10-item scale	5-point Likert scale (strongly disagree to strongly agree)	A = 0.84–0.94	Not reported

Author(s) and year	Participants/ sample	Framework/ theoretical model	Design	Instrument	Scoring	Reliability	Validity
McClearly and Brown (2003)[27]	Staff nurses in acute care (N = 175)	Not specified	Explorative survey	Two EROS (Edmonton Research Orientation Survey) [34] subscales were used (1) The EROS Valuing subscale (8 items) (2) The EROS Evidence-Based Practice/Using research subscale (10 items)	5-point Likert scale (strongly disagree to strongly agree) 4-point scale (very poor to very good)	Overall α = 0.93	Construct validity
Rodgers (2000)[35]	Staff nurses and directors (N = 680)	Not specified	Explorative study	Questionnaire, Follow up interviews	Dichotomous outcome ('yes' or 'no'), questions on research use: sometimes/ always	Overall α = 0.63	Content validity
Rutledge *et al.* (1996)[36]	Oncology nurses (N = 769)	Rogers' theory of diffusion (1983)	Cross-sectional mail survey	Modified Nursing Practice Questionnaire (NPQ) based on Brett's Nursing Practice Questionnaire[37]	Dichotomous outcome ('yes' or 'no').	Overall α = 0.75	Face validity

Author(s) and year	Participants/ sample	Framework/ theoretical model	Design	Instrument	Scoring	Reliability	Validity
					Questions on research use: sometimes/ always		
Tsai (2000)[38]	Staff nurses and nurse managers (N = 398)	Not specified	Correlation study	Two instruments: (1) Research Participation Questionnaire (RPQ), 33 items (2) Research Utilisation Questionnaire (RUQ), 11 items	Dichotomous outcome ('yes' or 'no')	Not reported	Content validity
Tsai (2003)[39]	Staff nurses (N = 89)	Stetler & Marram (1976)[40]	Quasi-experimen-tal	Structured questionnaires, which covered 5 sections (1) scale of attitude towards research, 29 items; (2) scale of perceived support of the institution, 27 items; (3) research participation questionnaire, 33 items; (4) research utilisation questionnaire, 11 items; (5) demographic data	(1) 5-point scale (total agree to total disagree) (2) 5-point scale (high support to no support) (3) 2-point scale (participation to no participation) (4) one single-choice, multiple-choice, open-ended question (5) open-ended questions	α = (1) 0.94 (2) 0.77 (3) 0.91 (4) not reported (5) not reported	Not reported

Author(s) and year	Participants/ sample	Framework/ theoretical model	Design	Instrument	Scoring	Reliability	Validity
Varcoe and Hilton (1995)[41]	Staff nurses in medical–surgical and critical care nursing (N = 183)	Crane's conceptualisation (1989)	Cross-sectional Study	The Research Use in Nursing Practice[42] 20 items Self-reported	4-point scale (not at all to always) 3-point scale (never to always)	Overall α = 0.87	Content Validity
Wallin *et al.* (2003) [43]	Registered Nurses (N = 119)	Not specified	Comparative survey	Questionnaire developed by Humphris and Littlejohns (2000)[24] based on the work of Champion and Leach (1989) and Pettengill *et al.* (1994).[20,33] Research utilisation (9 items), attitudes (12 items), availability and support (8 items)	5-point Likert scale: (strongly disagree to strongly agree)	α = Research utilisation: 0.84 Attitude: 0.88 Availability and support: 0.75	Not reported

Results

Quality of studies

No single included study was assessed to be of high methodological quality. Six quantitative studies and three qualitative studies of low methodological quality were excluded. Excluded articles essentially had shortcomings in measurement and analysis. The excluded qualitative studies did not clearly report or discuss the relationship between contextual factors and research utilisation. Rodgers (2000) used both a qualitative and quantitative design (the qualitative section exploring the quantitative outcomes) and was counted as one study. In total, ten studies were considered to have an acceptable level of quality.[35] The results of the quality assessment are reported in Table 5.

Table 5 Summary of quality scores of included studies

Author	Journal	Quality Score
Quantitative studies (point range 0–14)		
Varcoe and Hilton (1995)[41]	Canadian Journal of Nursing Research	9
Tsai (2003)[39]	International Journal of Nursing studies	8
Tsai (2000)[38]	International Journal of Nursing Studies	7
Wallin *et al.* (2003)[43]	Journal of Advanced Nursing	7
Rutledge *et al.* (1996)[36]	Oncology Nursing Forum	7
Hatcher and Tranmer (1997)[22]	Canadian Journal of Nursing Administration	7
Butler (1995)[31]	Canadian Journal of Nursing Research	6
Rodgers (2000)[35]*	Nurse Education Today	6
McClearly and Brown (2003)[27]	Nurse Education Today	5
Champion and Leach (1989)[33]	Journal of Advanced Nursing	5
Qualitative studies (point range 0–123)		
Rodgers (2000)[35]*	Nurse Education Today	81

Score intervals of quantitative research: 0–4 = low, 5–9 = medium, 10–14 = high; Score intervals of qualitative research: 0–41 = below average, 42–82 = average, 83–123 =superior.
*Study combining qualitative and quantitative design.

All included studies showed limitations either in design, sampling, measurement or statistical analysis (Table 6). All studies were designed as cross-sectional surveys, with one study using a quasi-experimental design. Seven studies used

probability sampling and only one justified sample size. All studies used self-reported instruments and only five of 10 studies had a response rate above 60%. Three studies employed a theoretical framework for guidance.

Table 6 Summary of quality assessment of included studies (10 included quantitative papers)

	Number of articles	
	No	Yes
Design:		
Was the study observational (cross-sectional)?	0	10
Was probability sampling used?	3	7
Sample:		
Was sample size justified?	9	1
Was sample drawn from more than one site?	5	5
Was anonymity protected?	8	2
Was response rate more than 60%	5	5
Measurement		
Contextual determinants		
Were contextual determinants measured reliably and validly?	0	10
Were the contextual determinants of sufficient magnitude to be measured and to impact nurse's use of research?	5	5
Research utilisation		
Were contextual determinants measured rather than self-reported?*	10	0
If a scale was used for measuring effect, was the internal consistency ≥70?	1	9
Was a theoretical model/framework used for guidance?	7	3
Statistical analysis		
If multiple effects were studied, were correlations analysed?	6	4
Were outliners managed?	3	7

*This item scored two points if yes. All the others scored one point.

Contextual factors and research utilisation

This review identified 10 study findings that had a statistically significant relationship with research utilisation. Because of conceptual overlap among the study findings, they were clustered into six contextual factors: role of the nurse, multifaceted access to resources, organisational climate, multifaceted support, time for research activities and provision of education. A summary of findings is presented in Table 7.

Table 7 Summary of findings on associations between contextual factors and research utilisation

Source	Contextual determinants	Findings
Role		
Rutledge *et al.* (1996)[36]	Extent of research-related job responsibility	S
Wallin *et al.* (2003)[43]	Sustained involvement in change teams	S
Access		
Multi-faceted access to research related resources		
Champion and Leach (1989)[33]	Access (availability)*	S
Hatcher and Tranmer (1997)[22]	Access (availability)*	S
Access to human resources		
Rutledge *et al.* (1996)[36]	Access to clinical nurse specialist	S
Rutledge *et al.* (1996)[36]	Access to an in-house nurse researcher or research committee	NS
Access to material resources		
Rodgers (2000)[35]	Access to library	NS
Rutledge *et al.* (1996)[36]	Access to library	S
Rodgers (2000)[35]	Access to journals and access to summaries or titles	S
Rutledge *et al.* (1996)[36]	Access to nursing journals	NS
Organisational climate		
Varcoe and Hilton (1995)[41]	Research climate	S
Rodgers (2000)[35]	Hospital type	NS
Support		
Support for conducting research		
Butler (1995)[31]	Nurses' involvement in data collection	NS
Tsai (2000)[38]	Nurses' participation in research (data collection, research seminars)	S
Human support		
Butler (1995)[31]	Perceived support within the system	NS
Champion and Leach (1989)[33]	Support from colleagues and physicians	NS
Champion and Leach (1989)[33]	Support from key administrative persons	S
Hatcher and Tranmer (1997)[22]	Support from colleagues, administrators and other health care professionals	S

Source	Contextual determinants	Findings
Material support		
Rutledge *et al.* (1996)[36]	Number of conferences	S
Varcoe and Hilton (1995)[41]	Supportive infrastructure of the organisation (library facilities, ethics committee)	S
Time		
Rodgers (2000)[35]	Time spent studying on duty	NS
Rodgers (2000)[35]	Time spent studying off duty	S
Education		
Tsai (2003)[39]	8-week course on RU training	NS
McClearly and Brown (2003)[27]	Course about research design	S
McClearly and Brown (2003)[27]	Course about reading and using research	NS
Rodgers (2000)[35]	Number of study days on nursing research	S
Rodgers (2000)[35]	Nurse training area	NS

NS, not statistically significant; S, statistically significant.
*Example of index questions: I have access to research findings where I work; I have time to read about research while I am on duty; In-service programs on research findings are presented in my hospital.

Role

Two studies pointed to a relationship between the role of the nurse and research utilisation.[36,43] Rutledge *et al.* (1996) found a statistically significant relationship between the extent of job responsibility and research utilisation.[36] Wallin *et al.* (2003) investigated the effect of nurses' sustainability in participating in quality improvement (QI) teams. Nurses who were involved in QI work over a full three-year period reported more implementation of research into practice than those who had earlier discontinued their QI work.[43]

Access

Findings on access were grouped into three categories: multifaceted access to research related resources, access to human resources and access to material resources. Two studies used a multi-faceted subscale called availability, which had a statistically significant association with research utilisation. The scale included items such as access to research findings, presentation of research findings and time to read research.[22,33] Mixed results were reported regarding

access to human resources and its relationship to research utilisation.[36] The results of two studies that examined access to material resources were equivocal.[35,36]

Organisational climate

Varcoe and Hilton (1995) reported a statistically significant relationship between research climate (an environment where research use is encouraged and recognised) and research utilisation, whereas Rodgers (2000) found no difference between research use in a teaching and non-teaching hospital.[35,41]

Support

Six studies examined various types of support, which were grouped into human support, material support and support for conducting research. Mixed results were reported regarding human support.[22,31,33] The number of conferences that nurses attended and supportive infrastructures were ways of conceptualising material support. Two studies reported a statistically significant relationship between material support and research utilisation.[36,41] Two studies that examined the relationship between participation in research (initiated by the organisation) and use of research reported diverse results.[31,38]

Time

Rodgers (2000) conceptualised time as time on duty and time off duty to read research reports. Approximately half of the nurses in that study spent at least 4 hours per month off duty studying research, which had a significant association to research utilisation.[35]

Education

Education was considered to be a contextual factor in studies where the organisation provided nurses with specific education. Educational activities including research methods, statistics courses and training in research utilisation over several days were reported. Three studies examined education,[27,35,39] of which McClearly and Brown (2003) reported both statistically significant and non-significant effects of different research courses on research utilisation.[27] Rodgers (2000) found that the number of study days spent on nursing research was significantly related to research use. However, during focus group interviews, participating nurses reported that study days were not as engaging and helpful as accredited courses.[35]

Strength of relationship between contextual factors and research utilisation
To assess the strength of the relationships between the identified contextual factors and research utilisation, each factor was examined in light of both statistically significant and non-significant findings and the results were found to be largely inconclusive. Because of these mixed results and the moderate quality of included studies; the strength of evidence for individual contextual factors could not be ascertained. In addition, methodological limitations in reviewed studies hindered an investigation of inter-correlations among the factors associated with research utilisation.

PARIHS framework
This study used the PARIHS framework key element context as an underlying theoretical structure. The 10 study findings categorised into six contextual factors were mapped to the components of context; organisational context, understanding of the prevailing culture, the nature of human relationships as summarised through leadership roles and the organisational approach to routine monitoring of systems and services – evaluation. All identified factors could be mapped onto either the context, culture or leadership dimensions, but none were found that addressed evaluation (Figure 2).

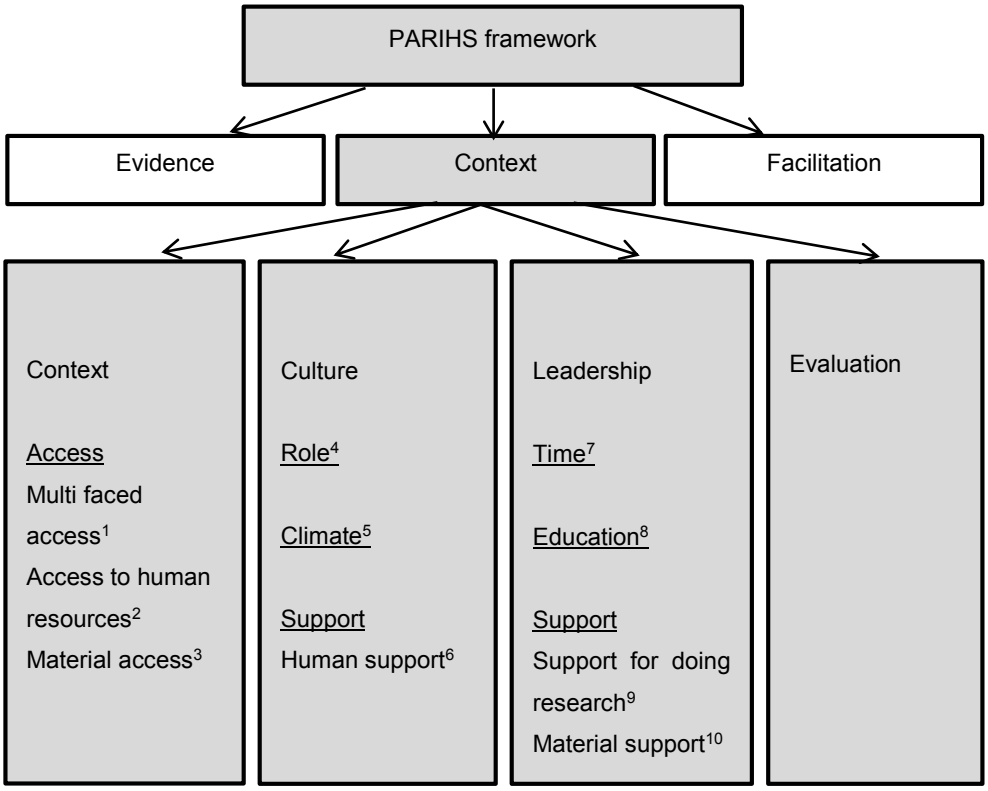
Discussion

Six contextual factors had statistically significant associations with nurses' research utilisation. However, it was not possible to determine the ranked importance of these factors because of the mixed results and methodological limitations. The findings suggest that contextual factors may influence the development of environments that are conducive to implementing research in practice and should be investigated further.

Methodological quality
In general, included studies were limited by their design; most were cross-sectional surveys based on self-reports from participants. This design is limited as there is no longitudinal measure of change over time, nor can it establish cause and effect relationships, or control for extraneous effects on the measure of research use. This field of research would benefit from more effectiveness and intervention studies, employing experimental and longitudinal designs. Designing studies where contextual factors are altered to determine the impact of

research utilisation should yield more robust findings. The ultimate aim of inquiry about research utilisation is to determine the impact of research utilisation on patient outcomes.

Figure 2 Mapping the contextual factors and review findings onto the context dimension of the PARIHS framework



[1] Access to research findings, time to read about research findings, in-service programmes on research findings. [2] Access to a clinical nurse specialist or to an in-house nurse researcher or research committee. [3] Access to library, journals and summaries or titles. [4] Extent of research-related job responsibility and sustained involvement in change teams. [5] Research climate and hospital type. [6] Perceived support within the system from colleagues, physicians, other health care professionals and key administrative persons. [7] Time spent studying on duty and off duty. [8] An 8-week course of RU training, course about research design, course about reading and using research, number of study days on nursing research and nurse training area. [9] Nurses' involvement in data collection and nurses' participation in research. [10] Number of conferences and supportive infrastructure of the organisation.

Context and research utilisation

Clarity of the meaning of concepts used in research is essential before claims about study results can be made. The context in which nursing practice occurs has been described as unbounded, because it is influenced by financial, social,

political, economic, historical and psychosocial factors.[18] McCormack *et al.* (2002) also suggest that other characteristics such as decision-making within nursing, staff relationships, organisational systems, power discrepancy and the authority of the organisation to innovate are important considerations in any expression of the concept of context. [18]

Measuring the concept of context is challenging because the environments within which nurses work are so complex, multi-faceted and varied based on the influences described above. Existing researchers in the field argue for the value of context but rarely go beyond describing its importance.[44,45] Previous attempts to measure the nursing practice environment have led to the development of numerous instruments,[46,47] each of which appear to measure different constructs.[48] Cummings *et al.* (2006) concluded that the overall concept of the nursing practice environment remains poorly specified and inadequately measured, recommending that the most useful advances in ongoing development of this concept will result from advancing and testing robust theory about the relationships among specific features within the practice environment or context.[48] The findings of this review will contribute to the development of theory related to how specific contextual features influence nurses' research utilisation.

We used the PARIHS framework as an underlying theoretical structure for the contextual factors, although this model is still in the developmental phase and not all components have been clearly conceptualised. The mapping of factors to the dimensions of context, culture or leadership was, to some extent, subjective because factors like 'nurses' involvement in data collection' and 'nurses' participation in research' may have fit under all three dimensions. However, all contextual factors fit into one of the dimensions of PARIHS' context, suggesting that context, culture and leadership have a positive influence on research utilisation by nurses. No factor could be mapped to the dimension of evaluation. Overall, studies that examine how audit and feedback relate to research use are infrequent. Another reason may be due to the lack of studies examining the implementation of research-based guidelines that met our inclusion criteria. We do not claim that this mapping exercise provides construct validity for the PARIHS framework; our study was not designed with a validation objective. However, we believe that PARIHS is a fruitful starting point for better understanding of the impact of context on research utilisation and more studies should explore this area of inquiry.

In addition to the complexity of measuring the concept of context, the measurement of the concept of research utilisation varied in the studies in this review. Three studies used the Research Utilisation Questionnaire (RUQ).[33] This instrument measured research utilisation using a multi-item scale, which was not

tested for construct validity.[49] The lack of construct clarity and a theoretical framework for the RUQ made it difficult to grasp what was measured by the research utilisation subscale. Other reported measures were the Nurses Practice Questionnaire (NPQ) based on Rogers's stages of innovation adoption and the Edmonton Research Orientation Survey (EROS). The NPQ used a process approach to measure use of specific nursing practices, implying that 'reading and appraising research reports' has similar weight to 'using research in practice'. The EROS instrument has a 10-item subscale on using research, but was not built on a clear operationalisation of research utilisation. The remaining studies used other index constructions or single item(s) to measure research utilisation. As in the case of measuring context we do not believe that these approaches to measuring research utilisation represent the optimum measurement. Instruments with specified construct validity are necessary for future research into research utilisation.

From our review, we conclude that some contextual factors have an association with research utilisation; however, overall the results were mixed. Therefore, we are not convinced that the factors identified in this study are the only, or the most important, for research uptake among nurses. More empirically based work needs to be done to identify the contextual factors that consistently enhance research utilisation.

Conclusion

The main purpose of this study was to obtain a better understanding of the state of evidence on whether contextual factors influence nurses' research utilisation. Based on the analysis of findings from the final group of included studies, we recommend the following:

- Measures of research utilisation, whose validity is clearly demonstrated, are needed. One approach to enhancing interpretation is to provide nurses with a clear definition of research utilisation before they complete a survey questionnaire.
- More theory and research are needed to conceptualise and measure nursing context, within PARIHS and other frameworks.
- Observational and intervention studies with less reliance on self-report would strengthen the evidence obtained from research in this field.

- The impact of research utilisation on patient outcomes has to be assessed, as well as the sustainability of practice changes when implementing research findings.

Equivocal findings and methodological limitations suggest that this field of research would benefit from more robust research designs that will ultimately support the investigation of organisational contexts on nurses' research utilisation and thereby lay the groundwork for investigations into the relationship between nurses' research utilisation and patient outcomes.

What is already known about this topic

- There is a gap between available research-based knowledge and what is used in clinical nursing practice.
- Both individual and contextual factors have an influence on research utilisation in health care.
- Contextual factors are relatively unexplored in the field of research utilisation.

What this paper adds

- Six contextual factors (education, support, time, access, climate and role) were identified as having statistically significant but inconsistent relationship (mixed results) with research utilisation.
- Methodological limitations in study designs made it difficult to assess the strength of the relationship between contextual factors and research utilisation.
- The six contextual factors could be mapped to the dimensions of leadership, culture and context of the Promoting Action on Research Implementation in Health Services framework, but no contextual factors were found for the evaluation component.

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Adherence to the guideline 'Triage in emergency departments': a survey of Dutch emergency departments

CHAPTER 3

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Aims and objectives. The aim of this study was to evaluate the adherence to the 2004 guideline 'Triage in emergency departments' three years after dissemination in Dutch emergency departments.

Background. In 2004, a Dutch guideline 'Triage in emergency departments' was developed. Triage is the first step performed by nurses when a patient arrives at an emergency department. It includes the prioritisation of patients to ensure that doctors see patients with the highest medical needs first. Although the national guideline was developed and disseminated in 2004, three years on there was no insight into the level of implementation of the guideline in practice.

Design. A cross-sectional descriptive design.

Methods. In February 2007, data were collected from ward managers and triage nurses at all emergency departments in the Netherlands (n = 108), using a questionnaire that was based on the recommendations and performance indicators of the guideline.

Results. In total, 79% of all 108 Dutch emergency departments responded. The main findings showed that over 31% of the emergency departments did not use a triage system. Emergency departments using the Manchester Triage System had a mean adherence rate of 61% of the guideline's recommendations and emergency departments using the Emergency System Index adhered to a mean of 65%.

Conclusion. The guideline 'Triage in emergency departments' was disseminated in 2004, but results from this study indicate that an improvement in adherence to this guideline is required.

Relevance to clinical practice. Adherence to guidelines is important to standardise practice to ensure that patients receive the appropriate treatment and to improve quality of care.

Background

Triage is the first activity performed by nurses when a patient arrives at an emergency department (ED). Triage is a process of decision-making to prioritise treatment and needs of patients in ED based on clinical urgency. Triage acuity is defined as classification of patient acuity that characterizes the degree to which the patient's condition is life-threatening and whether immediate treatment is needed to alleviate symptoms.[1] Triage nurses classify patients on the basis of their need for medical attention: patients with the highest medical needs will be treated first.[2-4]

The number of patients arriving at EDs has increased over the past few years, partly because of self-referrals, resulting in overcrowded EDs. Therefore, there is a need for a system that prioritises patients in the order of urgency.[5-7] Worldwide, different triage systems are used. Systems most commonly used are the Australasian Triage Scale (ATS, Australia, New Zealand, Hong Kong and Belgium), the Canadian Emergency Department Triage and Acuity Scale (CTAS, Canada), the Emergency Severity Index, also known as the Boston System (ESI, United States) and the Manchester Triage System (MTS, United Kingdom).[8-12] All these different triage systems include assessment of the patient's most important complaint, combined with a physical examination, leading to an urgency rating. This rating indicates the length of time a patient can wait safely before being seen by a doctor.[13]

Although the need for a system for urgency classification of critical care patients was known, Dutch EDs did not use standardised triage systems prior to 2004. There was no protocol or guideline for urgency rating. Patients were seen by medical staff in the order of arrival instead of urgency of care, which could lead to serious consequences. This undesirable situation required changing.

Therefore, the Dutch Institute for Healthcare Improvement (CBO) and the Dutch Society of Emergency and Accident Nurses (NVSHV) developed a guideline for systematic triage in EDs in 2004.[14,15] The 2004 guideline 'Triage in emergency departments' provides direction regarding implementation, training, resources, performance and evaluation, for nurses working in EDs in determining the urgency of patients. The guideline further offers ward managers at the EDs guidance in policy making.[16,17]

The introduction of the guideline in 2004 was no guarantee that the guideline would be used in practice. Research on the implementation of guidelines indicates that the use of guidelines is not always reflected in the care patients receive in

practice.[18-21] This is also referred to as the gap between theory and practice. As a consequence, patients often do not receive the care they need.[22]
This study provides insight into the current practice of triage in Dutch EDs and the level of adherence to the guideline. For this study, we formulated the following research question: what is the degree of implementation of the 2004 guideline 'Triage in emergency departments' in Dutch EDs three years after its dissemination? Furthermore, the findings of this study and new available research findings on triage will be used to update the guideline and guide implementation activities.

Methods

Study design and setting

A cross-sectional descriptive design was used. A questionnaire was developed based on recommendations and performance indicators of the 2004 guideline 'Triage in emergency departments'. Questions were formulated on all recommendations and performance indicators of the guideline. To ensure content validity, the questionnaire was evaluated by two members of the NVSHV, two Health Care workers at the EDs (ward manager and registered nurse), two persons of the Netherlands Centre for Excellence in Nursing (LEVV) and one person of the Scientific Institute for Quality of Healthcare. They critically reviewed the questionnaire on content and clarity of answering scales and on completeness of all aspects of triage.
For this study, a full population sample was used, including ward managers of all EDs in the Netherlands (n = 108). The ward managers were asked to distribute the questionnaires to one registered ED nurse trained in triage (triage nurse). Ethical approval was not needed as the questionnaire did not ask participants for medical or highly personal information and did not require a large amount of time to complete (http://www.ccmo-online.nl/main.asp?pid=1&taal=1).

Measures

The questionnaire was divided into two components: the first component had to be filled in by a ward manager and the second by a triage nurse working in the ED. The first part of the components was identical and was related to the type of organisation, dissemination (acquaintance with the guideline) and use of triage systems. Only EDs using a triage system were asked to answer the follow-up

questions related to adherence to recommendations from the guideline (process of triage, competences of nurses and implementation of triage).
Ward managers received extra questions related to the approach of implementation and performance indicators of the guideline (process, structure and outcome measurements).
For the performance indicators, evidence from clinical information was requested (Appendix).
Answering scales were a two-point scale ('yes–no') or a six-point scale ('always–mostly–often–regularly–sometimes–never'). In the introduction mail, a clarification was given for the six-point scale: 'always' meant if all nurses/doctors performed the activities all the time (100%), 'mostly' meant within 80–99%, 'often' within 60–79%, 'regularly' within 40–59%, 'sometimes' within 1–39% and 'never' 0%. The questions included room for clarification.

Data collection
A list of hospitals in the Netherlands with the names of all EDs was collected from the NVSHV. All hospitals were contacted and asked whether the hospital had an ED and what the name of the ward manager was to whom we could send the questionnaire. Based on website information, university and teaching hospitals (http://www.rivm.nl, http://www.stz-ziekenhuizen.nl) were identified. The remaining hospitals of the list were classified as non-teaching hospitals. In February 2007, the questionnaires were sent to ward managers of all EDs (eight university hospitals, 28 teaching hospitals and 72 non-teaching hospitals) with the kind request to fill in the first part of the questionnaire and to distribute the other part to a nurse working at the department. Ward managers of triage-performing EDs, were asked to forward the questionnaire to a triage nurse, as nurses who filled in the questionnaire had to have knowledge on triage.
To improve response, stamped return envelopes were added. As the questionnaires were anonymous, a reminder to return the questionnaire was sent to all ward managers after three weeks. After five weeks, another reminder was sent including the questionnaires. In addition, information on the research was published on the websites of the Department of Critical Care (http://www.laiz.nl), the NVSHV (http://www.nvshv.nl) and the Dutch Community Trauma Nursing (STNN, http://www.trauma-nursing.nl/stnn/).

Analytical methods
Data were analysed using Statistical Package for Social Sciences (SPSS) 14.0 (IBM Nederland B.V., Nieuwegein, The Netherlands). The statistical analyses

included descriptive frequency distributions of all variables. Data from all EDs were analysed by type of organisation, dissemination of the guideline and use of a triage system. Only the data of those EDs that used a triage system were analysed in association with implementation, personnel, performance, resources, evaluation and performance indicators.

When activities were performed in 80% or more, this was seen as high and sufficient. For that reason, the six-point scale questions were transformed into a two-point scale (a 'yes' and 'no' scale): the 'yes' category including 'always' and 'mostly', the 'no' category including 'often', 'regularly', 'sometimes' and 'never'. The category 'often' was excluded from the 'yes' category and included in the 'no' category because the 'no' category indicates room for improvement.

Analyses were performed on the total sample, separately for each respondent group (ward managers and triage nurses) and type of hospital (university hospitals, teaching hospitals and non-teaching hospitals). Of each type of triage system, the percentage of follow-up was calculated with the median, spread and interquartile range of scores. Differences between ward managers and nurses were analysed on aspects related to triage. The expectation was that they scored differently on the questions, as they would have other interests related to triage. For example, ward managers have to ensure that nurses perform triage and facilitate organisational aspects like education and rooming facilities. Nurses are responsible for the professional performance of triage. As university hospitals consisted of only eight hospitals, analyses of the university hospitals were grouped with analyses of the teaching hospitals.

Pearson's chi-square tests were used to detect differences between groups (type of hospital and ward managers vs. nurses). To ensure the overall change of making a type I error for multiple comparisons, statistical significance was set at $p < 0.0019$ after Bonferroni correction ($0.05/26 = 0.0019$).

Results

A total of 158 of 216 questionnaires (73%) were returned (80 ward managers and 78 triage nurses). A total of 81 of 108 EDs (75%) returned the questionnaires. In addition, four ward managers responded by telephone, stating that they would not return the questionnaire, because their ED was already involved in other research concerning triage or was not using a triage system or implemented the guideline recently.

Type of organisation

The participating EDs were representative of the Dutch context. All eight university hospitals responded (100%). For the 28 teaching hospitals, the response rate was 82% (n = 23), and for the 72 non-teaching hospitals, the response rate was 69% (n = 50).

Dissemination

All in all, 99% of the ward managers (n = 79) and 92% of the triage nurses (n = 72) knew about the national guideline. The main source of dissemination of the guideline was the Dutch Society of Emergency and Accident Nurses (NVSHV). Triage nurses stated that ward managers were also an important source. Table 1 shows other sources that were employed for the dissemination of the guideline.

Table 1 Sources of dissemination of the guideline Triage at the emergency departments

Sources	Ward managers (n=80), n (%)	Triage nurses (n=78), n (%)
Colleague	5 (6)	13 (17)
Internet	9 (11)	3 (4)
Professional journals	26 (33)	7 (9)
NVSHV [1]	49 (61)	21 (27)
STNN [2]	16 (20)	11 (14)
CBO [3]	19 (24)	2 (3)
Ward managers	3 (4)	22 (28)
Other	14 (18)	7 (9)

[1] Dutch Society of Emergency & Accident Nurses; [2] Dutch Community Trauma Nursing; [3] Dutch Institute for Healthcare Improvement

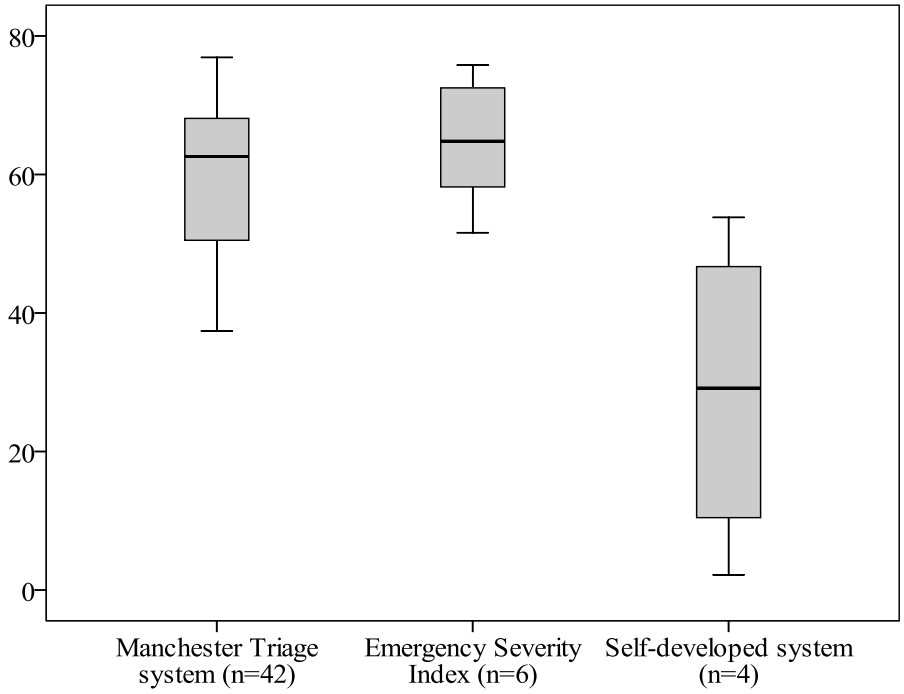
Triage systems

Almost 31% (n = 33) of the EDs did not use a triage system. Patients were seen by a nurse in the order of arrival instead of urgency of care. Two standardised triage systems were used at EDs in the Netherlands: 42 EDs used the MTS and six EDs the Emergency System Index (ESI). Four EDs reported the use of a self-developed triage system.

Adherence to recommendations and performance indicators

Figure 1 shows the adherence to all recommendations and performance indicators of the 2004 guideline 'Triage in emergency departments' for each of the triage systems, based on the questionnaire of the ward managers. EDs that used the MTS had a mean adherence rate of 61%, EDs using the ESI had a mean adherence rate of 65%, whereas EDs using a self-developed triage system had a mean adherence rate of 29%.

Figure 1 Adherence to recommendations versus type of triage system (%)



Guideline implementation

The questionnaire for the ward manager included questions related to the approach to guideline implementation. The answers to these questions are presented in Table 2. Some ward managers pointed out that the doctors were informed about the procedure of triage after triage was established. In 87% of the EDs (n = 69), implementation of the triage system occurred by change agents consisting of a ward manager, a project leader or an advisor. About half of the EDs used a systematic method for implementation and reserved some type of budget for the implementation of a triage system.

Table 2 Approach to implementation of triage systems

Implementation	Ward managers (n=52)*, n (%)
Top-down	22 (42)
Multidisciplinary	40 (77)
Change agents	45 (87)
Systematic method for implementation	24 (46)
Budget reserved for:	
ICT system[1]	33 (64)
Personnel	25 (48)
Training	27 (52)
Triage room	28 (54)

*Only ward managers of ED's which use a triage system filled in the questionnaire
[1]ICT system: Information Communication Technology system

Training

The guideline recommends that nurses performing triage follow an education in Acute Care, the Trauma Nursing Core Course (TNCC), the Emergency Nursing Paediatric Course (ENPC) and didactic training in triage. Furthermore, they have to have more than one-year clinical work experience.
On average, nurses had a more positive score on trained triage nurses compared with ward managers, except for training by colleagues. There were statistically significant differences in answers found between nurses and ward managers regarding TNCC and work experience (Table 3).

Resources

Table 3 shows the triage resources that were available in the EDs. Almost 80% of all EDs have created a triage room, whereas about 70% used an Information Communication Technology system (ICT system), formulated a triage workgroup and had information brochures in the waiting room.

Performance

Triage nurses did not always carry out triage of every patient arriving at an ED. According to the ward managers, a triage nurse saw nearly two out of three patients within five minutes of arrival. Pain assessment was carried out among almost all patients. Two out of every three EDs formulated a triage protocol based on the guideline for triage and consensus at the ED. The protocols contained

agreements concerning the tasks of the triage nurse, what to do when the ED is crowded and the coordination of the patient flow (Table 4).

Table 3 Training for nurses and triage resources in the emergency department

	Ward managers (n=52), n (%)	Triage nurses (n=54), n (%)	Difference % (95% CI)	P value
Training for triage nurses				
Education Acute Care	45 (87)	53 (98)	-10 (-19 to 0)	.0423
TNCC[1]	31 (60)	47 (87)	-26 (-43 to -10)	.0019*
ENPC[2]	5 (10)	18 (33)	-23 (-39 to -7)	.0045
1–2 years work experience	33 (64)	52 (96)	-32 (-46 to -18)	.0000*
Certified training (STNN[3])	12 (23)	16 (30)	-8 (-26 to 11)	.4109
Training by colleagues	28 (54)	25 (46)	7 (-13 to 28)	.4747
On-the-job training	40 (77)	53 (98)	-18 (-30 to -7)	.0024
Multi-disciplinary training	17 (33)	21 (39)	-5 (-25 to 15)	.6157
Resources				
Information brochure	35 (67)	--		--
Triage room	41 (79)	--		--
ICT system[4]	37 (71)	--		--
Triage group	37 (71)	--		--

* Statistically significant (p-value < .0019) between ward managers and triage nurses
[1]Trauma Nursing Core Course; [2]Emergency Nursing Paediatric Course; [3] Dutch Community Trauma Nursing; [4] Information Communication Technology system

Evaluation

Table 4 additionally presents results related to the evaluation of triage at the EDs. Over 50% of EDs evaluated the trial period. The evaluations led to changes related to responsibilities of the triage nurses and the doctors, interventions triage nurses are permitted to perform, content of triage assessments, development of pain protocols, ICT systems and use of triage rooms. Multidisciplinary reflection occurred less often than monodisciplinary reflection. Based on these evaluations, improvements were made associated with adding necessary supplies to triage rooms (e.g. computers, stretchers, thermometers, dressings), increasing personnel numbers (having triage nurses on day, evening and night shifts), agreements on the tasks of triage nurses, development of pain protocols and adjustments to ICT systems.

Table 4 Performance and evaluation of triage

	Ward managers (n=52) n (%)	Triage nurses (n=54) n (%)	Difference % (95% CI)	P value
Performance triage				
Triage assessment of all incoming patients	42 (81)	44 (81)	2 (-13 to 7)	.7938
Triage assessment within 5 minutes after arrival	32 (62)	41 (76)	-12 (-30 to 6)	.1987
Urgency rating within 3 – 5 minutes	49 (94)	50 (93)	7 (-3 to 17)	.1854
Triage protocol	32 (62)	29 (54)	7 (-9 to 23)	.2804
Pain assessment	49 (94)	54 (100)	-4 (-11 to 3)	.2777
Treatment during assessment	28 (54)	41 (76)	-20(-38 to -2)	.0342
Treatments:				
Blood sampling	46 (88)	52 (96)	-1 (-10 to 9)	.8854
Electrocardiograms	28 (54)	25 (46)	12 (-8 to 31)	.2381
Controls	39 (75)	44 (81)	0 (-16 to 15)	.9592
Painkillers	46 (88)	47 (87)	8 (-4 to 20)	.1664
Work agreement to carry out treatments	40 (77)	41 (76)	11 (-9 to 30)	.3607
Responsibility for patients in waiting room referred to triage nurse	43 (83)	41 (76)	12 (-4 to 27)	.1455
Evaluation				
Trial period (n=30)	30 (58)	29 (54)	3 (-17 to 23)	.3956
Adjustments after trial period	20 (67)	16 (55)	12 (-14 to 37)	.3741
Multidisciplinary reflection	26 (50)	21 (39)	14 (-5 to 34)	.1522
Monodisciplinary reflection	41 (79)	30 (56)	26 (9 to 44)	.0035
Sufficient budget for implementation	28 (54)	--		--
Patient satisfaction measured (n=35)	35 (67)	11 (20)	49 (31 to 67)	.0000*
Waiting time	30 (86)	--		--
Urgency classification	19 (54)	--		--
Pain	16 (46)	--		--
Attitude	32 (91)	--		--
Privacy	26 (74)	--		--
Health workers satisfaction measured (n=33)	33 (64)	27 (50)	18 (-1 to 38)	.0639
Decreased aggression	24 (73)	--		--
Triage system	20 (61)	--		--
ICT system[1]	18 (55)	--		--
Triage room	18 (55)	--		--

* Statistically significant (p-value < .0019) between ward managers and triage nurses

[1]Information Communication Technology system

Performance indicators

Table 5 shows results associated with the performance indicators. There is a wide range in the registration of the indicators. Registration of the reason for leaving the ED occurs most often (over 90%). The indicator 'registration of reason for not achieving the target time' is used least of all performance indicators. Sixty-four percent of the EDs (n = 32) registered incidents of aggression. Of these EDs, five provided the number of aggressive incidents at their department.

Table 5 Performance of triage related to the performance indicators of the triage guideline

Performance indicators	Ward managers (n=50), n (%)
Registration of urgency rating	38 (76)
Registration of time between arrival and first contact triage nurse	36 (72)
Registration of duration of triage process	14 (28)
Registration of time between urgency rating and first contact with doctor	35 (70)
Registration of % of target time according the protocol	21 (42)
Registration of reason for not achieving target time	8 (16)
Registration of first contact with doctor and leaving the ED	38 (76)
Registration of reason for leaving the ED	46 (92)
Registration of urgency rating related to dismissal from ED	14 (28)
Registration of retriage (n=10)	10 (20)
Reason: Max. waiting time	4 (40)
Pain intervention	6 (60)
Other	5 (50)
Registration of % of patients without urgency rating	26 (52)
Registration of information regarding:	
Retriage	9 (18)
Urgency rating	11 (22)
Waiting time	10 (20)
Pain	10 (20)
Registration of aggression (n=32)	32 (64)
ED's who gave actual number of aggression incidents	5 (16)

Discussion

This study was designed to examine the adherence of EDs in the Netherlands to the 2004 guideline 'Triage in emergency departments'. Although the study is performed in a Dutch setting, the results may be relevant for other countries as well, indicating potential lack of adherence to triage guidelines in EDs.

The guideline was disseminated in 2004, and because most ward managers and nurses know about its existence, the expectation was that nearly all EDs would use a triage system by now. Additionally, the Netherlands Health Care Inspectorate (IGZ) and the NVSHV recommend the use of the guideline, which should have advanced its use as well.[14,23] Nevertheless, over 38% of the EDs that filled in the questionnaire did not perform triage using a standardised triage system. Some EDs stated that they would implement a triage system within one year. Another reason why EDs have not implemented a triage system could be the fact that a new triage system is currently being developed: the Dutch Triage System (NTS). Collaboration between the Dutch College of General Practitioners (NHG), the NVSHV, the Netherlands Mental Health Care Association (GGZ Nederland) and the National Institute for Guidelines EMS (Stichting LAMP) should result in one system for telephonic and physical triage for all acute care settings (general practitioner, ambulance, ED and mental health care).[24] An agreement has been made between the four organisations that as soon as this new system is in place the acute care settings in the Netherlands must use this system. However, this process could take several more years and EDs need to perform systematic triage during this time.

The MTS is the triage system used most frequently. This could be explained by the fact that the guideline explicitly recommends this triage system on the basis of conclusions on triage in an earlier literature review.[14,15] The ESI is also used in the Netherlands. The use of other international triage systems was not found. Although the MTS and ESI are valid and reliable systems,[25-28] little research has been conducted on the validation of MTS and ESI for the Dutch context. One study assessed the reliability and validity of the MTS in two EDs in the Netherlands. The authors found a moderate to substantial inter-rater reliability, and nurses were consistent in their decision-making around urgency classification. The MTS appeared to be more sensitive in its use for children who need immediate or urgent care than for other patients in the ED.[7] Two studies examined the validity of the MTS in paediatric emergency care. The authors found a moderate validity.[6,29] A fourth study looked at the validation of the ESI triage algorithm in self-referred patients in one ED in the Netherlands. The

authors declared that the ESI triage algorithm is likely to be reliable in predicting the severity of patients' condition in the Netherlands.[15] Although these studies are available, more research into the validation and comparison of the two systems for Dutch EDs is needed. Four EDs used a self-developed triage system. It remained unclear how these self-developed systems functioned. These systems are not validated, and it appears that they have little in common with the recommendations of the guideline.

Guidelines are valuable tools to promote evidence-based practice. Although the dissemination of the guideline seems to be good, thorough implementation of the guideline seems to be lacking. Our study provides no clear insight into the factors that may have contributed to the moderate implementation of the guideline. One explanation could be that many EDs did not use a systematic approach to implementation.[30] Another reason could be that only half of the EDs had a budget for the implementation of the guideline at their disposal. It is important that managers take into account that successful implementation of guidelines can lead to extra costs.[31] Over 80% of the EDs made use of a change agent. Other studies suggest that the use of change agents facilitate guideline implementation.[31,32] Further research related to factors that influenced implementation of the guideline is needed to develop strategies to increase the use of the guideline.

Evaluation is an important step in the process of implementing a guideline.[33,34] Performance indicators can be used to evaluate the use of the guideline.[34,35] The indicators give insight into the delivered quality of patient care. Furthermore, the actual care can be compared with the recommended care in the guideline.[36] Although ward managers can use the performance indicators of the guideline for policy making regarding triage, only half of the ward managers stated that they actually used the performance indicators. One reason for not using the indicators was that EDs did not have a digital registration system. Lack of resources to register indicators is one of the most important factors that hinders the use of performance indicators.[37,38]

An immense variance between the adherences to different recommendations of the guideline exists. The recommendation with the lowest rate of compliance is the ENPC. The highest rate of compliance was found for pain assessment. A study on clinical guidelines indicated different reasons for low compliance with recommendations. First, the recommendation could be incorrect because of a lack of scientific evidence for the recommendation. Second, the influence of the development group or the influence of different parties involved in development of the recommendation (for example patients, doctors, managers and the government).[39]

Some EDs modified a few recommendations. One recommendation often modified was 'seeing patients within five minutes of arrival', which was often changed to 'within 10 minutes of arrival' as five minutes was found to be too short. Rogers (1995) refers to this as re-invention of the innovation.[40] Although this study gives insight into whether the recommendations of the guideline are used by the EDs, it provides no insight into the factors that influence the use of the guideline. Therefore, we recommend a study on factors that promote or hinder the uptake of the guideline.

Triage nurses and ward managers achieved overall similar scores in regard to the recommendations. Only statistically significant differences between the scores of triage nurses and ward managers were found among recommendations related to TNCC, work experience and measurement of patient satisfaction. Triage nurses had a higher score related to training and performance, while ward managers scored higher on the recommendations of evaluation. One explanation might be that the task of the ward managers is more focused on evaluation, whereas nurses are responsible for the performance of triage. No statistically significant differences were found between types of hospital.

Limitations

This study has some limitations that weaken the credibility of the findings. The first limitation is related to the development of the questionnaire. As the questionnaire was meant to gain insight into the adherence of the guideline, the questionnaire was based on all recommendations and indicators of the guideline. The questionnaire was only validated on content and clarity by experts, but no test–retest of the questionnaire was performed.

Second, as a self-reporting questionnaire was used, there is a possibility of an over- or under-estimation of compliance with the guideline as socially desirable answers may have been given.

Third, the ward managers of each ED were asked to distribute the questionnaires to a triage nurse. This might have led to selection bias, as nurses could be chosen who already showed an interest in triage. They may have completed the questionnaire differently compared with other nurses at the department who do not agree with the department's policy concerning triage. Despite the possible bias, we feel this study gives a balanced overview of what the level of adherence to the guideline is.

A fourth limitation is related to the response of EDs and type of hospital. Although the all-response rate was relatively high (75% of all EDs in the Netherlands), a difference in response rates was found between university,

teaching and non-teaching hospitals. The university and teaching hospitals had a response of higher than 80%, whereas nearly 70% of the non-teaching hospitals responded. Although this could have biased the results from the non-teaching hospitals, we feel that the answers of the non-teaching hospitals represents were well represented, as 50 EDs participated. Furthermore, we found only one significant difference between university/teaching and non-teaching hospitals (registration of reason for not achieving target time).

Conclusions

In conclusion, dissemination of the 2004 guideline 'Triage in emergency departments' appears to be good. Important sources of dissemination are the profession (NVSHV) and the ward managers. However, improvement is still required concerning the actual implementation of the guideline 'Triage in emergency departments'. Further research into recent developments related to triage should be part of the updating process and dissemination of the guideline.

Relevance to clinical practice

Adherence to guidelines is important to reduce variations in practice and to ensure that patients receive the appropriate treatment and to improve quality of care. The results shown in this study suggest that the existence of a guideline does not mean that it is automatically transferred into daily practice. It also shows the need of further awareness for the use of performance indicators related to triage. More research on barriers that hinder the use of triage and strategies to implement triage in EDs is wanted. These research findings should support the revision and implementation of guidelines in EDs.

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Appendix

Questionnaire	
General questions	Type of hospital* Knowledge of existence of the guideline 'Triage at the emergency departments'* Sources of dissemination* Use of (type) triage system* *(in case of no use of any kind of triage system, the questionnaire stopped here)* Reason use of the specific type a triage system
Process of triage	Patients are triaged after arrival at the ED Triage takes place within 5 minutes after arrival at the ED Triage leads within 3- 5 minutes to an urgency rating Pain assessment is part of triage; if yes, which scale is used Patients are informed on urgency code, waiting times and retriage During waiting times, complaint related interventions are put in motions; which interventions; is this according to a specific protocol Who is responsible for patients in the waiting room There is a working agreement for triage; what agreements does this contain; how is the agreement drawn up There are information brochure at the ED; do all patients receive this brochure
Competences nurses	Nurses are competent to determine the urgency rating, informing patients on urgency rating and waiting time The percentage of nurses who have followed 1) an education in acute care; 2) the Trauma Nursing Core Course (TNCC); 3) the Emergency Nursing Paediatric Course (ENPC); 4) training in triage; and 5) more than one year work experience at the ED All steps of triage registered by the triage nurse (complaint; flow chart; discriminator; pain score; urgency code)
Implementation of triage	Top-down implementation Multidisciplinary implementation Communication in terms of policy and instructions; consultation; information services; measurement and evaluation moments; feedback on (temporary) results Involvement of a change agent A triage room is available; how is this facilitated (second exit; alarm button; presence of camera, desinfectance, examination gloves, hand basin, other facilitations)

Questionnaire	
	Training in triage: 1) multidisciplinary, 2) time between training and implementation, 3) all new employees receive the training, if yes how, 4) trail to get acquaintance in triage (how long, evaluation after the trail, adjustments after trail) Reflection moments related to the triage process in multidisciplinary team Reflection moments related to triage process in monodisciplinary team A triage group is formulated Information Communication Technology system (ICT) is present Budget reserved for costs related to the implementation of triage (ICT, formation, training, information brochure, renovation costs for waiting room, other)
Quality indicators *(only filled in by ward managers)*	Triage is imbedded in quality system Use of quality indicators of the guideline Registration of origin patient Registration of urgency codes Registration of moment of arrival at the ED until first contact nurse Registration of triage time (moment contact patients with nurse) Registration target time (first contact patients with doctors); conform the guideline Registration reason not meeting the target time Registration time patients leaving the ED Registration outflow reasons Registration reason retriaged patients Evaluation of patient experience (information on waiting times and urgency codes, pain, privacy and treatment) Evaluation of experiences personnel (aggression, triage system, ICT-system, triage room) Registration of aggression per month/year at the ED (before/after triage) Decrease of waiting times after implementation of triage Decrease of completion time after implementation of triage

If questions were filled in with 'no', reasons why not were asked.
*Filled in by all participants

Factors influencing the implementation of the guideline 'Triage in emergency departments': a qualitative study

CHAPTER 4

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Aims and objectives. The objectives are: (1) to identify factors that influence the implementation of the guideline 'Triage in emergency departments' (2004) in emergency departments in the Netherlands, and (2) to develop tailored implementation strategies for implementation of this guideline

Background. Guideline dissemination is no guarantee for guideline implementation. In 2004 the guideline 'Triage in emergency departments' was disseminated in Dutch hospitals. Guideline revision was scheduled in 2008. Prior to the revision, factors which influenced the implementation of the guideline (2004) were studied to be addressed at the implementation of the revised guideline.

Methods. This is an exploratory study using a qualitative design including: a questionnaire sent to all emergency departments in the Netherlands (n = 108): four focus group interviews, including nurses and ward managers and in-depth interviews with ward managers and doctors. Based on the results, tailored implementation strategies and activities were suggested which target the identified influencing factors.

Results. Various factors at individual, social context and organisational level were identified as influencing the implementation of the 2004 version of the guideline, namely: level of knowledge; insight and skills; work preferences; motivation and/or commitment; support; informed doctors; preliminary work and arrangements for implementation; description of tasks and responsibilities; workload and resources. Ward managers, nurses and doctors mentioned similar as well as different factors. Consequently, tailored implementation strategies and activities related to education, maintenance of change, motivation and consensus-building, information, organisation and facilitation were suggested.

Conclusion. Nurses, ward managers and doctors broadly indicated similar influencing factors, although the importance of these factors differed for the different groups. For nurses, resistance and lack of resources are most important, ward managers mentioned culture and doctors the availability of doctors at the emergency department.

Relevance to clinical practice. Insight into the barriers for implementation and tailoring implementation strategies to these barriers improves the implementation.

Introduction

In 2004, an evidence-based guideline for systematic triage in emergency departments (EDs) was developed by the Dutch Institute for Healthcare Improvement (CBO) and the Dutch Society of Emergency & Accident Nurses (NVSHV).[1,2] Triage is defined by Gilboy *et al.* (2005, p. 17) as: *'the classification of patient acuity that characterises the degree to which the patient's condition is life threatening and whether immediate treatment is needed to alleviate symptoms'*.[3] Based on this classification, nurses at the EDs prioritise patients in sequence of need.

Background

The guideline 'Triage in emergency departments' had to be updated in 2008. We evaluated the adherence and the implementation process of the 2004 guideline in a previous study, to generate useful insights for the revision of the guideline in 2008. Results showed that over 30% of all EDs in the Netherlands did not perform triage. Furthermore, EDs had a mean adherence of less than 65% of the recommendations in the guideline, with a variance of 2–78%.[4]

In health care organisations the importance of evidence based guidelines has increased extensively in recent years. Guidelines are useful tools to turn evidence-based knowledge into practice which leads to a consistent approach for improving patient care.[5] Nevertheless, literature shows that the existence of a guideline does not mean that recommendations of the guideline are actually followed.[4,6-8] To facilitate implementation, models have been developed which support a systematic programmatic approach to the introduction of innovations, including guidelines. It is suggested that following the steps of these models would increase the chance of successful implementation of innovations.[9,10] One systematic approach is the theoretical framework developed by Grol and Wensing (2005).[11] Grol *et al.* (2005) have integrated several theories and approaches related to effective implementation of innovations in an implementation model.[9] This led to a model consisting of five steps: (1) development of a concrete proposal for change in clinical practice, (2) analysis of the target group and identification of the obstacles or barriers for change, (3) linking the activities to the needs, facilitators and barriers for change, (4) development and implementation of an implementation plan and (5) continuous evaluation or monitoring based on indicators.

For a successful change of professional behaviour, factors that promote or hinder the implementation of guidelines should be identified (step two of the framework of Grol and Wensing) to tailor guidelines to the setting and to design appropriate strategies to overcome potential barriers (step three).[11-15] Influencing factors vary from setting to setting. These are often classified in characteristics related to the innovation (e.g. complexity of the guideline, presence of clear scientifically based knowledge, involvement of the target group during the development of the guideline), the individual professional (e.g. experience and knowledge, age), the social context (e.g. support, familiarity and agreement with the guidelines among professionals, openness to change) and the organization (e.g. training, personnel, workload, access to research related resources, time).[7,12,13,16-22]
Although an earlier study provided insight into the extent that the recommendations of the guideline 'Triage in emergency departments' (2004) were followed,[4] it did not clarify the factors that influenced the implementation of the guideline. Based on the framework of Grol *et al.* (2005),[9] the first aim of this study is to perform a context analysis to explore the experiences of nurses, ward managers and doctors in guideline implementation and the factors that influenced the adoption of the Dutch guideline 'Triage in emergency departments' (2004) (step two of the framework). The second aim is to develop specific implementation strategies and activities for the revised guideline (2008) which target the identified factors (step three of the framework).

Methods

Study design and setting

An inventory on factors hindering or promoting the implementation of guidelines can be performed using qualitative and/or quantitative methods.[9] This exploratory study used a descriptive design with qualitative and quantitative elements. Firstly, to obtain insight into the factors that influenced the implementation of the guideline 'Triage in the emergency department' (2004) from experiences of nurses, ward managers and doctors working at EDs in the Netherlands. Secondly, to develop implementation strategies and activities to overcome the factors that hinder the implementation of the guideline.

Data collection

Different methods were used to gain understanding of the influencing factors namely a questionnaire, focus groups and in-depth interviews:

Questionnaire
In 2007, a questionnaire was sent to every ED in the Netherlands (n = 108). All ward managers were asked to fill in the questionnaire and to select one nurse and one doctor to do the same. The questionnaire consisted of questions based on the recommendations of the guideline. Answering scales were a two-point scale ('yes – no') or a six-point scale ('never – sometimes – regularly – often – mostly – always'). If EDs replied that they did not carry out a specific recommendation, a follow-up question was asked whether they could identify 'why not'. For this study only the data of these 'why not' questions were used, as these questions pointed out specific factors that influenced the uptake of triage. For example: 'why are patients arriving at the ED not seen by a nurse within five minutes, as the guideline recommends?'

Focus groups
In addition to the questionnaire, focus groups were organised, to cover a wider range of influencing factors by the questionnaire. By performing focus groups we could go more in-depth.
To gain participants for the focus group, two approaches were used. Firstly, in March 2007, members of the Dutch Society of Emergency & Accident Nurses (NVSHV) were approached by post (n = 200). These members were randomly selected from a mailing file of the NVSHV which consisted mainly of nurses working in the ED and were asked to participate. Secondly, ward managers who stated in the national questionnaire that their ED used the Manchester Triage System (MTS) or the Emergency Severity Index (ESI) (n = 48) were invited to participate and also asked to indicate a nurse on their department who would be willing to participate. In May 2007 all focus groups were held.

In-depth interviews
No doctors participated in the focus groups, as it was difficult for them to attend due to time pressures, therefore on site in-depth interviews were organised with them. Doctors were recruited from the same hospitals as the ward managers who were interviewed. This ensured that representatives of all professions dealing with triage were involved in the study. The interviews took place between July–September 2007.

Inclusion criteria
All EDs (a full population sample) in the Netherlands received the questionnaire. For the participants of the focus groups and interviews inclusion criteria were: participants worked in an ED that performed triage using the MTS or the ESI;

participating nurses had to perform triage; participants worked in different types of hospitals (university hospital, teaching hospital and non-teaching hospital) and in hospitals distributed across the Netherlands. A specific inclusion criterion for the interviews was that the ward managers had not already participated in the focus groups.

Procedure

Participants in the questionnaire study, the focus groups or the interviews were informed about the purpose. Assurances of confidentiality and anonymity were also given. For the focus groups and the interviews the primary questions were open: 'In your opinion, which factors (1) hindered and (2) promoted the implementation of triage following the recommendations of the guideline Triage in the emergency department (2004) at your ED?' Besides the primary questions, another question was asked during the interviews, namely if persons could give a suggestion to overcome any barriers. Subsequent discussions explored the influencing factors and the suggestions more deeply.

During the focus groups all mentioned factors were recorded on a flipchart. At the end of the focus groups all participants were invited to point out three main factors that influenced the implementation process at their ED. This was done to classify the factors of importance.

The focus groups lasted no longer than 90 minutes, the interviews lasted 30–60 minutes. The focus groups were conducted by two researchers (MJ and CK), the interviews by one researcher (MJ). Notes about issues arising during the focus groups or the interviews were made and questions were asked afterwards if these issues had not been clarified during the focus groups or interviews.

Analysis

Influencing factors stated in the questionnaire were written down. As some factors were very specific, we derived themes from individual remarks and then using simple frequencies to assess relative importance as we assumed that there is a close relation between the frequency to which a factor was mentioned and the degree of influence. Factors which were mentioned only once were assumed to be specific to that ED and were left out of the analyses. The other factors were then classified into the categories; innovation, individual, social or organisational.[9]

To analyse the focus groups and interviews, qualitative content analysis was carried out to obtain insight into the factors that influenced the implementation of the guideline and the activities that were used or were suggested to overcome barriers.[23] The focus groups and interviews were audio taped and transcribed. As

the participants of the focus groups individually pointed out the most important factor, a distribution of the most influential to least influential factor was made, using the results of the flipchart. Common themes were identified by two researchers (MJ and CK), categorised by hand and matched to the categories related to the innovation, the individual, the social context and the organisation.[9] Member checking confirmed the credibility of the data: each participant was given a full transcript of the interview with a summary of themes to determine whether the themes were appropriately identified and matched their responses. The results of the questionnaire and interviews were then combined.

Development of implementation strategies

The next phase was the development of tailored implementation strategies and activities to overcome the factors that hindered the uptake of triage. We selected different strategies and suggested activities to overcome the factors that influenced the implementation negatively.[9]

Meeting with experts

An expert meeting was organised to present and discuss the results related to the influencing factors with the tailored strategies and activities. The experts consisted of the chairperson of the NVSHV, four nurses, two ward managers, seven doctors (all working at an ED), an implementation counsellor and a guideline development counsellor. The experts did not participate in the focus groups or interviews.

Ethical approval

The recommendations of the Netherlands' Central Committee on Research Involving Human Subjects were executed, following the Step-by-step plan RC review (http://www.ccmo-online.nl/main.asp?pid=1&taal=1). Ethical approval of a certified health care ethics committee was not needed, as by Dutch law this is not necessary when patients are not exposed to experimental care or treatment, when data collection does not occur at patient level, when participants are not asked for medical or highly personal information and when data collection is not burdensome (http://www.ccmo.nl).

Results

A total of 81 out of 108 EDs (75%) returned the questionnaires. Of these 81 EDs, 59% used the MTS (n = 42) or the ESI (n = 6). In total, the ward managers pointed

out 12 influencing factors, the nurses mentioned 15 factors and the doctors stated four main factors. In total four focus group meetings were held. Due to practical reasons the focus groups were composed differently; one focus group consisted of only nurses (n = 7), one group of only ward managers (n = 3) and two mixed focus groups enclosed nurses (n = 11) as well as ward managers (n = 4). The interviews took place with three ward managers and three doctors. Nurses, ward managers and doctors experienced differences and similarities on factors which influenced the implementation of the guideline. Table 1 shows all factors that came up from the questionnaire, focus groups and interviews.

Nurses' perception of factors that influence the implementation of the guideline

The main factors stated in the questionnaire were lack of resources (triage room, Information Communication Technology software (ICT-software), education and personnel) and workload. Of the resources, shortage of personnel and the absence of a triage room were factors which had the most negative influence. If the ED did not provide these conditions, nurses were more reluctant to perform triage.

In the focus groups, resources and workload were also mentioned as influencing factors, but not as most important. One key factor mentioned by nurses was related to the social context (resistance to perform triage among colleagues and how difficult it is to overcome resistance), as one nurse clearly stated:

> *'In the beginning there was a lot of resistance among the nurses. Creating clarity and informing the nurses what triage was about, finally resulted in acceptance of performing triage. It is important to point out what triage yields and what the benefits are. You should change the whole behaviour of nurses. It takes years before there is a mental change. Triage can be seen as a new specialisation.'*

The second key factor was commitment to perform triage among nurses as well as among doctors. If nurses agreed to perform triage and the doctors did not follow the agreements related to the target time (seeing the patients in order of urgency in a specific time schedule) it discouraged the nurses from performing triage.

Ward manager's perception of factors that influence the implementation of the guideline

In the questionnaire, the main factors ward managers mentioned concerned; workload, shortage of personnel and the absence of a triage room. In the focus groups and interviews ICT-software and education were also mentioned as important conditions for triage. During the focus groups and interviews it appeared that the ward managers considered these conditions as less important than the nurses' opinion:

> *'If one cannot realise all conditions fully, you should try to make the best of it and see what you can do.'*

Contrary to the ward managers, nurses expressed resistance if the resources were not present. A good example is related to the amount of personnel. The ward managers' view on triage was that when it is crowded at the ED, triage is especially important. The nurses' opinion was the opposite: triage should not be performed in busy times since nurses are needed in the treatment rooms. Or as one ward manager mentioned:

> *'I had the idea that nurses resisted to perform triage, as long as I did not facilitate all preconditions. This ended up in a long discussion. Nowadays I see that nurses are convinced of the advantages of triage, although some still say: 'I cannot perform triage, as…' And then the same old arguments are stated.'*

Another important factor brought up by the ward managers during the focus groups and the interviews was related to the social context, especially culture at the ED. According to the ward managers, nurses base their work merely on experiences and old routines. It takes time and patience to change old routines. Also triage is experienced by ward managers as a negative activity as one respondent mentioned:

> *'Some nurses who are willing to perform triage are somewhat 'disdainfully' looked at by other nurses. The word triage sounds somewhat 'negative'; who is the 'triage-girl today.*

At the organisational level, ward managers pointed out that feedback of results is vital, as quoted in the next fragment:

'Feedback of the results to nurses should be part of the work. Do not only look at the advantages and disadvantages for nurses but also consider the advantages of triage for patients. For example, does triage lead to more satisfaction among patients? So, give insight in all benefits of triage, before and after implementation.'

Doctors' perceptions of factors that influence the implementation of the guideline

In the questionnaire the doctors mentioned workload as an important influence on the use of triage. The interviews showed that the doctors had a different perspective on the influencing factors. To them, the most important factor was the availability of doctors on the ward. Doctors are often working at different locations in the hospitals: the inpatient departments in the hospitals or the outpatient clinics. Therefore, it is for the doctors on duty often difficult to meet the target times on the ED. Furthermore, one respondent pointed out a difference between hospitals is the presence of a specialised ED-doctor. They are trained to work in the ED fulltime. Therefore ED-doctors are very well aware of the triage procedure and they can inform their colleagues from other disciplines. Hospitals without an ED-doctor have more problems with triage.

According to the three participating doctors, organizing specific meetings for doctors on triage is a positive factor, although there was some concern about the attendance at these meetings. Often just a few doctors joined these meetings, so most of them remained uninformed. Another factor was a high turn-over of doctors. Often doctors are not informed about the procedure related to triage. It takes time before they are informed and familiar with performing triage. One doctor described the implementation of triage at the department as follows:

'When implementing triage, we expected that from the moment everybody was informed about the triage system, everybody automatically would perform triage. This appeared to be wrong. Among ED-doctors who use triage daily it is not a problem. Within a few months you know the procedure. Doctors of other disciplines who were not involved in the implementation have more problems in the uptake of triage.'

Table 1. Factors influencing the implementation of triage at the ED

	INFLUENCING FACTORS*		
	Nurse	**Ward manager**	**Doctor**
The guideline	Neurological symptoms and fever amongst children are not incorporated in urgency codes	Neurological symptoms and fever amongst children are not incorporated in urgency codes Triage time as indicated in the guideline is too short	Neurological symptoms and fever amongst children are not incorporated in urgency codes
The individual	Lack of knowledge, insight and skills Work based on experiences and old routines	Lack of knowledge and skills among nurses Work based on experiences and old routines No motivation/discouraged nurses Feedback is not always appreciated	Lack of knowledge, insight and skills No motivation No priority for target time
The social context	Culture Resistance No cooperation with doctors No feedback No commitment Lack of support (all professions) Change in society (increased number of patients, need for care	Culture Resistance No cooperation with doctors Low attendance of doctors during information meeting Difference in need between ward managers and nurses	Culture No feedback or evaluation Low attendance information meeting Doctors are not informed on the urgency codes of patients Absence of ED-doctors No instruction of triage

	INFLUENCING FACTORS*		
	Nurse	**Ward manager**	**Doctor**
	changes from daytimes to evening times)	No insight in relevance among nurses and doctors No involvement of doctors during implementation	Frustration among nurses if doctors do not follow the protocol Unfamiliarity with triage
The organisation	Shortage of personnel No triage room No ICT-software† Lack of education Workload No task description/no triage protocol No evaluation, no audit Top-down or bottom-up implementation Outpatient clinics/patients arriving by ambulance	Shortage of personnel No triage room No ICT-software Lack of education Workload No triage protocol/no task description No evaluation, no audit Top-down or bottom-up implementation No insight in advantages No cooperation of management hospital No time for implementation No clarity in juristic consequences Problems with ICT-software No ED-doctor High change of doctors	Shortage of personnel Lack of education Workload No task description nurses

*The italicized factors are mentioned by two or more professions

† Information Communication Technology software

One doctor mentioned the importance to actually do something with given feedback; it discourages doctors as well as nurses from performing triage, if nothing is done with feedback:

> *'At the ED everybody was enthusiastic to perform triage. But when you find out that nobody does anything with the results of triage, it is difficult to keep everybody motivated.'*

Although doctors experience triage as important, one doctor portrayed a negative consequence of triage:

> *'My idea about triage is that sometimes patients have to wait longer in the waiting room than necessary, specific among patients with code blue or green. Doctors easily say: 'I don't need to see the patient yet, as I still have some time left. As if it gives you a justification that patients have to wait longer than the target times gives you. During busy times, it is medically justified for patients to wait. However, besides medical urgency you should also consider the client's perspective.'*

Implementation strategies

The influencing factors that hindered the implementation (Table 1) can be categorised in key factors namely: knowledge, insight and skills; daily routines; motivation and/or commitment; support; informed doctors; preliminary work and arrangements for implementation; description of tasks and responsibilities; workload and; the presence of resources (Table 2). Subsequently, these factors were linked to the following implementation strategies: educational strategies, strategies for the maintenance of change, motivational strategies and consensus-building strategies, informative strategies, organisational strategies and facilitating strategies.

During the interviews, activities were discussed to resolve these barriers. These activities were placed under the different strategies. This way every ED could, based on their own influencing factors, set out their own activities to decrease the influence of the factors that inhibit the implementation of triage at their department. Table 2 shows the influencing factors linked with the different strategies and suggested activities, based on the ideas of the respondents.

Table 2. Implementation strategies and activities based on the influencing factors

Influencing factors	Implementation Strategies	Suggested activities
The individual		
Shortage in knowledge, insight and skills	Educational strategies	Certified education in acute care or ED-education Official training in triage Training-on-the-job Testing of knowledge (e.g. case discussion)
Preference of old routines or disregard to perform triage	Motivational and consensus-building strategies	Reflection, supervision, dialogue Evaluation & feedback on performance triage
The social context (team approach)		
Shortage of motivation and/or commitment of nurses and doctors *Shortage of support of colleagues and management*	Motivational and consensus-building strategies	Informing all involved disciplines on the purpose, content, use and the advantages of triage Norm setting: all nurses with the required education need to perform triage Creating commitment before implementation of triage (e.g. newsletters, team meetings) Feedback on team performance (Multidisciplinary) reflection: evaluation and case discussions
Lack of informed doctors	Informative strategies	During implementation involvement of doctors Organising special meetings for doctors ED-doctors informing doctors of other disciplines

Influencing factors	Implementation Strategies	Suggested activities
The organisation		
Lack of preliminary work and arrangements	Organisational strategies	Formation of a triage workgroup Inventory of which recommendations of the guideline the ED already uses and which not Schedule time for preliminary work, implementation and evaluation
Disagreements in tasks and responsibilities		Translation of the guideline to a local situation/protocol Drawn up agreements with doctors Reflection in a multi- and monodisciplinaire team
Workload		Feedback on triage, specific during rush hours Insight in advantage of triage Assigning one nurse responsible for triage per shift
No triage workgroup	Facilitating strategies	Formation of a triage workgroup involving ward managers, nurses and/or doctor (informal leaders) Description of tasks workgroup
No triage room		Consultation with ward managers concerning the possibilities Organising of a triage room: conditions of the triage room
No ICT-software[†]		Consultation with ward managers concerning the possibilities Stimulating the to use ICT-software (by nurses and doctors)

[†] Information Communication Technology software

Discussion

From this study, together with an earlier study,[4] it becomes clear that, although the guideline 'Triage in emergency departments' was released in 2004, after three

years the guideline was not (fully) implemented in each ED. This is contrary to what was expected as the NVSHV and the Netherlands Health Care Inspectorate (IGZ) who promoted the guideline as a national standard. This study gives insight into reasons why EDs did not implement the guideline (step 2 of the implementation model of Grol & Wensing 2005).[11] Furthermore this study linked implementation strategies and activities to overcome the barriers that hinder the uptake of the guideline (step 3).

Influencing factors

Some variety was found between the different professions' perceptions on influencing factors. Most factors mentioned by nurses were also mentioned by ward managers. A few of these factors were also mentioned by doctors. Although there was overlap between the professions, the relevance of the factors could differ. For example, nurses mentioned not performing triage at busy times. Ward managers mentioned busy times as an influencing factor as well, but they did not find this a significant factor for not performing triage. On the contrary, they stated that, specifically at busy times, triage is important and should therefore be performed, because it is in the interest of patients. One doctor mentioned busy times also. Nevertheless that doctor had the opinion, that when the decision is made to perform triage, nurses should continue to perform triage, whether they are busy or not. One explanation for the difference of importance per factor pointed out by the different disciplines could be due to other interests and consequences. As the professions have a somewhat different view on the influencing factors it affirms the importance of including all disciplines during the identification of factors that could influence the implementation of the innovation. This way strategies and activities could be developed to overcome all factors that hinder the uptake of the innovation.

The factor 'shortage of personnel' was mentioned by all three of the professions. Although this is a barrier for the implementation of triage, it is difficult to overcome this obstacle. A reason given is that EDs are dependent of the management of the hospital if they want to employ more nurses. Concerning this barrier, the ward managers were less reluctant than nurses. Nurses mentioned they would not perform triage if no extra nurse could be employed. Ward managers' point of view was that they should be creative in performing triage. As this problem was mentioned often, more research on this subject should be undertaken; is the number of nurses working at the ED still sufficient to cope with the demand of the society. Influencing factors were found in all categories (innovation, individual, social context and organisation). Related to the innovation only one factor that hindered the implementation was mentioned,

namely that not all symptoms are included (mentioned symptoms were neurological symptoms and fever in children). Nurses as well as the ward managers and doctors mentioned this factor. In an adjusted version of the MTS, these two symptoms are integrated.[24] Although no more factors related to the innovation were found, it does not mean that no more factors related to the innovation exist that obstruct the implementation. One explanation for only one found factor could be that the participants did not consider factors related to the innovation as most important.

Implementation strategies

Insight in factors influencing implementation supported the development of tailored implementation strategies that could be used to promote the uptake of the revised guideline (2008). Although this study examined the implementation of the guideline Triage in the emergency department, it could act as an example for other guidelines.

It is important to take into consideration that the strategies developed are based on factors experienced by EDs who have or have attempted to implement the 2004 guideline. In this way an experience-based rather than an evidence-based set of implementation strategies is developed. The strategies can be used during the implementation of the revised guideline.

Data collection

Due to practical reasons the composition of the focus groups differed. Although this could have influenced the results, no new factors were found during the last interview. Therefore we believe we have achieved data saturation and found most of the influencing factors.

Since the participating persons came from different hospitals in the Netherlands and different types of hospitals (university hospital, teaching hospital and non-teaching hospital), we can conclude that the factors found give a clear insight into which factors influenced the implementation process concerning the guideline in EDs in the Netherlands.

Triangulation of data was performed to find more influencing factors. It appeared that the interviews pointed out different and more factors than we received from the questionnaire only. Furthermore the factors found in the questionnaire were more focused on organisational factors whereas the interviews showed that individual and social factors were important as well. Therefore we suggest different approaches to explore factors which hinder or facilitate innovations.

Study limitations and recommendations

This study has some limitations. Firstly, the data collection took place amongst persons who worked at an ED that implemented triage (MTS or ESI) as we were interested in factors they pointed out as influencing the implementation process. This study does not present clear reasons why departments have not implemented triage. Secondly, the possibility exists that only respondents who are positive towards triage were included: ward managers indicated one nurse and one doctor at each ED to fill in the questionnaire and participation in the focus groups and interviews was voluntary. Possibly, this study gives less insight into the opinions or experiences of persons who work at an ED where triage is implemented and who are not positive about triage. This selection bias may be reflected in the given answers. Therefore we would recommend an investigation into the reasons why EDs have not implemented triage. Thirdly, a possible bias could be related to the researchers who conducted the focus group and the interviews. They were involved in another study related to the implementation of the guideline and may therefore have been known to the participants. Despite the possible bias, we feel this study gives a balanced overview what problems EDs face during the implementation of the guideline.

We tailored the implementation of strategies and activities to deal with the barriers for the implementation of the guideline to improve adherence. Although it gives clear insight into how to implement triage, it does not mean that all the activities should be used in each department. Also, the activities in Table 2 were recommended by the participants and we do not state that this list is complete. When departments have to implement innovations it is important to get an insight into local factors that hinder the uptake. Local strategies and activities should be based on local factors.[10] Therefore we suggest that, when implementing innovations, preliminary exploration of the obstacles or barriers for change should take place. Furthermore, no research was performed to test whether these activities are effective. This study was not directed to the effectiveness and efficiency of these activities, so further research is required to retrieve information on the effectiveness and efficiency of these activities.

Although the activities are explicitly designed for the implementation of the the guideline Triage in the emergency department, the evaluation approach used in this study can be a reference method for other innovations.

Conclusions

To conclude, between nurses, ward managers and doctors working in a Dutch ED there was an overlap in factors they perceived as influencing the implementation of triage, although their views on these factors differed. The most influencing factors mentioned by nurses were resistance and lack of resources. Amongst ward managers, the factor culture was most influential and among doctors the availability of doctors at the ED. The current development of specialised ED-doctors appears to have a positive influence on the implementation of triage.
Insight into factors which influence the uptake of innovations can be used in the development of implementation strategies. Based on the results of this study, it can be concluded that activities related to education, motivation and consensus-building, informing, organisation and facilitation should impede the implementation process of triage.

Relevance to clinical practice

Implementation of guidelines is essential for improving the quality of care. Insight into the barriers for implementation and tailoring implementation strategies to these barriers improves the implementation.

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A cluster randomized controlled trial on the effectiveness of educating emergency departments on implementing the guideline 'Triage in emergency departments'; translating research into practice

CHAPTER 5

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Background. Studies show that implementation of guidelines is difficult, resulting in insufficient adherence, leading to suboptimal care for patients and higher incidence of errors. Educating nurses to use a stepwise approach for implementation of guidelines can contribute to adherence with guideline recommendations.
This study evaluated the adherence effects of educating nurses of emergency departments (EDs) on implementation of a triage guideline.
Design. A cluster randomized control trial.
Methods. ED nurses of eight units in the intervention group (IG) followed an interactive educational program (EP) as change agents on implementation of innovations. The EP focused on a stepwise approach to implement the triage guideline and sharing knowledge and experiences. Different workshops were organised on topics suggested by the change agents. The control group (CG) (n=9), received the guideline by regular dissemination. The implementation of the triage guideline was evaluated using questionnaires, minutes of meetings, and by observations. Primary outcomes were percentages of patients triaged and given urgency codes within 10 minutes after arrival at the ED, and patients seen by doctors within target time (based on urgency codes). Secondary outcomes were related to the other recommendations of the guideline. Data were collected before the EP, one and seven months after the EP. Data were analysed using descriptive statistics and repeated measurements analysis. Qualitative content analysis was performed on data gained from the meeting minutes.
Results. No statistically significant differences were found between both groups related to the primary outcomes. Within the IG as well as the CG, statistically significantly more patients were triaged at follow-up ($p<.000$ and $p<.000$ respectively). Both groups showed a statistically significant improvement of patients seen by the doctor within target time (IG: $p<.006$ and CG: $p<.002$). The IG-units statistically significantly more often performed a context analysis resulting in tailored strategies and activities, compared with the CG ($p<.007$). Within the IG, statistically significant improvements were found related to some secondary outcomes, while in the CG no statistically improvements were found.
Conclusion. Education could not be related to superior triage guideline adherence. However, educating nurses on implementing triage by using a stepwise approach seems to improve the process.

Background

Clinical practice guidelines are used to assist health care professionals and/or patients when making decisions on appropriate health care in specific situations. Clinical guidelines are developed on the basis of the best available evidence. Good implementation of guidelines is important to ensure the quality of care.[1,2] Although this is known, research shows that guidelines are not always well implemented and adherence to guidelines varies.[1-6]

In 2004, the Dutch Society of Emergency & Accident Nurses (NVSHV) established a national guideline concerning triage at the emergency departments (ED), which was revised in 2008. According to this guideline, each ED should perform triage using a validated triage system.[7] Triage is an important task in an ED: patients receive an urgency code based on the severity of their symptoms. The urgency codes indicate the order in which the doctor should see patients, in this way patients with the most critical symptoms are treated first.[7,8] Triage contributes to clinical justice for patients, and is also an effective tool for monitoring and evaluating care given at EDs.[7,9]

In September 2008, all EDs in the Netherlands (n=105) received a copy of the guideline by mail (regular dissemination). The primary aims of the guideline (2008) are that patients who arrive at the ED receive an urgency code within 10 minutes from the triage nurse (triage time), and are then seen by a doctor on a time (target time) based on this urgency code (Table 1). The recommendations of the guideline (see appendix 1) cover three main components: 1) the process of systematic triage, 2) triage systems and 3) implementation of triage. The first component describes how triage should be performed, the second component describes the validity and reliability of triage systems and how EDs can choose a triage system for their own ED. The third component gives information on how EDs could implement the guideline it selves.[7]

Table 1 Guideline proposed urgency codes related to target times[7]

Urgency code	Target times
Immediate	Directly seen by a doctor
Very urgent	Medical care within 10 minutes
Urgent	Medical care within 60 minutes
Standard	Medical care within 120 minutes
Non-urgent	Medical care within 240 minutes

Although the Netherlands Health Care Inspectorate (IGZ) and the NVSHV recommend the use of the guideline, earlier research showed that adherence was suboptimal: over 31% of the EDs in the Netherlands did not use any kind of triage system in 2007.[6] At these EDs, patients were seen by the doctors in order of appearance or based on the urgency in the clinical view of the nurses. As a result, the doctors did not always see patients with serious medical conditions in time, which could have resulted in serious consequences for patients.[6]

When improving the implementation of guidelines in practice, several interventions can be effective, such as; educational meetings, educational outreach visits, audit and feedback, or reminders. Also, the use of influential people or a group of experts may play an important role in the implementation of innovations.[10-17] In line with this, the Netherlands Centre of Excellence in Nursing (LEVV) developed a training program to train nurses (so-named opinion leaders) in implementing innovations. The aim of this program was to increase the implementation skills and knowledge of the opinion leaders. The program was based on the implementation model of Grol & Wensing.[18-19] Within this model, several theories and approaches related to effective implementation of innovations were integrated. The model describes several steps for implementation: 1) development of a concrete proposal for change in clinical practice, 2) analysis of the target group and identification of the obstacles or barriers for change, 3) linking the activities to the needs and barriers for change, 4) development and implementation of the plan, and 5) continuous evaluation. One essential part of the LEVV program was to train opinion leaders in how to use the stepwise implementation model. Opinion leaders were also trained to carry out a context analysis to gain insight in factors that hindered or promoted the uptake of the innovation. Based on the factors identified, tailored implementation strategies were chosen. Using this model for a systematic approach could effectively overcome barriers to change.[10,18-25]

To increase the performance of triage as stated in the national guideline, an interactive educational program (EP) on how to implement the guideline at their department was designed for ED nurses, based on the framework of the LEVV's training program. The objective of this study was to assess the effectiveness of the EP on adherence to the triage guideline recommendations. The hypothesis was that the EP would increase the guideline adherence beyond potential improvement in EDs which received the guideline by regular dissemination only.

Methods

Design and setting

This study was designed as a cluster randomized control trial with EDs as the randomisation units, and with baseline and two follow-up measurements. Participants were recruited from April 2008 till August 2008. All ward managers of EDs in the Netherlands (n=105) received a questionnaire (base-line measurement), based on the recommendations and indicators (n=29) of the guideline 'Triage in emergency departments' (2008). EDs that did not use a validated triage system or had a self-reported adherence to the guideline's recommendations of less than 65%, were invited by telephone to participate in the EP (n=37). When EDs were interested (n=27), they were informed on the intervention face-to-face. After this introduction, 17 EDs agreed to participate. After a blocked randomization, based on the size of the hospitals (number of patient visits each year) and the percentage of follow up of the guideline (0%; 1 to 15%; 16 to 39%; or 40 to 64%), eight EDs were randomly allocated to the intervention group (IG) and nine EDs were randomised to the control group (CG). Figure 1 represents the recruitment flowchart.

The educational program

Each participating ED of the IG appointed two ED nurses. One nurse would participate in the interactive educational program (EP), the so-named change agents. The second nurse was a stand-in and sparring partner for the change agent. The change agent was defined as a nurse who leads change within the organization by managing and planning the implementation.[17] Change agents were selected on the basis of specific competences: at least one year work experience, an interest in triage, motivated to attend the EP, oral and written language skills, learning attitude, and cooperative skills.[24] The change agents had an active role in assisting the EDs through the process of change: implementation of triage.

The change agents received the EP on how the guideline 'Triage in emergency departments' (2008) could be implemented. The EP consisted of five meetings, each lasting for one day, over one year. The aim of the EP was to increase the implementation skills and knowledge of the change agents. At each meeting, a step of the implementation model of Grol & Wensing[19] was introduced and discussed (step 2, context analysis; step 3, developing strategies and activities; step 4, developing an implementation plan; step 5, plan for evaluation). Step 1 (development of a concrete proposal for change in clinical practice) was already

executed through the guideline 'Triage in emergency departments' (2008). Change agents received education and were coached on how to perform the different steps in their own practice.

Besides education on implementing triage using the systematic approach of the implementation model of Grol & Wensing,[19] the EP consisted of the following components:

- Time to share experiences on the performance of the different steps of the implementation model (step 2 until step 5). Change agents adapted aspects of other change agents for the implementation of the guideline on their ED and learned from other change agents how to overcome problems in their ED.
- Presence of an experienced nurse from a best practice unit where triage had already been implemented successfully (>80% adherence to the recommendations of the guideline). The best practice nurse attended the meetings and gave advice on the hindering or facilitating aspects they experienced during the implementation of the guideline. Also change agents could ask questions on specific points of interest.
- Workshops with themes introduced by participants (e.g. how to motivate colleagues, the development of a protocol). Workshops were given by experts on the different themes.

The change agents had to write down the results of the stepwise actions they performed at their own ED and to present the results during each meeting. This gave insight into their actions and experiences related to the implementation process. Table 2 gives an overview of the content per meeting.
The CG received the guideline by regular dissemination: all EDs received a hard copy of the guideline by post. They received no further education (standard method of care).

Data collection
The EP lasted from October 2008 till October 2009. Data were collected over 26 months using on-site observations on the ED (T0 in November 2008 and T1 in October 2009), and questionnaires (T0 in April 2008, T1 in October 2009, and T2 in May 2010).
Primary outcomes were percentage of triaged patients, patients triaged within 10 minutes (triage time), and patients seen within target time. Triage time was defined as the time between arrival at the ED and assignment of an urgency code by a nurse. Target time was operationalized as the time between assignment of

an urgency code and first contact with a doctor. These measurements are considered as most important aspects of triage, since the main purpose of triage is that patients are seen by the doctors in time. Secondary outcomes were recommendations related to the process of triage (e.g. which patients are triaged and within what time), implementation (e.g. presence of a triage protocol, a triage room, doctors informed), and to the usage of a systematic approach for implementation (e.g. usage of a systematic approach, usage of implementation work plan, identification of the barriers for change and linking these barriers to strategies) (Appendix 1).

Figure 1 Emergency department recruitment flowchart (CONSORT flowchart)

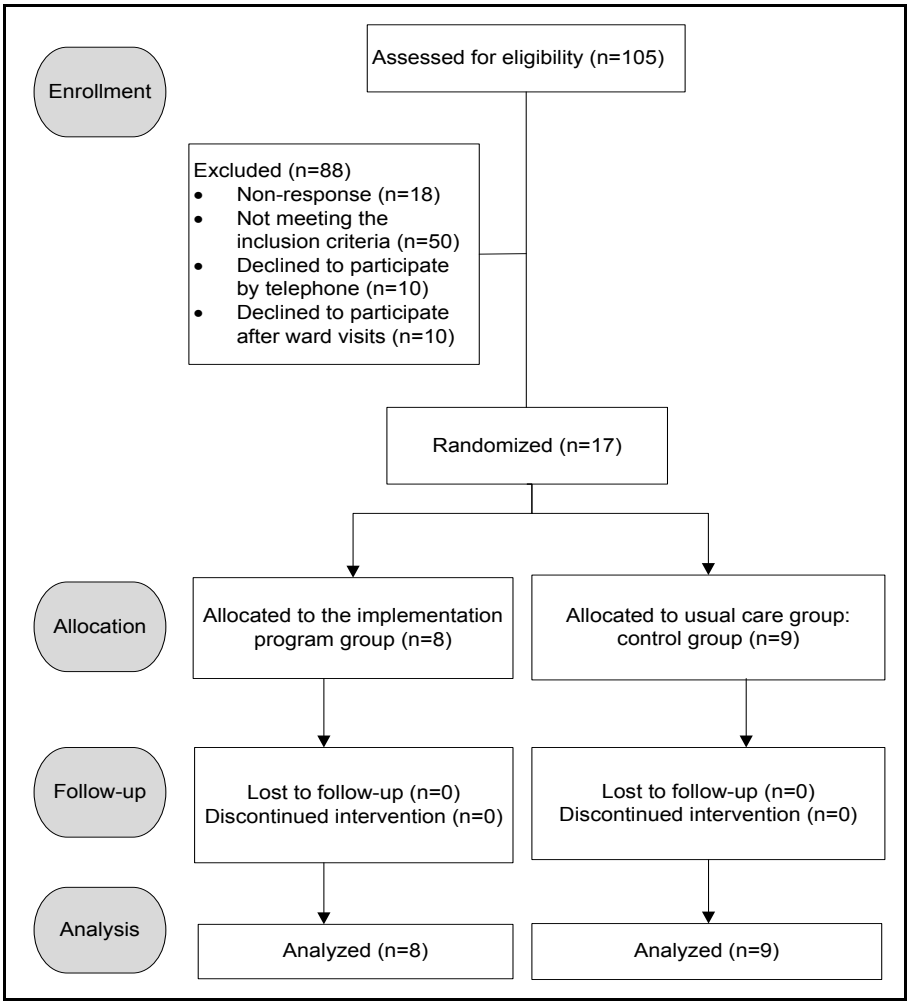


Table 2 Content of the interactive educational program

Implementation steps according to the model of Grol & Wensing (2004)	Content of meetings
Day one: Development of concrete proposal Context analysis	Lecture: introduction EP* Interviewing a best practice on implementation of triage in practice Lecture: introduction context analysis
Day two: Context analysis Implementation strategies	Analysis and sharing experiences on performed context analysis Lecture: introduction implementation strategies Interviewing a best practice on performed strategies in practice Lecture: measuring patient experience
Day three: Implementation strategies Triage protocol/indicators Implementation plan	Analysis and sharing experiences on implementation strategies Workshop: coaching skills Lecture: indicators and protocol for triage Lecture: introduction implementation plan Interviewing a best practice on implementation triage and development protocol
Day four: Triage protocol Implementation plan Evaluation (embedment/monitoring triage)	Analysis and sharing experiences on development protocol and implementation plan Interviewing a best practice Lecture: evaluation; embedment and monitoring triage Workshop: protocol (development and legislation) Workshop: how to motivate colleagues
Day five: Evaluation: embedment/monitoring triage	Sharing experiences on evaluation (embedment and monitoring of triage) Lecture: national developments on triage Evaluation personnel and professional development skills

*Interactive educational program

Observations

The observations measured the primary outcomes. The observations took place within the IG as well as the CG. A minimum of five patients per ED were observed by clocking triage time and target time using a stopwatch. To enhance the reliability of the measurements, all measurements were performed by the same researcher (DS).

Questionnaire

The target population for the questionnaire consisted of ward managers of all participating EDs (n=17). The questionnaire was based on questions related to all recommendations of the guideline.[7] and validated by expert opinion. The questions were related to demographics (e.g. number of patients per year, the use of a validated triage system), the process of triage, and implementation. At the time of last measurement, additional questions were added in relation to the usage of a systematic approach for implementation. Response options were either a two-point scale ('yes - no'), a four-point scale (0 till 25%; 26 till 50%; 51 till 75%; 76 till 100%), a six-point scale ('always-mostly-often-regularly-sometimes-never') or percentages (0-100%). In the introduction mail, a clarification was given for the 6-point scale: 'always' meant if all nurses/doctors performed the activities all the time (100%), 'mostly' meant within 76-99%, 'often' within 51-75%, 'regularly' within 26-50%, 'sometimes' within 1-25%, and 'never' 0%.

Analytical methods

Observations and questionnaire

Data were analysed using Statistical Package for Social Sciences (SPSS) 18.0 (IBM Nederland B.V., Nieuwegein, The Netherlands). The statistical analyses of the observations included descriptive frequency distributions of the variables triaged patients, triage time and target time. Mean triage time and target time were calculated. Furthermore evolvement over time was compared to IG and CG, using a repeated measurements analysis. Statistical significance was set at $p<.05$.

The statistical analyses of the questionnaire included descriptive frequency distributions for all variables. Additionally, a mean adherence to all recommendations was calculated per measurement. When recommended activities were performed in >76% of the patients, this was seen as sufficient. The 6-point scale questions and 4-point scale questions were therefore transformed into a 2-point scale: >76% or <75%. To examine whether the IG showed a superior improvement compared with the CG, repeated measures mixed models were performed. The questions related to usage of a systematic approach for implementation were analysed using Chi-Square tests. Statistical significance was set at $p<.05$.

Minutes of meetings

Qualitative content analysis was performed on minutes of the meetings. The minutes contained results from the context analysis with the tailored strategies,

draft protocols for triage and implementation plans, and plans for evaluation and monitoring triage.

Ethical considerations
Approval was gained from the Committee on Research Involving Human Subject Region Arnhem – Nijmegen the Netherlands (No. 2008/122).

Results

During every meeting, change agents of all EDs were represented. Throughout the year, two change agents were replaced by their spares as one change agent changed jobs (stopped after the second meeting) and one change agent went on maternity leave (stopped after the third meeting).
One ED from the CG was excluded from the data analyses of the questionnaire because it had used results from the context analysis and strategies from a change agent of the IG. If included, the outcomes of T2 (May 2010) would have been biased, also the implementation theory describes that each ED is unique and should therefore perform a context analysis of their own setting.[19]

Demographic outcomes
Directly after the EP (T1), all except for two EDs in the IG performed triage. These two EDs stated that they would start within a few months, as soon as all nurses of their ED had followed training in triage. During T2, one ED in the IG and one ED in the CG did not perform triage due to other policy priorities at the ED. All EDs used the Manchester Triage System, except for one ED in the CG that used the Emergency Severity Index. The numbers of patient visits, hospital admissions after ED visits, and EDs performing triage, showed no significant differences between and within the groups (Table 3).

Primary outcomes
Table 4 represents the data of the observations. No statistically significant differences were found between the two groups. Within the IG as well as the CG, statistically significantly more patients were triaged after the EP ($p<.000$ and $p<.000$ respectively). Within the CG, statistically significantly more patients were triaged within 10 minutes ($p<.002$). Both groups showed a statistically significant improvement of patients seen by the doctor within target time (IG: $p<.006$ and CG: $p<.002$).

Table 3 Characteristics before, directly after and seven months after the interactive educational program

		Systematic triage performed at EDs (n), type of triage system	Mean number/year of patient visits at ED (sd)	Mean number/year of hospital admissions via ED (sd)
Intervention group (n=8)	***T0***[1]	5 MTS[4]	19125 (9372)	4937 (2036)
	T1[2]	6 MTS	16265 (5918)	4219 (1026)
	T2[3]	7 MTS	16477 (5533)	4325 (967)
Control group (n=8)	***T0***	5 MTS	16815 (7573)	5605 (1588)
	T1	6MTS, 1 ESI[5]	17626 (7772)	5578 (1192)
	T2	6MTS, 1 ESI	17643 (7518)	5942 (1943)
Total (n=16)	***T0***	10 MTS	17970 (8317)	5293 (1777)
	T1	12 MTS, 1 ESI	16946 (6710)	4977 (1286)
	T2	13MTS, 1ESI	17060 (6405)	5187 (1728)

[1]Baseline measurement in April 2008; [2]Measurement in October 2009; [3]Measurement in May 2010; [4]Manchester Triage System; [5]Emergency Severity Index

Table 4 Results of the observations (before and 1 month after the interactive educational program)

Patients observed	**Intervention group (n=8)**			**Control group (n=9)**		
	T0[1] (n=68)	**T1[2] (n=82)**	**p-value (T0/T1)**	**T0 (n=67)**	**T1 (n=94)**	**p-value (T0/T1)**
Triaged patients	54%	82%	p<.000	42%	78%	p<.000
Triage time Patients triaged within 10 minutes	28%	39%	NS	19%	43%	p<.002
Mean triage time in hours (sd)	00:18 (00:19)	00:16 (00:21)	NS	00:22 (00:24)	00:11 (00:11)	NS

Patients observed	Intervention group (n=8)			Control group (n=9)		
	T0[1] (n=68)	T1[2] (n=82)	p-value (T0/T1)	T0 (n=67)	T1 (n=94)	p-value (T0/T1)
Range in hours (lowest-highest)	00:34 (00:08-00:42)	00:28 (00:04-00:32)	--	01:00 (00:05-01:05)	00:12 (00:05-00:17)	--
Target time						
Patients seen within target time	38%	61%	p<.006	30%	59%	p<.002
Mean target time in hours (sd)	00:33 (00:26)	00:32 (00:31)	NS	00:39 (00:41)	00:24 (00:22)	NS
Mean % adherence	40%	61%	p<.002	30%	60%	p<.000

[1]Measurement in November 2008; [2] Measurement in October 2009

Secondary outcomes

Both groups showed improvements in mean adherence to the recommendations of the guideline (Figure 2). Repeated measurement analyses showed statistically significant improvements within the IG related to the primary outcome: 'within ten minutes after arrival patients receive an urgency code' (p<.049, 95% CI: .002 - .747), and to the secondary outcomes 'nurses inform patients on urgency code and target time' (p<.018, 95% CI: .101 - .898), 'informing doctors on purpose and method of triage' (p<.041, 95% CI: .025 - .975), 'information material present in the waiting room' (p<.016, 95% CI: .134 – 1.116), 'presence of a triage nurse during day shift' (p<.018, 95% CI: .101 - .898), 'availability of a protocol with task description of the triage nurse' (p<0.19, 95% CI: .097 - .905), and 'a triage room is present' (p<.049, 95% CI: .003 - .747). Within the CG, no statistical differences related to the secondary outcomes were found over time (data not shown).

Each change agent performed a context analysis and formulated implementation strategies to implement triage at the ED. Statistically significantly fewer EDs from the CG (n=3) performed a context analysis (p<.007). The context analysis was performed more often and differently by the change agents of the IG. Change agents used questionnaires disseminated amongst nurses, questionnaires

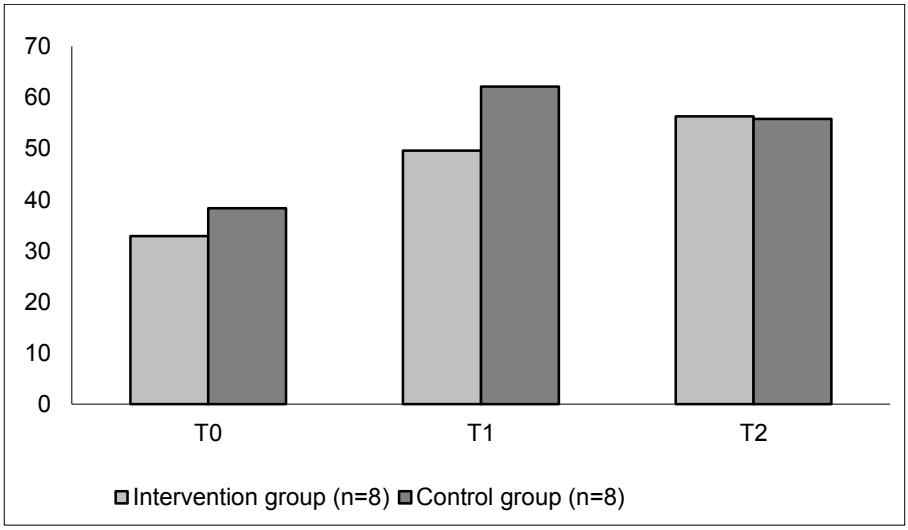
disseminated amongst nurses as well as doctors, face-to-face interviews with nurses or interviews during a department meeting. Main barriers or obstacles mentioned were related to lack of motivation and knowledge of colleagues (nurses as well as doctors), lack of resources (education, triage room, ICT-software, personnel), workload, high change of doctors, and absence of pain protocols.

All eight EDs from the IG planned tailored strategies and activities to overcome the obstacles or barriers. Statistically significantly fewer EDs from the CG (n=3) tailored strategies to the barriers identified ($p<.007$). Strategies or activities used by the change agents were related to education, motivation and consensus-building, information, organisation, and/or facilitation.

In total, administrators of 11 EDs (six EDs from the IG and five EDs from the CG) pointed out that their ED had developed a plan for implementation and a protocol based on the national guideline. Amongst EDs from the IG, six change agents developed the implementation plan and protocol. Two EDs from the IG pointed out that their implementation process was somewhat delayed as they were still working on step three (tailoring and organising strategies to the barriers and arranging conditions like education and an ICT-system).

In the final meeting, options of continuous evaluation and monitoring of the use of triage were discussed. Main components related to evaluation and monitoring of triage were mentioned, such as registration of triage times and target times using ICT-software, measuring patient satisfaction, supervision, the presence of a triage protocol and offering regular education (training-on-the-job).

Figure 2 Mean adherences to the recommendations over time



Discussion

This study evaluated whether educating nurses as change agents on how to implement the triage guideline would result in a better adherence to the guideline recommendations compared with EDs without this EP. Overall, both groups had an increase of adherence to the guideline recommendations over time. Results of the observations showed statistically significant improvements related to the primary outcomes percentage of triaged patients (within 10 minutes) and patients seen within the target time in both groups. Results related to the secondary outcomes showed that statistically significant more EDs of the IG performed a context analysis and planned tailored strategies and activities compared with EDs of the CG. Within the IG, statistically significant improvements were found related to information, presence of a triage nurse during dayshifts, task description for the triage nurse, and presence of a triage room (secondary outcomes). The CG showed no statistically significant differences associated with the secondary outcomes.

Although an increase for adherence was found, improvement of triage performance is still possible as the average percentage of mean adherence to the primary outcomes was about 60% in each group and 56% adherence to the secondary outcomes. An important result for patients visiting the EDs and the Dutch Society of Emergency & Accident Nurses (NVSHV) is that more EDs performed triage using a triage system, resulting in a higher percentage of triaged patients (about 80% of all patients). Although more patients received an urgency code within 10 minutes after arrival at the ED (about 40%) and have been seen within target time by the doctors (about 60%), the quality of care can still improve considerably by triaging more patients within triage time and target time.

Within this study, change agents were coached and educated how to implement an innovation, in this case the triage guideline. Educating change agents did not lead to statistically significant differences between the IG and CG related to guideline adherence. This corresponds with other studies that found a similar effect: an increase of adherence, but no statistically difference between the intervention and control group.[26-27] Although the presence of change agents did not lead to the desired effect (a higher adherence than EDs without the EP), we expect that the change agents learned how to implement innovations following a systematic approach. The change agents can use their knowledge on implementation of new innovations and share their skills and knowledge with other colleagues. Participants of the study of Holleman *et al.* (submitted) who followed a comparable program felt that the program empowered their function

of an 'opinion leader' in the field of nursing. The managers of the participating nurses considered the training program as a strengthening of the position of the 'opinion leaders as clinical leaders.[18] The study of Ploeg *et al.* (2010) showed that it is important to support and educate change agents adequate on knowledge transfer, policy development, research and evaluation, leadership and mentorship, on-going education and support to realize this.[28] Another reason for not finding an additional improvement in the IG compared with the CG, could be that although the CG was not encouraged to implement the guideline by the EP, the CG wards were motivated to implement the guideline themselves. This could be caused by the measurements performed at the ED-units of the CG, or by the NVSHV and the Netherlands Health Care Inspectorate (IGZ) who propagated the triage guideline by publications in professional journals and presentations at conferences. We cannot be sure of this, as Grol *et al.* (2005) mentioned that publications in journals and conferences as an implementation strategy have an inadequate to modest effect.[19]

This study did not analyse whether other factors influenced the adherence to the guideline. Other studies mentioned that the role of persons who improve the use of research in practice have some individual characteristics which could have influenced the implementation of the guideline. Characteristics mentioned were the position in the organization, the credibility among colleagues, clinical experiences, or earlier experiences with implementation. Furthermore, support of the organization or management could have been different amongst all EDs.[28-29] Thompson *et al.* (2006) state that strong communication and interpersonal skills can influence the change in practice.[30] Two change agents mentioned that administrators followed another route concerning triage during the EP. This was due to higher management or administrators who were not always informed on the procedure of the EP.

Several limitations should be considered in interpreting the results. First, the data of the questionnaire are based on ward managers' self-reported view on the performance of triage at their ED. This may have led to over reporting or socially desirable results.[31] To minimize this bias we performed observations at the ED. Secondly, this study gives little insight in implementation processes on the departments: what happened and which actions did the EDs perform. Thirdly, this study included a small group of participants, which possibly limits the credibility, or generalization of the findings. Fourthly, some administrators did not select change agents based on their competences, but they were randomly selected. It could be that the competences of change agents differed, which could have biased the implementation. Selecting nurses as change agents based on their competences could have led to a better outcome. Fifth, four nurses from the CG

mentioned that their ED already planned to implement triage even before they were invited to participate in this study. Four EDs brought up that they started implementing triage earlier than planned because of this study. This could have biased the results, as they were already committed to implement triage.

Conclusions

In conclusion, this study found no additional effect of educating nurses as change agents related to guideline adherence. It appears that just educating nurses on how to implement triage does not lead to a better adherence. Other factors seem to hinder or promote the implementation of triage.

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Appendix

Recommendations of the guideline

All patients (including control patients and ambulance patients) are triaged
Within 5 minutes after arrival at the ED, nurses start with triage
Within 10 minutes after arrival at the ED patients received an urgency code
The nurse informs the doctor on the urgency code
The triage nurses informs the patient on urgency code and target time
Triage nurses treat patients according to the pain protocol
The nurse responsible for triage is directly available for (re)triage
The triage nurses informs the patient on retriage
Patients in waiting room will be seen again by the nurse when target time has passed (retriage)
Patients in waiting room will be seen again by the nurse when the medical situation of the patient changed (retriage)
The doctors have been informed on the purpose and method of triage
The nurse responsible for triage is responsible for patients in the waiting room
Triage nurses are recognizable for all disciplines
Information material present in the waiting room
Triage nurse during day shift
Triage nurse during evening shift
Triage nurse during night shift
A protocol is present which describes the tasks of the triage nurse
A protocol for specific patient groups (e.g. immobile patients, non-cooperative patients or children) is present
A pain protocol is present
A pain protocol for adults is present
A pain protocol for children is present
Triage nurses who followed an acute care education (>76%)
Triage nurses who followed an addition triage training (>76%)
Triage nurses with minimal 1 year work experience after the acute care education (>76%)
An ICT review board is present
An ICT-software is present
An triage room is present
An triage workgroup is formulated
Patient satisfaction is measured

Identifying and overcoming obstacles in implementing the guideline 'Triage in emergency departments': a qualitative study.

CHAPTER 6

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Background. In 2008, the guideline 'Triage in emergency departments' was disseminated amongst all emergency departments (EDs) in the Netherlands. Triage entails prioritizing patients according to medical urgency. This study investigates obstacles nurses encountered during guideline implementation and actions nurses undertook to overcome problems.

Methods. This qualitative descriptive study is part of a larger randomized control trial study. Thirty-four in-depth interviews were held amongst nurses from 17 different EDs. Eight EDs were randomized in an intervention group (IG) and nine EDs in a control group (CG). The IG received an interactive educational program on how to implement the triage guideline using a stepwise approach.

Results. Nurses in the IG and CG faced broadly the same obstacles. However, the IG nurses were more structured in solving obstacles, related to 10 different subcategories: registration of triage/target time; triage performance; pain management; motivation; knowledge; patients; cooperation/support doctors; cooperation/support ward managers/management; resources; workload. Actions involved: addressing colleagues when agreements on triage were not followed; developing protocols; evaluating triage performance; applicating software; involving colleagues in the implementation process; educating/training and developing information material.

Conclusion. Lack of motivation among colleagues and lack of resources seemed the most important obstacles in implementing the triage guideline. IG nurses began searching earlier and more systematically for solutions to overcome hindering factors than ED nurses in the CG.

Background

Development and implementation of clinical practice guidelines improves the quality of care and patient safety. Implementation of guidelines into daily practice is complex and is influenced by factors related to innovation, the individual, the social context or the organisation. Inadequate implementation of guidelines can result in patients not receiving appropriate care.[1-6] Theories state that it is important to find out which factors influence the implementation process, and to develop strategies to overcome obstacles.[4,7-9]

In 2008 an obsolete guideline 'Triage in emergency departments' was updated. Triage classifies patients on the basis of medical urgency, with patients with a higher medical need being treated first.[10-12] The guideline recommends that triage nurses should follow a training in triage and have at least one year of ED work experiences. One difference between the two guidelines versions is that the earlier guideline specifically recommended the use of the Manchester Triage System (MTS). The 2008 guideline recommends triage systems that have a high reliability and validity and that are suitable for the Dutch context. This could be the MTS, but could also be another valid or reliable triage system. A second difference between the two guidelines is that the 2008 guideline incorporated practice based implementation strategies and activities for triage.[13,14] The first goal of the 2008 guideline is: the triage nurse assigns an urgency code to the patient within ten minutes after arrival at the ED. This urgency code, based on a patient's complaint and physical conditions, indicates the legitimate waiting time (target time) for patients before being seen by a doctor. This leads to the second goal: doctors see patients within the target time.[14]

A previous study showed that in 2007 over 30% of all EDs in the Netherlands did not implement an earlier version of the triage guideline.[15] Nevertheless, it is important to perform triage, to prevent dangerous delay in treatment which can result in serious complications for patients.[16] To implement the updated guideline successfully, an interactive educational program (EP) was developed to train ED nurses how to instigate triage. Eight EDs received the EP (the intervention group; IG) and nine EDs participated as the control group (CG). The guideline was disseminated by post to all EDs.

This study evaluates the process of implementation of the updated guideline in the 17 EDs (IG and CG), in order to develop an understanding of what problems arose and which actions nurses undertook to implement the guideline. The research question is: what did ED nurses of the IG and the CG experience as factors hindering the implementation of the guideline 'Triage in emergency

departments' and which actions did they undertake to overcome these problems? Furthermore, this study explores whether the intervention group and the control group faced different obstacles or used different approaches to overcome hindering factors.

Methods

Study design and setting

This qualitative descriptive study consists of in-depth interviews at 17 EDs across the Netherlands, which had an adherence to the 2008 guideline of less than 65%. Adherence was measured using a questionnaire, based on the recommendations and indicators (n=29) of the guideline 'Triage in emergency departments' (2008). In total, eight EDs were randomized in an intervention group (IG) and nine EDs in a control group (CG).). To diminish bias during randomization, randomization was stratified for number of patient visits a year and percentage of adherence of the guideline recommendations.

EDs of the IG appointed one ED nurse to participate actively in the interactive educational program, a so-named 'change agent' (n=8). Nurses who were already interested in triage were chosen as change agent by the ward manager. The CG (n=9) appointed one ED nurse as a contact person for this study.

All change agents and contact persons were interviewed twice.

Interactive educational program

The interactive educational program (EP) consisted of educating change agents in systematic guideline implementation, using the Grol & Wensing's stepwise implementation model.[4] The change agents followed a five-day EP over one-year (October 2008 till October 2009). During the EP, change agents shared experiences on practical performance of the different steps of the model (context analysis, developing strategies to overcome hindering factors, developing an implementation plan, and a plan for evaluation) and learned from the experiences of a best practice model (an ED that had already implemented triage successfully). Additionally, workshops on certain themes were organised (e.g. motivating colleagues, developing protocols).

Measurements

Semi-structured in-depth interviews were conducted at two moments, in April 2009 (half way the EP) and December 2009 (after the EP). This way, ED nurses

would be sufficiently able to recall experienced obstacles and undertaken actions. The interviews consisted of three main questions: 1) what was your reason for involvement the research project, 2) which hindering factors did you experience during implementation of the updated triage guideline and 3) how did you overcome these obstacles?
A topic list guiding the interviews consisted of five categories with specific items (Table 1): the innovation, the individual, the social context, the organization and the role of the change agent.[4] When new items arose while interviewing one participant then these were included in following interviews.

Table 1 Topic list for the interviews

Categories	Topics
Innovation	Dissemination; implementation
Individual	Knowledge; motivation; awareness
Social context	Triage work group; patients; support; culture
Organization	Resources (e.g. finances, education, staffing)
Change agent	Participation; time spent on implementation; advantages of participation of the interactive educational program

Data collection
After obtaining informed consent from the interviewees, all interviews were audio taped. The interviews lasted for a maximum of 70 minutes. To improve the accuracy, credibility, validity and transferability of the interviews, member checking was performed post interview.[17]
Additionally, minutes of meetings including verbal or written information from the change agents during the EP were taken to gain insight into the problems and solutions of the ED nurses.

Analyses
Content analysis was used to identify obstacles and activities to overcome the obstacles for implementation of the triage guideline.[18] Interviews were transcribed by four trained persons and were read entirely to develop an understanding of each interview. The transcripts were divided into fragments which were then analysed as segments using the computer program Kwalitan (version 5.0; Computer-Based Analysis of Qualitative Data, Nijmegen, The Netherlands, www.kwalitan.net). Open coding was applied to each segment and compared for similarities and differences. Investigator triangulation was done on 20% of all the segments to conclude whether the codes given to the segments

were correct. Consensus was effectively achieved in most cases in determining if segments were coded correctly. When there was disagreement, the segments were re-reviewed and discussed and the opinion of others in the research group was sought leading to an agreement in the end. As an underlying theoretical structure for this study, the categories the innovation, the individual, the social context, the organization and the role of the change agent were used. The interviews were analysed at group level (IG or CG) and comparisons between the two groups were made.

Ethical considerations

Approval was gained from the Committee on Research Involving Human Subject Region Arnhem – Nijmegen the Netherlands (2008/122). All transcribers signed a promise of confidentially form related to the content of the interviews.

Results

In total 34 interviews were conducted. Reasons for participation in the EP differed. Some EDs wanted to renew triage, considering this project as a trigger. Also, exchange of experiences and group support were seen as a way to learn and facilitate the implementation. Furthermore, the project offered a stepwise implementation approach, leading to better adherence to the triage guideline.
Ward managers initiated the participation in the EP, as triage is a required standard by the Netherlands Health Care Inspectorate (IGZ).

Obstacles and undertaken activities

In relation to the four categories innovation, individual, social context, and organisation, 10 subcategories were identified that hindered the implementation of the triage guideline (Table 2).

The innovation (guideline)

Registration of triage and target times

Three EDs did not register data of triage and target times, resulting in lack of insight in correctly performance of triage. One nurse mentioned:

> *'Sometimes we have the impression that several medical disciplines exceed the target time. However, this is only based on nurses' experiences. The management wants this to be proven by data.'*

Monitoring triage time and target time leads to a better performance of triage, as insight is gained into organizational problems related to triage. Another perceived advantage was that improvements would be more visible to nurses and doctors, improving motivation to perform triage. One nurse in the IG explained that registration of times resulted in a better quality of care as more patients were triaged and were seen on time by the doctors.
Actions undertaken were: ward managers addressed doctors when they did not register target times; triage time and target time were registered using ICT-software; results on triage and target times were evaluated with the team; information boards were attached to the wall with an overview of patients in the waiting room and assigned target time; and work shifts of doctors were adjusted based on target times.

Table 2 Obstacles for implementation of the triage guideline

Categories	Obstacles
Innovation	Incomplete registration of triage or target time Inconsistence triage performance Inadequate pain management
Individual	Lack of motivation among nurses and doctors Knowledge deficits
Social context	Insufficient patient information Lack of cooperation or support doctors Lack of cooperation or support ward managers/management
Organisation	Lack of resources High workload

Triage performance
Nurses (n=6) mentioned that during busy periods triage was not consistently performed and absence of a clear task description (n=5) hindered the performance of triage.
Here, actions undertaken were appointment of triage nurses during every shift, development of a task description, or feedback on or evaluation of the performance. Also, promoting a flexible attitude during implementation was seen

as important: trial and error. Furthermore, in the IG the use of a stepwise approach led to increased acceptance within the team.

Pain management

According to four nurses, no adequate pain protocols were present at the ED. Also, nurses forgot to ask patients whether they had pain and some nurses gave pain medicine based on their nursing experience instead of following a protocol. During the EP, all EDs from the IG developed and used an adult and paediatric pain protocol as advised in the guideline. Also at most EDs, registration of pain was integrated in the ICT software. Three EDs from the CG developed a pain protocol.

The individual

Motivation

All EDs (n=17) mentioned problems related to motivation of nurses and doctors to perform triage. This was due to different factors: no support of colleagues (nurses, doctors, management), lack of commitment, resistance or not motivated to change old routines, focus on possible bottlenecks, dislike of the task of triage, no insight into the advantages of triage, no resources (e.g. education, triage room, ICT-software), inadequate protocols, workload, no consequences when doctors don't meet the target times, unsuccessful prior implementation of triage, or fear/uncertainty about triage performance.

Actions to improve motivation were: evaluating colleagues on their performance of triage, informing colleagues, providing insight into the advantages and the use of ICT-software, choosing a starting date, case discussion (incidents at the ED) or the use of logbooks, arguing that triage is a national requirement, development of a triage-protocol, and providing evidence of aggression reduction in the waiting room. Furthermore, time was allowed for performing triage.

Specific actions by change agents involved: applying the theory of implementation in practice, holding regular workgroup meetings, involvement of the team during implementation, using targeted implementation strategies to overcome any lack of motivation, using innovators and new colleagues to implement triage or, as mentioned by one nurse, rewarding the team when targets were met:

> *'The first day every patient was triaged we treated the team to an apple-pie. Yes, a reward that as a team we did a great job.'*

The realization that education on triage was seen as an important factor to motivate colleagues:

> *'We received the training en we… Well, there is a form of transformation. I don't hear the statement "I have worked for 30 years this way" anymore. That is funny. In the beginning I often heard this.'*

Knowledge
Another problem was nurses having insufficient knowledge. Nurses were not informed about, or trained in, how to perform triage. Furthermore, nurses had limited knowledge of the content of the national guideline:

> *'The guideline lies in my inbox. Sometimes I ask questions about the guideline. Then they look at me, totally speechless and bewildered.'*

As a result, nurses are uncertain about choosing urgency codes and there is a dispute on assignment of urgency codes.
Undertaken actions were: (re)training, informing colleagues about the guideline, teaching trainee nurses how to perform triage, training-on-the-job, and copying and providing urgency codes with definitions to all colleagues. Two nurses from the IG pointed out that their ward manager applied for a training course on triage.

The social context
Patients
Patients were not always told about the procedure of triage, which resulted in an increase of complaints and aggression in the waiting room. Therefore, nurses from all EDs gave more information to patients (e.g. brochures, posters, TV in the waiting room or information at the hospital website). Nurses from the IG gave more information as the guideline recommended this. Information increased patient satisfaction, one nurse described this as:

> *'The agitation has decreased and patients stated that they find it pleasant that they obtain information immediately from the nurses. Incidents of aggression have decreased and there are less complaints or agitated patients. Well… and just… more calmness in the waiting room.'*

Cooperation/support of doctors
Problems related to cooperation/support among doctors consisted of: various levels of support and interest; not meeting target times; often occupied elsewhere;

or a large exchange of doctors unfamiliar with triage. Furthermore, nurses did not always call doctors when target times exceeded.
Actions of nurses were informing doctors about the guideline and agreements (training or newsletter), feedback on registered target times, ED-doctors informing colleagues-doctors about triage, involvement of doctors in the workgroup, and introducing triage to new doctors. A better cooperation occurred between nurses and doctors since doctors did meet the target times.

Cooperation/support of management
As mentioned, lack of cooperation, support or priority from the management were problems. Extra time to implementation triage during work hours was refused, no budget for resources was available and the guideline was implemented top-down. Also two nurses mentioned inadequate communication between ward managers and triage workgroups.
Actions undertaken were: making ward managers aware of existing options to implement triage systematically and/or informing ward managers about the importance (national requirement). Undertaken actions resulted in extra time to implement triage and, despite cuts, realization of the need to budget for resources to implement triage.

> *'Although the department had no budget, the management agreed to increase the number of personnel. I think that is special. Then they see the importance of triage.'*

The organisation
Resources
All nurses (n=17) experienced inadequate resources which they consider essential (e.g. insufficient training, no triage room, no extra staffing, no workgroup, absence of ICT software) as a major obstacle that hindered the implementation of triage, although the necessity of specific resources varied. Training was seen as an essential condition, ICT software could be replaced with paper records. Having no triage room was a problem, but if there was no space at the ED, a creative way of performing triage was needed:

> '*The resources… When it is clear that at a specific moment not all resources can be realized, you need to find another solution. You all need to pick it up together and find a way to cope with it.'*

Four ward managers would realize resources when the ED was renovated. Other actions involved negotiating with ward managers to give them an insight into the relevance of these preconditions. It was agreed that triage should be performed as soon as all nurses were trained.

Workload
Another often mentioned obstacle was workload. During rush hours nurses lacked time to perform triage, often as a result of insufficient staffing. This led to lack of awareness about the numbers and types of patients in the waiting room and the urgency of needed care.
All nurses mentioned a need for extra staff. During the end of the EP, some ward managers from the IG realized more staffing. Informing colleagues on the advantages of triage, especially during rush hours, led to understanding and acceptance of the relevance of triage.

Differences between the IG and CG
The CG experienced more problems in implementing triage than the IG. Furthermore, when change agents faced problems, they developed and applied tailored strategies to overcome these specific problems. Repeatedly, identified problems resulted in targeted actions and solutions, whereas problems amongst the CG were not always solved or did not always lead to actions:

> *'A specific activity is that we really need to perform triage, that it is well implemented, also during rush hours. Well I think there lays the priority. We have no specific plan to approach this. At least I don't have it. And we did not mention this.'*

Another nurse from the CG mentioned during the first interview that she wanted to introduce evaluation moments. During the second interview she answered:

> *'We have done this once during a work meeting. It did not go as planned. But we do not have a separate evaluation moment. No. Maybe we should do that.'*

Also, all change agents knew the content of the guideline, in contrast with the CG, who were not aware of the guideline or did not use it:

> *'I will honestly confess that I am not aware of the guideline.'*

'A triage nurse, that came from the guideline. But all the other things we have interpreted it on our own. We have not used the guidelines.'

Change agents

An additional problem change agents felt was that colleagues were not always informed about their activities. Colleagues had no awareness of the tasks of change agents and the way they tried to implement triage. As the change agent, nurses often felt that they were solely responsible for triage. They had a need for shared team responsibility (nurses, doctors and ward managers) for the implementation of triage. Another problem change agents had was their limited influence:

'At the start of the program I thought "that is nice, we do it step by step, and then triage is implemented", but that is not how it works in practice. For me it is not possible to arrange everything by myself at the work floor.'

Also, ward managers sometimes had another view on the implementation and performance of triage and imposed their view:

'My ward manager stated out of the blue, that triage had to be executed from this day on. That was really abruptly. There you go, I was making strategies based on the context analysis. Everything which was so clear to overcome hindering factors… I could not do anything with it. I heard from the secretary that it did not work, not surprisingly…'

All change agents agreed on the relevance of appointing an innovator to implement an innovation. Furthermore they learned how to implement an innovation by using a stepwise approach leading to results. Some change agents already mentioned that they used the knowledge they gained for the implementation of other innovations:

'I learned how to use the theory of Grol and how to develop a protocol. Not only for this project. I used my knowledge on implementation for other innovations as well.'

Discussion

This study was designed to evaluate factors that hindered the implementation of the guideline 'Triage in emergency departments' and actions nurses undertook to overcome these problems.

The main obstacles nurses faced during implementation of the 2008 triage guideline were related to registration of triage/target time; triage performance; pain management; motivation; knowledge; patients; cooperation/support doctors; cooperation or support ward managers or management; resources; workload. Key actions were targeted at these obstacles.

In the study by Janssen *et al.*[19] the authors identified which factors influenced the implementation of an earlier guideline related to triage. Factors found in this study seem to correspond with results from that study.[19] This study found additional hindering factors related to the innovation (no registration of triage/target times; problems related to triage process; no correct pain management) and patients (lack of information). Davies *et al.* (2008).[20] implemented six nursing guidelines and found similar influencing factors. Consistent with the study of Davies *et al.* (2008),[20] we found that support of ward managers was seen as an important facilitator for guideline implementation. Davies *et al.* (2008).[20] identified workload, time pressures or resistance as obstacles for guideline implementation. Some ED nurses in our study mentioned workload and time pressure as well. All nurses mentioned lack of motivation and resources. Therefore, it seems that these factors were the most essential. Overall, the IG and the CG mentioned similar obstacles. Yet, we experienced a difference between the two groups. Nurses from the CG experienced more problems, resulting in fewer tailored actions or results compared with the IG. Reason for this could be that change agents had to give an overview of their problems based on a context analyses. Based on the problems they faced, they developed targeted strategies to overcome these problems. This is seen as an important step in the implementation process.[1,4,9,21] The CG did not use a systematic approach to find out with which actions or strategies they could overcome problems during implementation of triage.

The second interviews brought no new insights related to hindering factors. Therefore we assume that we have reached saturation related to the hindering factors as no new factors came across.[17] During the last interviews, most nurses were still implementing the guideline. It is possible that in a later stage, more activities would have taken place, resulting in a higher adherence to the guideline.

A limitation of this study is that the researcher who performed the interviews knew the nurses, as the researcher was involved in the delivery of the EP and had contact with the nurses of the CG.[17] This could have biased the outcome of the interview towards socially desirable answers. On the other hand, we think that nurses were more open to talk about problems they experienced at their ED, as a familiar situation was already created.

Conclusion

This study identified 10 factors hindering the implementation of a (triage) guideline. The most influential factors were motivation and resources.
Whether one receives programmatically support during the implementation or not, the factors hindering the implementation of triage were the same in both groups. However, with extra guidance during implementation, the implementation process is more systematic, leading to targeted actions. Change agents became familiar with a systematic approach for implementation of triage, which is also applicable to the implementation of other innovations.

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The patient's experience of triage in emergency departments: a quantitative study

CHAPTER 7

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Submitted

Background. Quality of care from the patient's perspective is increasingly used in the evaluation of quality of care. Based on patients' evaluations, health care organizations can improve their quality of patient care. In triage in emergency care, patient experiences have not been often evaluated.
Aims and objectives. To describe patient experience on triage in emergency departments (EDs).
Methods. This study had a longitudinal quantitative design. EDs not performing triage according to the Dutch triage guideline (2008) in 2009 were included (n=15). A questionnaire based on the Consumer Quality Index was used to measure patient experiences before and after implementation of triage. Patients visiting the EDs were invited to participate during two weeks in October 2008 and November 2009. Differences between the two points in time were tested with ANOVA for continues variables, and with χ^2-tests for nominal and ordinal variables.
Results. 645 patients participated in this study. After implementation of triage, significantly more patients felt that they received an urgency code more quickly ($p<.000$), their pain was assessed directly after arrival at the ED ($p<.039$), they were treated within target time ($p<.000$) and they were informed on expended target time ($p<.000$). Also, fewer patients in the waiting room were worried after they had spoken with a nurse ($p<.046$). Overall, patients had a more positive experience at the ED after the implementation of triage ($p<.000$).
Conclusion. When EDs perform triage, patients experience their ED visit more positively: patients feel more informed, less worried, treated more quickly, and patients experience that ED nurses more often perform pain assessments and treatment.

Background

The patients' perspective is increasingly used in the evaluation of quality of care provided. Based on the outcomes of patient's evaluations, health care organizations can improve their quality of care given to patients.[1]
At the emergency department (ED) quality could be improved by carrying out triage using a triage system. By performing triage, EDs optimize the waiting time of patients: patients with the highest medical need are treated first. The main goal is to treat those patients with critical and intense symptoms as soon as possible, reducing the risk of a negative impact of long waiting times on the prognosis.[2-3]
Triage addresses the process from arriving at the ED until the first contact with the doctor.[3] When triage is performed correctly, patients receive information on the reason why they have to wait for a specific time before being seen by a doctor (target time). It also explains how target time is justified, based on their signs and symptoms. This way patients are less agitated or worried while sitting in the waiting room, as they have seen a nurse and know why they are waiting and for how long.[4-5] Communicating and informing patients about waiting times, and the respectful attitude of care givers improve the patient's experience of health care quality at the ED.[1, 4, 6-8]
In 2005 a triage guideline was introduced in Dutch emergency departments.[9] The Dutch Society of Emergency & Accident Nurses (NVSHV) promoted the implementation of triage. Yet, while studies often evaluate the effectiveness and safety of different triage systems, patients' experience on triage as an improvement is seldom evaluated.[10] Göransson and Von Rosen (2010)[10] investigated patient experiences of the triage encounter in Swedish EDs. Over 56% of all participating patients in this study experienced time to triage as too long. Only 31% of the patients were informed on target time and 22% were informed that target time was based on their medical urgency. Yet, 95% of all patients experienced that the triage nurse listened to them and took their complaints seriously, and over 96% felt they were treated with respect. Patient experiences other than through these Swedish data are not available.
The Dutch guideline has formulated two primary goals, namely all patients visiting the ED 1) receive an urgency code within 10 minutes after arrival, and 2) are seen by the doctor within target time. Another goal of the guideline is to improve the patient satisfaction.[3] Whether triage in accordance with this guideline leads to improvement in the patient's experience when visiting the ED (e.g.

provision of information, treatment of care givers, pain) is the subject of this study.

Methods

Study design and setting

This study has a longitudinal quantitative design with a before and after measurement. In total 17 out of all 105 EDs in the Netherlands participated in the baseline measurement (October 2008). These 17 EDs were distributed across the country and were included as they either did not use a validated triage system or had a self-reported adherence to the triage recommendations of less than 65% in 2008. EDs were included in the follow-up, when they were using a validated triage system in November 2009. This resulted in a final 15 EDs. During a period of two weeks, all patients visiting these EDs who had to wait in the waiting room were invited to participate. Other inclusion criteria were age >16 years and the ability to speak and read the Dutch language. Excluded were relatives of the patients, severely confused patients, patients arriving by ambulance and patients with life threatening conditions. Patients visiting the ED received a questionnaire where they could rate their actual experiences and what they found important when they visited the ED.

Instrument

For this study a structured questionnaire developed by the Dutch Institute for Healthcare Improvement (CBO) was used. The CBO questionnaire was developed in 2007 and especially designed to measure patient experience at EDs. Patients' experiences are measured instead of patient satisfaction, as patients' experiences have shown to be more objective and to give more information for quality improvement than patient satisfaction which relies upon expectations combined with personal preferences.[11-12]

The panel that developed the CBO questionnaire consisted of different representatives. These were from the CBO, the Netherlands Institute for Health Services Research (NIVEL), caregivers working at EDs (doctors and nurses), and an advisor from the National Support Point Client Advisors. The panel used different sources: the national guideline 'Triage in emergency departments' (2004), questionnaires in use at five different EDs across the Netherlands, and the Inpatient questionnaire of the Picker Institute Europe. The Picker Institute

Europe has developed survey instruments to obtain patients' experience with specific dimensions of care (www.pickereurope.org/).
The CBO questionnaire consists of four standard questions and 23 questions to be selected when relevant (the so-named library). The standard questions are related to privacy, waiting time, given information and whether caregivers treated patients with respect. Questions from the library are related to pain, triage time and target time, presentation at the ED (e.g. by a GP, ambulance, policlinics or self-referrals), informed consent, trust in knowledge of care givers, treatment of caregivers, and involvement of family. Answering options are based on the Consumer Quality Index.[13]
As we were interested whether patient experiences improved after the introduction of triage, questions related to triage were selected from the library. Questions were related to the following themes: demographic data (age and gender); treatment of the care givers; the content and process of care related to triage; information before and during the given care; and fulfillment of agreements. Furthermore, specific focus on the patient's experience was given to waiting times, target times, pain, and complaints. The final questionnaire consisted of 14 questions with a 4-point-scale ('yes – likely yes – likely no – no'). Questions related to treatment of caregivers were scored using the answering options 'yes, by all – not by the secretary – not by the nurses – not by the doctor – not by others'. To gain an overall rating on aspects of care, one question was asked how the patient scored the care given at the ED prior to being seen by the doctor (at a scale from1 till 10; very bad to excellent).

Data collection

The measurements took place before (October 2008) and after (November 2009) the implementation of triage. During two weeks, from Monday till Friday, all patients meeting the inclusion criteria were invited to participate (convenience sample).
To improve the response, all participating EDs received information on the procedure of the measurement in advance. One nurse of each ED received verbal information from the researchers and an instruction letter. They were asked to inform colleagues (nurses and secretary). The medical secretary gave all patients arriving at the ED an invitation letter together with the structured questionnaire. In the letter, patients were informed on the reason why patient experience was being measured and were asked if they were interested in participating in the study. Patients who wished to participate responded to the letter giving their consent, contact details and a preferred contact time. The following week,

patients who agreed to participate were telephoned and the questionnaire was filled in during the telephone call.

Data analysis

Data analysis was performed on the 15 EDs before and after the implementation of triage. As the questions were asked by telephone, no missing data were present. Data were analyzed using SPSS 19.0 (Statistical Package for Social Sciences). The descriptive statistical analyses included frequencies, means and standard deviations. Data before and after implementation were compared to find significant and relevant differences. Differences in time measurements were tested with ANOVA for continuous variables (such as age and mean score for given care), and with crosstabs and χ^2-test for nominal and ordinal variables. A significance level of 0.05 was used for all tests.

Ethical considerations

Approval was gained from the Committee on Research Involving Human Subject Region Arnhem – Nijmegen the Netherlands (No. 2008/122).
Anonymity was assured as the names of patients were not identifiable in the research data.

Results

Demographic information

In total, 723 patients agreed to participate in this study. Of these 11% (n=78) were excluded. Reasons for exclusion were: death after agreement (n=4), still admitted in the hospital (n=7), withdrawal from the study (n=14), not answering the telephone after three attempts (n=38), or an unobtainable telephone number (n=15). In 2008, 328 patients were included and in 2009 a total of 317 patients.
Age ranged from 16 to 93, with a mean age of 47.8 years. About 47% were female. There were no statistically significant differences regarding age and gender, before and after implementation of triage (Table 1).

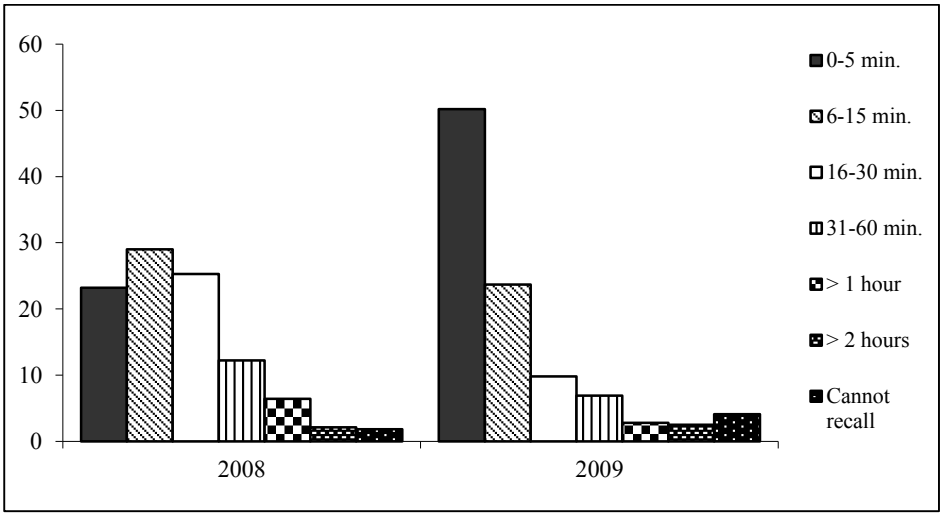
Urgency code

After implementation of triage, patients felt they had received an urgency code more quickly as compared to before implementation ($p<.000$; 95% CI: 0.276 - 0.740) (Figure 1). In 2008, 52% of all patients visiting the EDs were triaged within 15 minutes after arrival at the ED. In 2009 this percentage was over 73%.

Table 1 Demographic data of the study participants (n=645)

	2008 (n=328)	2009 (n=317)
Age (years): mean (sd)	47.2 (16.1)	48.5 (18.9)
Gender (female): n (%)	153 (46.6)	151 (47.6)

Figure 1 Time between arrival at the emergency department and receiving an urgency code



Pain, waiting times, information, complaints, and communication/ treatment
After implementation of triage, more patients felt they were asked whether they had pain directly after arrival at the ED (p<.039). Almost 50% of all patients said they received pain relievers before implementation of triage. In 2009, over 57% of all patients received pain relievers. After triage implementation, more patients said they were treated within target time (p<.000). Also when the target time expended, more patients felt they were informed on the expended target time (p<.000). Fewer patients in the waiting room felt worried after they had spoken with a nurse (p<.046). After the implementation of triage, more patients felt they were treated with less respect (p<.003). Even though more patients found it appropriate that their waiting time depended on medical urgency instead of the arrival time, no statistically significant difference was found. The overall score

for given care was statistically significantly higher after implementation of triage (Table 2).

Table 2 Results related to pain, waiting times, information, complaints, and treatment

	2008 (n=328)		2009 (n=317)		Differences between Measurements
	N (yes)	*%*	*N (yes)*	*%*	
After arrival, asked for pain[1]	147	46	209	66	p<.039
Patients who had no pain	116	35	112	35	NS *
Received immediately pain relievers after arrival[1] *(2008, n=212; 2009, n=205)*	103	49	117	57	NS
Informed on reason for waiting[1]	142	43	182	57	NS
Informed on target time[1]	144	44	152	48	NS
Treated within target time[1]	179	55	187	59	p<.000
Informed when target time expended[1]	36	11	153	48	p<.000
Not worried about complaints in waiting room after seeing a nurse[1]	285	87	283	89	p<.046
Treated with respect by all caregivers[1]	325	99	302	95	p<.003
Not by the secretary	0	--	5	2	
Not by the nurse	0	--	8	3	
Not by others	2	1	0	--	
Caregivers took emotions into considerations[1]	321	98	302	95	NS
Not by the secretary	4	1	4	1	
Not by the nurse	2	1	10	3	
Not by other	3	1	0	--	

	2008 (n=328)		2009 (n=317)		Differences between Measurements
	N (yes)	*%*	*N (yes)*	*%*	
It is appropriate that waiting time depends of complaints instead of arrival time[1]	268	82	281	89	NS
Given care (scale 0-10): mean (sd)[2]	7.3 (1.3)		7.8 (1.3)		p<.000

[1] = χ2; [2] = ANOVA; *NS = not statistically significant

Discussion

This study focused on patient experiences in relation to triage. Overall patients had a more positive experience at the ED after the implementation of triage. This was due to better information on the waiting process and more attention of nurses to the pain experiences of patients. Another improvement was that patients felt they were more often seen by nurses during triage time. Furthermore, patients were aware that it was safe to wait and were made aware of why some patients who attended later then they did, could be treated faster than they were. Patients pointed out that thanks to better information, they were less agitated and less worried whilst waiting in the waiting room. They knew why they had to wait and felt that the reason for their wait was legitimate. This finding was also reported in a study of Watt *et al.* (2005).[12]

Although patient experiences were more positive after triage was implemented, there are still areas for quality improvement. First, after implementation of triage, almost 66% of patients were asked whether they experienced pain. Yet, still 34% of all patients were not asked whether they had pain. When patients experienced pain, about 50% of the patients received analgesia. This indicates that the triage nurse should still pay more attention to the pain experience of patients. Even more so, as pain assessment is an important element in triage. The outcome of the pain assessment influences the urgency code for patients.[3, 14-15] Secondly, one approach to increase patient satisfaction is to inform patients about waiting time. Waiting time is an important factor in how patients experience their visit.[4, 12, 16-19] In this study, 43% of the patients were not given information about their reason for waiting and over 50% were not informed about their target time or when their target time expended. So there is much room for improvement. Nevertheless,

these results were more positively compared to the study by Göransson and Von Rosen (2010) as they found that only 31% of patients were informed on target time and only 22% were informed what the target time meant.[10]
Most patients experienced that health care givers treated them with respect and their emotions were taken into consideration before as well as after the implementation of triage. These results are comparable with results from the other study on the patients' experience.[10]
The literature on triage systems strongly recommends the use of triage systems at EDs, based on validation and reliability of the triage systems.[20-21] Our study confirms this recommendation, only not based on the validity and reliability of the triage systems, but on positive patients' experiences.

Limitations
During our study, a Consumer Quality Index for the accident and emergency departments (CQI A&E) was being developed. In the future, we advise to use this CQI A&E to measure patients' experiences related to triage as the CQI A&E is a standardized and validated system and will be used amongst all Dutch EDs.[1]
The study population was limited to Dutch-speaking patients. Non-Dutch speaking patients and care givers might add valuable information. Other studies mentioned that race could influence patient satisfaction in emergency departments.[8, 22-23] As 21% of the Dutch population are immigrants,[24] it would be interesting to investigate patient experience on triage within populations of different ethnicities. Especially, as in the coming decades the immigrant population will grow.[25]
Another limitation of this study is related to potential recall bias. We have chosen to collect the data within two weeks after the ED visit. When patients receive the questionnaire directly during the ED visit, it limits recall bias. However, we could not ask patients to fill in the questionnaire while waiting in the waiting room, as triage is the process of arrival at the ED until first contact with the doctor. Therefore, filling in the questionnaire within two weeks, was seen as an acceptable way to gain information.
Finally, there could be a discrepancy between experiences of patients and actual performance of ED nurses. Within this study we did not evaluate whether patient experiences matched the actual triage time, target time or given information. In an earlier observational study performed at the same ED-units amongst other patients, about 60% of all patients were seen within target time.[26] This corresponds with the experiences of patients on target time within this study. This

could indicate the reliability of experiences of patients, at least related to target time.

Conclusions

This study gave insight into patient experiences related to triage. When EDs perform triage, patients have a more positive experience of their ED visit than when triage is not performed. This is mainly due to better information on the process of care while patients wait in the waiting room. Also, pain assessments and pain treatment are more often carried out by the ED nurses. Despite this, results showed that there is room for improvement related to information services, pain assessment and pain treatment.

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General discussion

CHAPTER 8

The work on this thesis was started following the revision of the triage guideline in cooperation with the Dutch Society of Emergency and Accident Nurses (NVSHV) and the Netherlands Centre of Excellence in Nursing (LEVV). As the guideline (version 2008) was developed according to the state of the art (the Appraisal of Guidelines Research and Evaluation),[1] we believed that it was of good quality and that the guideline ought to be implemented, using effective implementation techniques.
Often, when research findings are published and disseminated via guidelines, not enough attention is paid to further implementation.[2] Therefore, we tried to overcome the gap between published research and research use in nursing practice by supporting emergency departments (EDs) in implementing the triage guideline.

Within this thesis we explored: 1) contextual factors that influenced research utilisation in nursing; 2) the adherence to the 2004 guideline 'Triage in emergency departments' in Dutch EDs three years after its dissemination; 3) the effects of an interactive educational program on adherence to the 2008 triage guideline recommendations; 4) factors influencing the implementation of the 2004 and 2008 triage guidelines in Dutch EDs; 5) actions taken by EDs to overcome hindering factors for implementation of the 2008 triage guideline; and 6) whether triage leads to an improvement in the patients' experience of given care.

This chapter starts with a summary and a discussion of the main findings. Then, methodological considerations are discussed. Next, main conclusions are drawn and finally, recommendations for future research and implications for practice are presented.

Summary and discussion of the main findings

Contextual factors and research utilisation in nursing
Six contextual factors having a significant relationship with research utilisation (RU) in nursing were identified, namely: the role of the nurse, multi-faceted access to resources, organisational climate, multi-faceted support, time for research activities and provision of education (*chapter 2*). The findings suggest that contextual factors may influence the development of environments facilitating the implementation of research in nursing practice.

It was not possible to determine the relative importance of these factors, due to mixed results and methodological limitations in study designs of the included studies. Also, the impact of RU on patient outcomes, as well as the sustainability of change in practice when research findings are implemented, remained unclear. The findings made us wonder which factors influenced RU in terms of adherence to the recommendations of the evidence-based guideline 'Triage in emergency departments' (2004), and we decided to study this.

Adherence to triage

Our study on adherence to the 2004 guideline 'Triage in emergency departments' revealed that three years after dissemination of the guideline, 31% (n=34) of the 108 EDs in the Netherlands did not use a triage system as recommended (*chapter 3*). EDs mainly used two standardised triage systems: the Manchester Triage System (MTS) (80%) or the Emergency Severity Index (ESI) (12%). EDs using the MTS had a mean adherence of 61% (ranged from 37% to 78%) on the 39 guideline recommendations and EDs using the ESI adhered to a mean of 65% (ranged from 52% to 76%) of the recommendations. Four EDs (8%) with a self-developed triage system had a mean adherence of 29% (ranged from 2% to 54%). These results suggest that self-developed triage systems lead to a lower adherence to the guideline recommendations. Furthermore, it is unclear whether self-developed triage systems are sensitive and specific enough to identify the critically ill among patients. Results from the study in *chapter 3* suggest that an increase in adherence to the recommendations of the triage guidelines is still possible as percentages of adherence varied amongst EDs (2% to 78%).

Many studies evaluated the validity and reliability of triage systems.[3] The evaluation of the adherence to triage guidelines or protocols. One study looked into the organisation and performance of triage in Swedish EDs.[4] In Sweden, triage was introduced in the late 1990s.[5] According to Göransson *et al.* (2005), Swedish EDs did not adhere well to triage standards or guidelines. Also, 46% of Swedish EDs did not use any triage system,[4] compared to 31% of Dutch EDs.
Guidelines are important tools to improve the quality of care given to patients.[6] However, guidelines can have advantages (e.g., based on the best available research evidence, source for teaching or education) as well as disadvantages (e.g., unrealistic expectations, risk of so-called 'cookbook medicine').[7,8] It is still unclear what percentage of guideline adherence is acceptable and what we should strive for.[9] EDs should always be critical on when to adhere to the triage guideline and when to deviate from it. For example, when it is not busy at the ED, patients can be helped as soon as they arrive and will always be seen on time, making

triage unnecessary. Also, patients arriving at the ED with an urgency code 'red', assigned to them by the emergency medical dispatch centre, need to be treated immediately, making triage undesirable. Another reason for deviating from triage guideline recommendations could be that not all recommendations of the guideline have been validated,[10] such as the recommendation related to triage time. The guideline recommends, based on expert opinion,[3] that patients should be triaged within ten minutes after arrival. Some EDs stated that they changed this recommendation in their triage protocol to 15 minutes as they were unable to adhere to the recommended 10 minutes due to logistical problems. There should be more research on acceptable triage times for Dutch EDs.

Some recommendations in the triage guideline could be valued as more essential than other recommendations. Two essential recommendations are related to patients being triaged and seen by the doctor within target time,[3] though one could debate the exact time targets (see above). Another essential recommendation which could be considered is that triage nurses must have skills and sufficient knowledge in performing triage.[4,11] In Swedish EDs, triage was at times performed by personnel lacking the proper skills and knowledge, which could lead to a safety risk for patients.[4] The 2008 guideline recommends that triage nurses must have followed an ED education and triage training. The triage training should be repeated every four years with specific attention to paediatric triage. Also, nurses should have a minimum of one year of working experience at the ED before they are allowed to triage patients.[3] Our results indicated that most triage nurses received on-the-job training. It is unclear if on-the-job training is an efficient way to become competent in triage, as the content of the training could vary amongst EDs. Another essential recommendation is the one related to pain assessment, because pain is one of the six key discriminators and therefore influences the target time. Patients with severe pain are classified as 'very urgent'.[11,12] Berben *et al.* (2008) found that 91% of patients visiting the ED experienced pain and 86% experienced pain when discharged from the ED.[13] These results show that it is important that triage nurses pay attention to the subject pain and perform adequate pain assessments. We found that, according to ward managers and ED nurses, pain assessment was almost always performed (> 90% of all triaged patients) (*chapter 3*), and about 70% of the patients mentioned that a pain assessment was performed during triage (*chapter 7*). In contrast with other studies,[14,15] our results suggest that pain assessments have largely been performed according to the triage guideline recommendation. Self-reports by managers and nurses could have caused a degree of positive bias here. To improve the use and effectiveness of guidelines in practice, it might be valuable to focus more on the essential recommendations rather than all recommendations

of the guideline.[10]

Interactive educational program

Effective implementation ensures guideline adherence in practice, resulting in improved patient outcomes.[10] As our results showed that adherence to the triage guideline in EDs was still insufficient in 2007 (*chapter 3*), we developed an interactive educational program to increase the adherence to recommendations of the updated 2008 triage guideline (*chapters 5 and 6*). Wensing and Grol (2005) described factors that could increase the effectiveness of education, namely: the duration of the education (several days is more effective than one day), an appropriate group composition (all participants from one organisation is more effective than participants from different organisations), needs assessments for the activities, and active participation or the use of local opinion leaders.[16] Also, Thompson *et al.* (2007) mentioned that educational interventions combined with local opinion leaders or multidisciplinary teamwork may represent effective interventions to increase RU in nursing.[17]

The Netherlands Centre of Excellence in Nursing (LEVV) developed a training program for potential opinion leaders in nursing. The aim of the training program was to increase the implementation skills and knowledge of the aspiring opinion leaders. A key component of the program was the implementation model of Grol & Wensing.[7,18-20] With support from a coach from the LEVV training program, we developed a tailored interactive educational program (EP) to implement the 2008 triage guideline. Our interactive EP consisted of five meetings during one year and included theory on implementation[7] and application of the theory in their own practice, workshops and opportunities for sharing experiences. Eight EDs participated as the intervention group (IG) and each ED appointed one ED nurse who followed the EP. Nine EDs participated as the control group (CG). The CG received the 2008 guideline by post and had the opportunity to implement the guideline without further support.

We expected to find considerable differences between the percentages of guideline adherence between the IG and the CG. This expectation was supported by other studies which indicated that postal distribution of guidelines or protocols has minimal impact on change in clinical practice.[21-23] However, no statistically significant outcomes such as improvement of the percentages of triaged patients or patients seen within target time between the IG and the CG were identified (*chapter 5*). Regarding the process of implementation, the IG nurses searched for solutions to overcome hindrances earlier and more systematically than nurses in the CG group (*chapter 5 and 6*).

It seems that an interactive EP is not the only element influencing effective implementation as we did not find superior triage guideline adherence improvement in the IG. Other elements for effective implementation of the triage guideline could be related to contextual factors that influenced the development of environments open to implementation (*chapter 2*) or external motivation.[7,24] The Health Care Inspectorate (IGZ) and the Dutch Society of Emergency and Accident Nurses (NVSHV) promoted the 2008 triage guideline during our follow-up period of 1½ year. It remains unknown whether we would have found different results if the IGZ and the NVSHV would have been less involved in promoting triage in EDs. In a study performed in Sweden, an increase in the use of triage scales in Swedish EDs was found: from 54% in 2002 to 97% in 2010. Farrokhnia and Göransson (2011) mentioned that this change took place without any involvement from national authorities.[5] So, one could assume that the influence of the IGZ and the NVSHV would have been small and other elements would have influenced the implementation of triage in our studies.

Farrokhnia and Göransson (2011) did not report whether triage was performed correctly at the EDs.[5] Although 88% (n=15) of the EDs in our study implemented triage, adherence percentages differed strongly per ED and per recommendation. Therefore, not only the percentage of EDs using a triage system is important, but also the degree to which EDs adhere to the triage systems or guidelines. Another element that might explain the minor differences between the IG and the CG could be the guideline itself. Many guidelines lack advice for their implementation.[8] The 2008 triage guideline incorporated instructions for implementation.[3] These instructions were based on literature and results from practice-based research amongst EDs across the Netherlands. These instructions may have assisted EDs of the CG during implementation of triage.

An alternative explanation for the minor differences between the two groups could be related to activities in the CG. The measurements took place in the IG as well as in the CG. These measurements could have drawn attention to triage and stimulated the implementation of the guideline in the CG.

We did not study whether differences in effectiveness between components of the EP existed. Nevertheless, ED nurses of the IG considered the exchange of experiences and workshops on motivating colleagues to perform triage as important elements. They also mentioned that a systematic approach for implementation supported the implementation of triage at their ED.

Some ED nurses revealed that they already used their knowledge on systematically implementing other innovations in practice. Furthermore, the EP was developed in such a way that it was tailored to the specific needs of users in practice.[7,16,25,26] This strengthened the EP.[16]

Factors influencing implementation of triage

In *chapters 4 and 6* we evaluated which factors influenced the implementation of the 2004 and 2008 triage guidelines. Factors influencing the implementation were related to the guideline (neurological symptoms and fever amongst children not incorporated), the individual professional (level of knowledge, insight and skills, work preferences, motivation and commitment), the social context (support of doctors and ward managers, informed doctors and informed patients) or the organisation (description of tasks and responsibilities, workload and resources). Lack of motivation among colleagues and lack of resources seemed to be the most hindering factors in implementing the triage guideline. Nurses, ward managers and doctors indicated similar influencing factors, although the importance of these factors differed for the three groups of professionals. Largely, these factors influencing the implementation of triage related to nurses' skills and personal capacity and work environment (e.g. high workload and practical arrangements) were also found in the study of Andersson, Omberg and Svedlund.[11]

Key actions to overcome hindering factors were: addressing colleagues when agreed-upon recommendations on triage were not followed, development of triage protocols, evaluation of triage performance, integration of triage in ICT software, colleague involvement during implementation, education or training and finally, development of information material.

The studies in *chapter 4 and 6* had a qualitative design (focus groups and in-depth interviews). It is plausible that only those factors that were most consciously experienced by the participants were mentioned. It is possible that less prominent factors could have influenced the implementation of triage, such as factors related to the financial system.[27] As no new issues emerged after the last interviews, it seemed that we had reached saturation.

Similar to the contextual factors having a relationship with RU found in *chapter 2*, were human support (defined as support from administrators, doctors and a best-practice nurse), time to set out activities for implementation of triage and provision of education on a stepwise approach for implementation. Another study related to RU among emergency nurses supported the concept of limited resources (no time and no support) as a barrier.[28]

Patients' experiences

Triage systems have been developed to increase patient safety. Seeing patients immediately after arrival at the ED is intended to improve the quality of care, and therefore should also improve patient experiences. Patient experiences can highlight areas that can be improved, which EDs can incorporate into daily

practice. It seems that triage leads to a higher patient satisfaction and/or better patient experience.
Indeed, the results of our study show that patients experienced their ED visit more positively when EDs performed triage (*chapter 7*). Patients felt more informed, were less worried, and believed they received faster treatment. Also, patients experienced that ED nurses more often performed pain assessments and administrated pain treatment. Almost 90% of the patients found it appropriate that their waiting time depended on their complaints instead of on their arrival time. Still, the results show that there is room for improvement in relation to information services, pain assessment, pain treatment and being treated within target time.

This study shows that triage is important for patients' experiences at the ED. It suggests that informing patients on why they have to wait after being seen by a triage nurse decreases their agitation, which was also found in the study of Möller *et al.* (2010)[29] and the studies in *chapters 3 and 6*. In the studies in *chapters 3 and 6*, ward managers and nurses mentioned a decrease in aggression amongst patients in the waiting room. Nevertheless, only 50% of all patients were informed about their reason for waiting or their target time. Compared to the findings in a similar study performed in Sweden, where it was found that about 30% of patients were informed on target times,[30] these percentages could be valued as high. Still, this result suggests that EDs could pay more attention to informing patients on target times.

Methodological considerations

This thesis consists of several studies. Within each study, specific strengths and limitations were discussed. In this paragraph, we summarise general methodological considerations related to the designs.
Contextual factors were relatively unexplored in the field of research utilisation (RU). Therefore, this thesis started with a systematic literature review (*chapter 2*). All steps (data collection, evaluation of the included studies and extracting and coding of information) were performed by two independent researchers and, when necessary, the results were discussed with a third rater (an expert in performing reviews and in RU), until consensus was reached. This minimised the subjectivity and increased the interrater reliability. To decrease selection bias, different search strategies were performed (databases, a hand search, an author

search on websites and research institutes, consultation of key researchers in the field).
This systematic literature review had a few limitations. First, the review was a narrative review which is less objective than a meta-analysis. Second, the included studies operationalized the independent and dependent variables differently: the studies used different scales to measure RU and contextual factors were not clearly defined. This made it difficult to grasp what was measured. Third, one relevant paper was excluded as it was not available within the time limit for this review. Finally, the included studies showed conflicting results. This made it not possible to determine the ranked importance of the found contextual factors. Therefore, the results should be interpreted with care and should be investigated further.
In our view, this systematic literature review generated strong evidence in relation to our research question, as systematic reviews are considered as highest in the evidence hierarchy.[31]

Evaluation is important to determine the use or effectiveness of a program, practice or intervention.[31] The study in *chapter 3* evaluated the adherence to the recommendations of the triage guidelines. The study had a cross-sectional descriptive design and a self-report questionnaire was used. The questionnaire was based on the recommendations and performance indicators of the 2004 triage guideline and the content was validated by experts. This increased the validity of the questionnaire,[31] although it would have been better to further evaluate the validity of the questionnaire. A limitation of structured questionnaires is that they have a tendency to invite social desirability of responses.[31]
A strength of the study in *chapter 3* is that we invited all EDs in the Netherlands and had a high response rate (75%). Possibly, the cooperation with the NVSHV and our approach for data collection (reminders after three and five weeks) contributed to the high response rate. So, in our view, the results are representative for the Dutch EDs. Another strength of the study in *chapter 3* is that it evaluated the adherence to the triage guideline three years after dissemination of the guideline. EDs had time to become aware of the existence of the guideline and had time to implement it. Therefore, the results gave a realistic insight in the adherence to triage, as it was measured after a longer time period.

The study in *chapter 4* had a qualitative design. A strength of this study is that it evaluated factors influencing the implementation of triage three years after dissemination of the guideline. Therefore, EDs could point out clearly what

influenced the implementation of the triage guideline positively or negatively. Another strength of this study is that all professionals dealing with triage (nurses, ward managers and doctors) were included. It gives a complete view on factors influencing the implementation of triage by all involved professionals. A final strength of this study is that it used different methods for data collection (focus groups, in-depth interviews and questionnaires). Triangulation of data increases the credibility of the results.[31] A limitation of this study is related to selection bias. The possibility exists that we included participants who were positive towards triage. Also, only EDs were included that implemented triage. We could have missed factors which EDs not performing triage experienced.

The study in *chapter 5* was a cluster randomised controlled trial (RCT). An experimental design is considered as the golden standard for intervention studies. Nevertheless, there are some constraints that make the performance of an RCT in our setting difficult. First, our study was conducted in a clinical setting (EDs) over which we had little control. It was impossible to standardise the intervention as clinical settings are dynamic entities that experience change daily (e.g. change in staff, policy). Second, we were not able to carry out blinding, as after randomisation EDs were informed whether they were randomised in the interactive EP or not, as EDs in the IG had to send an ED nurse who participated the EP. Third, a limitation was a possible selection bias. Participating EDs volunteered for the interactive EP and therefore were a self-selected group. This could have influenced the results as they could have been stimulated for guideline uptake. On the other hand, the participating EDs were not early adopters as they did not implement the 2004 triage guideline correctly four years earlier.
A strength of the study was that triangulation of data collection was used (questionnaire and observation). The questionnaire was based on the recommendations and performance indicators of the 2008 triage guideline and was validated by experts. We tried to prevent socially desirable answers on the questionnaire via performing observations at EDs. To overcome observer bias, we clocked triage times and target times and gained information on triage and target times from the computer software. Another strength is the longitudinal design, which allowed us to measure changes over time.

To gain insight into aspects or events that could have influenced the implementation of triage, process evaluations took place (*chapter 6*). This could clarify some results found in *chapter 5*. The study in *chapter 6* had a qualitative, descriptive and longitudinal design. The longitudinal design allowed us to measure changes over time and decrease recall bias of the participants.

A limitation of the study could be related to the researchers who lead the focus group and conducted the interviews. They were also involved in the EP and therefore knew the participants. This could have biased the outcome of the interview towards socially desirable answers. Despite the possible bias, we believe this study gives a balanced overview of problems EDs face during the implementation of the guideline. As the participants were familiar with the researcher, we experienced that they were open and sincere in their experiences.
In addition to effects of the interactive EP on adherence and influencing factors, we investigated patients' experiences on triage (*chapter 7*). A strength of this study is the longitudinal design. A baseline measurement was performed and a measurement after implementation of triage. This way we were able to measure differences over time. Also, for this study a structured questionnaire developed by the Dutch Institute for Healthcare Improvement (CBO) was used. The CBO questionnaire was developed in 2007 and was designed especially to measure patient experience at EDs.
There could have been selection bias in the study on patient experiences, as the study population was limited to Dutch-speaking patients or persons older than 16 years. Non-Dutch-speaking patients or relatives might have added valuable information. Also, there could be a discrepancy between experiences of patients and actual performance of ED nurses. We did not evaluate whether patients' experiences matched the actual triage time, target time or given information. In an earlier observational study performed at the same ED-units amongst other patients, about 60% of all patients were seen within target time (*chapter 5*). This corresponds with the experiences of patients on target time within this study. This could indicate the reliability of the outcomes. Finally, there could have been recall bias, as patients were invited to participate during their ED visit, but were phoned within two weeks after the ED visit. When patients receive the questionnaire during the ED visit, it limits recall bias. However, we could not ask patients to fill in the questionnaire while waiting in the waiting room, as triage is the process of arrival at the ED until first contact with the doctor. Therefore, filling in the questionnaire within two weeks was seen as an acceptable way to gain information.

Main conclusions

In conclusion, we find the following. First, six contextual factors influence research utilisation: the role of the nurse, multi-faceted access to resources,

organisational climate, multi-faceted support, time for research activities and provision of education (*chapter 2*). Second, although dissemination alone leads to improvement (*chapter 5*), it is insufficient for adequate implementation of triage guidelines (*chapter 3*). Third, an interactive educational program for the implementation of the Dutch triage guideline (2008) results in some improvement in practice, but cannot be related to superior triage guideline adherence (*chapter 5*), even though educating nurses on implementing triage using a stepwise approach improves the implementation process (*chapter 5*). Fourth, nurses, ward managers and doctors broadly indicate similar factors influencing the implementation of triage, although the importance of these factors differs for the different groups (*chapter 4*). Lack of motivation among colleagues, lack of resources, resistance and lack of doctors at the EDs are the most hindering factors in implementing the triage guideline (*chapters 4 and 6*). Future implementation strategies and activities related to education, maintenance of change, motivation and consensus-building, information, organisation and facilitation are suggested by nurses, ward managers and doctors working at EDs (*chapters 4 and 6*). Finally, patient experiences improve when triage is performed according to the triage guideline. Patients feel more informed, are less worried, and believe they receive faster treatment Also, when triage is performed, patients experience that ED nurses more often perform pain assessments and pain treatment (*chapter 7*).

Recommendations for future research and practice

Several recommendations for future research and practice can be formulated based on the results of this thesis.

Recommendations for future research:

- Observational and intervention studies with objective rather than self-report measures are recommended to measure contextual factors in relation to research utilisation.
- More research is advised on the impact of RU on patient outcomes or patient experiences, as well as the sustainability of practice changes when implementing research findings.
- An update of the literature on contextual factors related to RU is advised.
- Effectiveness of integration of implementation advice or instructions in guidelines must be evaluated.

- Further research on triage times in order to gain national consensus about this aspect is advised.
- Further research on the execution of an interactive educational program using a stepwise implementation model for guideline implementation in nursing is recommended, to gain more insight in the effectiveness of interactive educational programs.
- More research on factors influencing the implementation of triage guidelines and adherence to these guidelines is advised.
- More research is advised on the impact of guidelines on patient outcomes or patient experiences, as well as the sustainability of practice changes when implementing research findings. Non-native speaking patients or relatives should participate also, as their experiences might add valuable information.
- Implementation strategies to influence the adherence to triage guidelines should be investigated further.

Recommendations for practice:

- EDs should strive for triage of all their patients. Two exceptions can be made namely, when patients must be treated immediately after arrival at the ED (code red) or when there are no other patients in the waiting room.
- To improve patients' experiences, EDs should pay attention to informing patients about reason of waiting and target times.
- An update of the 2008 triage guideline is advised.
- To reach effective implementation process of triage, a stepwise approach is advised.
- Increase the implementation knowledge and competences of (student) nurses. This will lead to better implementation of innovations, resulting in a better quality of care.

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Summary – Samenvatting

CHAPTER 9

Summary

Scientific evidence often comes into practice via evidence-based guidelines. An evidence-based guideline is a document consisting of recommendations, advices and work instructions to support the decision-making of health care professionals and patients. Guidelines are based on scientific evidence, the discussions based on that evidence and the concluding opinions.[1] Guidelines support health care professionals and patients when deciding what good care is in certain circumstances. Guidelines also ensure that everyone receives the optimal standard care. Guidelines can therefore be important tools in improving the quality of care, assuming that the guidelines are properly implemented. That is not always the case. Failure to adhere to the guidelines can lead to situations where patients do not receive the care they need. It is therefore important to increase our knowledge on guideline implementation.

This thesis investigated different aspects of the implementation of scientific evidence in nursing practice, using evidence-based guidelines, especifically the guideline 'Triage in emergency departments'. In 2004, the Dutch Society of Emergency and Accident Nurses (NVSHV) released this triage guideline. The guideline 'Triage in Emergency department' was revised in 2008, following the advice of the 2004 guideline. Triage is defined as: *'Classification of patient acuity that characterizes the degree to which the patient's condition is life-threatening and whether immediate treatment is needed to alleviate symptoms'*.[2]

A summary of each chapter of this thesis follows below.

Chapter 1

Chapter 1 includes an introduction of the conducted studies describing the background, the relevance and the research questions of this thesis. Developments in evidence-based nursing practice and guidelines are described shortly, followed by a clarification of the subject triage, and a description of the different triage systems and the guideline 'Triage in emergency departments'. Finally, a brief description about the subject implementation and two implementation models, the PARIHS framework and the model of Implementation of Change, is given.

The introduction ends with the following research questions:

- Which contextual factors in health care organisations are associated with research utilisation in nursing?
- What is the degree of adherence to the 2004 guideline 'Triage in emergency departments' at Dutch hospitals three years after its dissemination?
- Which factors influenced the implementation of the 2004 guideline 'Triage in emergency departments' in EDs in the Netherlands?
- What is the effectiveness of an interactive educational program on adherence to the 2008 triage guideline recommendations?
- What did ED nurses experience as factors hindering the implementation of the 2008 guideline 'Triage in emergency departments' and which actions did they undertake to overcome these problems?
- Does implementation of triage lead to an improvement in the patient's experience of given care?

Answering these research questions increases our knowledge on guideline implementation. We studied factors, guidelines and strategies influencing the implementation of guidelines, and the effect of guideline adherence on patient's experiences.
The studies in this thesis are mainly focused on the emergency departments (EDs), but the knowledge gained in these studies is also useful for the implementation of nursing guidelines in other settings.

Chapter 2

Chapter 2 contains a systematic literature review, exploring which contextual factors are associated with research utilisation (RU) in nursing practice. Insight in contextual factors influencing RU in nursing practice can support health care organizations creating an environment in which scientific knowledge can be easier implemented.
In total, ten articles met the inclusion criteria. Six contextual factors had a significant relation with RU in nursing practice. These factors were: the role of the nurse (involvement in quality improvement teams and extent of job responsibility), multi-faceted access to resources (e.g. library, journals or research nurses), organisational climate (research climate and hospital type), multifaceted support (support for conducting research, human support and material support), time for research activities and provision of education related

to implementation to nurses. The actual effect of these factors related to RU remains unclear as the results of the included studies differed. Also, only a few studies were of good methodological quality. It is therefore important to perform more objective observational and interventional research, in order to create a better insight in the impact of contextual factors and RU in nursing practice.

Chapter 3

Chapter 3 evaluated the adherence to the guideline 'Triage in emergency departments'. This guideline was published for the first time in 2004. It remained unknown to what degree Dutch emergency departments (EDs) used a triage system and to what degree EDs adhered to the recommendations of the guideline. In 2007, all EDs in the Netherlands (n=108) were sent three questionnaires to gain insight in the degree of adherence: one questionnaire for the administrators, one for doctors and one for ED nurses. The questionnaires were based on the recommendations of the 2004 guideline.
In total, the response rate was 79% of EDs. Over 31% of the EDs used no standardised triage system. The Dutch EDs mainly used the Manchester Triage System (MTS) (39%) and the Emergency Severity Index (ESI) (6%). EDs using the MTS had a mean adherence of 61% to the recommendations of the triage guideline, while EDs using the ESI had a mean adherence of 65%.
The 2004 triage guideline appeared to be disseminated good, as 99% of all administrators and 92% of ED nurses were aware of the triage guideline.
The guideline was disseminated mainly via the Dutch Society of Emergency and Accident Nurses (NVSHV) and via the administrators. Nevertheless, results showed that there was still room for improvement related to the adherence to the 2004 triage guideline.

Chapter 4

Chapter 4 gives insight into factors influencing the implementation of the 2004 guideline 'Triage in Emergency departments' and describes which tailored strategies can be used for the implementation of this guideline.
This study used different data collection methods. Questionnaires on factors influencing implementation were sent to all EDs in the Netherlands (n=108). Furthermore, four focus groups with administrators and ED nurses were

organised. Also, in-depth interviews were held with administrators (n=3) and doctors (n=3).
Different factors influencing the implementation of the guideline were found, namely: lack of knowledge; lack of insight and skills; old work routines; lack of motivation and/or commitment; lack of support; doctors not informed; lack of preliminary work and arrangements for implementation; no description of tasks and responsibilities; high workload and lack of resources. Administrators, nurses and doctors mentioned similar as well as different factors, although the value of these factors differed between the groups. For nurses, resistance and lack of resources were deemed most important, whereas ward managers mentioned culture. Doctors mentioned the availability of doctors at the ED as the most influential factor. For successful implementation of the triage guideline, tailored strategies focusing on education, maintenance of change, motivation and consensus-building, information, organisation and facilitation were recommended by ED nurses, administrators and doctors.
This study provided insight into factors influencing the implementation of innovations. Based on this study, it can be concluded that activities based on education, motivation and consensus-building, information, organisation and facilitation should impede the implementation process of triage.

Chapter 5

In 2008, the guideline 'Triage in Emergency department' (2004) was revised. Chapter 5 describes a cluster randomised control trial (RCT) in which we investigated whether an interactive educational program (EP) contributes to the implementation of the 2008 triage guideline at EDs. The interactive EP was given to eight ED nurses of eight different EDs in the Netherlands (the intervention group). The EP used a stepwise approach for implementation: the model of Implementation of Change.[3] During each of the five meetings, one step of the model was introduced. Then, the ED nurses performed this step at their own ED. During the following meeting, the performance and results of the previous step were discussed with the other ED nurses. Another important element of the EP was sharing experiences with each other and with an ED nurse of a best practice: an ED where triage was already properly implemented. Furthermore, separate workshops were organised on topics suggested by the ED nurses. The participating EDs in the intervention group were studied, along with nine other EDs without the EP (the control group).

To gain insight into the process and results related to the adherence of recommendation of the 2008 triage guideline, measurements were performed at three intervals. This was done using questionnaires (T0, T1, and T2), observations (T0, T1) and minutes of the meetings. Primary outcomes were percentage of triaged patients, patients triaged within 10 minutes (triage time) and patients seen within target time. Secondary outcomes were the percentages of adherence to the remaining recommendations of the guideline.
Regarding the primary outcomes, we found no statistically significant difference between the two groups. At the end of the study, both groups, more patients were triaged and more patients were seen within target time. EDs of the intervention group more often performed a context analysis resulting in more tailored strategies and activities, compared with the control group. Regarding to some secondary outcomes, more improvements were found in the intervention group compared with the control group.
This study showed that an interactive EP did not contribute to better adherence of the triage guideline.
Other factors seem to influence the implementation of triage, such as promotion of the implementation of the triage guideline by the NVSHV during the EP, individual characteristics of the participating ED nurses (e.g. work experience or earlier experiences of implementation of innovations) and support from within the organization or by management. Nevertheless, it seems that educating nurses using an interactive EP using a systematic approach leads to a better implementation process.

Chapter 6

Chapter 6 describes factors influencing the implementation of the 2008 triage guideline in different EDs and which actions EDs undertook to overcome obstacles. This qualitative descriptive study was imbedded in the cluster RCT, as described in chapter 5.
For this study, interviews were held amongst 17 nurses from different EDs in the Netherlands at two intervals: April 2009 and December 2009. Eight of these EDs were randomly allocated to the intervention group (interactive EP) and nine EDs were randomised to the control group.
Within both groups similar influencing factors for implementation of triage were found. ED nurses of the intervention group searched more systematically to overcome hindering factors. In total, ten factors hindering the implementation of

triage were found, namely: no registration of triage/target time; problems related to triage process (no consequent performance of triage or lack of task description); no correct performance of pain management; lack of motivation; lack of knowledge; patients not informed; lack of cooperation/support by doctors; lack of cooperation/support by ward managers/management; lack of resources and workload. Lack of motivation amongst colleagues and the absence of resources were experienced as the most hindering factors. Actions that were taken involved: addressing colleagues when agreements on triage were not followed; developing protocols; evaluating triage performance; applicating software; involving colleagues in the implementation process; educating/training and developing information material.

Chapter 7

Chapter 7 examines patients experiences associated with triage. The question was whether triage in accordance with the triage guideline leads to improvement in the patient's experience when visiting the ED.
This longitudinal study was performed in 15 EDs in the Netherlands. EDs were included when they did not perform triage in 2008 according to the recommendation of the 2008 triage guideline, but used a validated triage system in 2009. A questionnaire based on the Consumer Quality Index (CQI) was used to measure patients' experiences before and after implementation of triage. Patients visiting EDs during two weeks in October 2008 (T0) and two weeks in November 2009 (T1) were included.
In total, 645 patients participated: 328 patients in 2008 and 317 in 2009. After implementation of a validated triage system, significantly more patients felt that they received an urgency code more quickly, their pain was assessed directly after arrival at the ED, they were treated within target time and they were informed on expended target time. Also, fewer patients in the waiting room were worried after they had spoken with a nurse.
Overall, patients had a more positive experience at the ED after the implementation of triage.
Nevertheless, results showed that there is still room for improvement related to informing patients, pain assessment and pain treatment.

Chapter 8

Within the final chapter the different studies of this thesis (chapters 2 through 7) are looked at critically.
This chapter starts with a summary and discussion of the main findings. This involves factors influencing RU in nursing practice and the adherence to triage guidelines. Also, the effects of an interactive EP for implementation of triage and experiences of patients related to triage are discussed. Then, methodological considerations are considered. Finally, main conclusions are drawn and recommendations for future research and implications for practice are presented.

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Samenvatting

Wetenschappelijke kennis vindt vaak een weg naar de praktijk via evidence-based richtlijnen. Een evidence-based richtlijn is een document met aanbevelingen, adviezen en handelingsinstructies ter ondersteuning van de besluitvorming van professionals in de zorg en patiënten, berustend op resultaten van wetenschappelijk onderzoek met daarop gebaseerde discussie en aansluitende meningsvorming.[1] Richtlijnen ondersteunen zorgverleners en patiënten bij het beslissen wat goede zorg is in bepaalde omstandigheden. Daarnaast zorgen richtlijnen er voor dat de zorgverlening door iedereen op dezelfde wijze verleend wordt. Daarom kunnen richtlijnen belangrijke hulpmiddelen zijn om de kwaliteit van zorgverlening te verbeteren, tenminste, wanneer de implementatie van richtlijnen goed gebeurt. Door het niet opvolgen van richtlijnen kan het voorkomen dat patiënten niet de zorg krijgen die zij nodig hebben. Het is daarom belangrijk om meer zicht te krijgen op hoe de implementatie van richtlijnen verbeterd kan worden.

In dit proefschrift werden verschillende aspecten van de implementatie van wetenschappelijke kennis in de verpleegkundige praktijk, overgedragen via evidence-based richtlijnen, onderzocht. Daarbij werd specifiek ingegaan op de richtlijn 'Triage op de spoedeisende hulp'. In 2004 heeft de Nederlandse Vereniging Spoedeisende Hulp Verpleegkundigen (NVSHV) deze richtlijn voor het eerst uitgebracht. In 2008 is deze herzien, conform het advies uit de richtlijn 2004. De 2008 triagerichtlijn definieert triage als: *'Het beslisproces van classificeren van patiënten naar de mate waarin het leven of de gezondheidstoestand bedreigd wordt. De classificatie heeft als doel, dat de patiënten het meest geschikte vervolgtraject doorlopen binnen de vereiste mate van urgentie'* (NVSHV 2008, pag. 31).[2]

Hieronder volgt een samenvatting van ieder hoofdstuk uit dit proefschrift.

Hoofdstuk 1

Hoofdstuk 1 bevat de introductie van de uitgevoerde studies met daarbij de achtergrond, het belang en de onderzoeksvragen. Ontwikkelingen op het terrein van evidence-based nursing practice en richtlijnen worden kort beschreven. Vervolgens wordt het onderwerp triage toegelicht. Hierbij is gekeken naar

verschillende triagesystemen en de richtlijn 'Triage op de spoedeisende hulp (SEH)'. Tot slot wordt kort het onderwerp implementatie besproken en worden twee implementatiemodellen, het PARIHS raamwerk en het implementatiemodel voor effectieve verandering, toegelicht.
De inleiding eindigt met de volgende onderzoeksvragen:

- Welke contextuele factoren beïnvloedden de toepassing van wetenschappelijke kennis door verpleegkundigen in de praktijk?
- In hoeverre werd, drie jaar na publicatie, de 2004-richtlijn 'Triage op de spoedeisende hulp' door SEH's opgevolgd?
- Welke factoren beïnvloedden de implementatie van de 2004-richtlijn 'Triage op de spoedeisende hulp' binnen Nederlandse SEH's?
- Wat was de effectiviteit van een interactief educatief programma in relatie tot de opvolging van de aanbevelingen uit de triagerichtlijn?
- Welke factoren ervoeren SEH-verpleegkundigen als belemmerende factoren voor de implementatie van de 2008 triagerichtlijn en welke acties ondernamen zij om de belemmerende factoren te verhelpen?
- Leidde triage tot een verbetering van patiëntervaringen met de gegeven zorg?

Het beantwoorden van deze vraagstellingen vergroot onze kennis van richtlijnimplementatie. Hierbij gaat het om factoren, richtlijnen en strategieën die de implementatie van richtlijnen beïnvloeden. Tevens vergroot dit ons inzicht in het effect van richtlijnnaleving op patiëntervaringen.
De studies in dit proefschrift richten zich specifiek op de SEH. Echter, deze kennis is ook bruikbaar voor de implementatie van verpleegkundige richtlijnen in andere settingen.

Hoofdstuk 2

Hoofdstuk 2 bevat een systematische literatuurstudie naar contextuele factoren in relatie tot het gebruik van wetenschappelijke kennis door verpleegkundigen in de praktijk. Het inzicht in contextuele factoren die het toepassen van wetenschappelijke kennis door verpleegkundigen bevorderen of verhinderen, kan gezondheidszorgorganisaties ondersteunen in het creëren van een omgeving waarin wetenschappelijke kennis in de praktijk gemakkelijker kan worden ingevoerd.
In totaal werden tien artikelen gevonden die voldeden aan de inclusiecriteria. Zes contextuele factoren bleken een significante relatie te hebben met het toepassen

van wetenschappelijke kennis door verpleegkundigen in de praktijk. Deze factoren waren: de rol van de verpleegkundige (betrokkenheid bij kwaliteitsverbetering en taak om wetenschap toe te passen), toegang tot meerdere onderzoeksbronnen (zoals een bibliotheek, wetenschappelijke tijdschriften of een verpleegkundige met onderzoekservaring), de organisatiecultuur (onderzoeksklimaat of type ziekenhuis), ondersteuning van verschillende partijen (zoals management en artsen), tijd voor invoeren van wetenschappelijke kennis in de praktijk en het aanbieden van educatie met betrekking tot implementatie aan verpleegkundigen. Het daadwerkelijke effect van deze factoren op het toepassen van kennis in praktijk is nog onduidelijk omdat de resultaten van de geïncludeerde studies rond deze factoren verschilden. Daarnaast waren maar weinig studies van goede kwaliteit. Daarom is het belangrijk om observationeel en interventie-onderzoek objectiever te maken, zodat een beter inzicht in de impact van contextuele factoren op het gebruik van wetenschappelijke kennis door verpleegkundigen ontstaat.

Hoofdstuk 3

In hoofdstuk 3 wordt de opvolging van de richtlijn 'Triage op de spoedeisende hulp' geëvalueerd. Deze richtlijn is in 2004 voor het eerst uitgebracht. Het was echter onbekend in hoeverre de SEH's in Nederland vervolgens een triagesysteem hanteerden en in hoeverre ze de aanbevelingen van de triagerichtlijn opvolgden.
Om een indruk te krijgen van de mate van opvolging werden in 2007 alle SEH's in Nederland (n=108) gevraagd drie vragenlijsten te beantwoorden: één door elke leidinggevende, één door een arts en één door een SEH-verpleegkundige. De vragenlijsten waren gebaseerd op de aanbevelingen uit de 2004-richtlijn.
In totaal was de respons 79%. Meer dan 31% van de SEH's gebruikten geen erkend triagesysteem. De systemen die werden toegepast binnen Nederlandse SEH's waren vooral het Manchester Triage System (MTS) en het Emergency Severity Index (ESI). SEH's die het MTS gebruikten, hadden een gemiddelde opvolging van de aanbevelingen van 61%, SEH's die gebruik maakten van het ESI hadden een gemiddelde opvolging van de aanbevelingen uit de triagerichtlijn van 65%.
Het verspreiden van de 2004 triagerichtlijn leek goed te zijn verlopen, aangezien 99% van de leidinggevenden en 92% van de SEH-verpleegkundigen de triagerichtlijn kenden. Verspreiding van de richtlijn ging vooral via de

Nederlandse Vereniging Spoedeisende Hulp Verpleegkundigen (NVSHV) en leidinggevenden. Resultaten lieten echter zien dat verbetering mogelijk was in het opvolgen van de aanbevelingen van de 2004 triagerichtlijn.

Hoofdstuk 4

Hoofdstuk 4 geeft inzicht in factoren die de implementatie van de richtlijn 'Triage op spoedeisende hulp' uit 2004 beïnvloedden en beschrijft welke gerichte strategieën ingezet kunnen worden voor de implementatie van deze richtlijn.
Voor deze studie zijn de data op verschillende manieren verzameld. Er is gebruik gemaakt van vragenlijsten die naar alle SEH's in Nederland zijn verstuurd (n=108). Daarnaast zijn vier focusgroepen met leidinggevenden en SEH-verpleegkundigen gehouden. Ook zijn er diepte-interviews met leidinggevenden (n=3) en artsen (n=3) georganiseerd.
Verschillende factoren die de implementatie van de richtlijn beïnvloedden werden geïdentificeerd, namelijk: gebrek aan kennis; gebrek aan inzicht en expertise; werken volgens oude routines; gebrek aan motivatie en/of betrokkenheid; gebrek aan ondersteuning; artsen niet geïnformeerd; afwezigheid van mogelijkheden en afspraken voor implementatie; afwezigheid van een triage taakbeschrijving; tijdsdruk; en ontbreken van voorzieningen. Leidinggevenden, verpleegkundigen en artsen benoemden zowel dezelfde als verschillende factoren. Ze gaven daarbij wel verschil in het belang van dezelfde factoren aan. Zo vonden SEH-verpleegkundigen weerstand bij andere verpleegkundigen en gebrek aan voorzieningen de belangrijkste factoren, terwijl leidinggevenden cultuur het belangrijkste vonden. Artsen benoemden de aan- of afwezigheid van artsen op de SEH als belangrijkste factor. Voor goede implementatie van de triagerichtlijn werden implementatiestrategieën gericht op educatie, behoud van verandering/borging, motivatie en consensusbuilding, informatie, organisatie en voorzieningen door de verpleegkundigen, leidinggevenden en artsen aanbevolen.
Deze studie gaf inzicht in factoren die de implementatie van innovaties beïnvloedden. Aan de hand van deze studie kan worden geconcludeerd dat activiteiten gericht op educatie, motivatie en consensus, informatie, organisatie en faciliteiten het implementatieproces bevorderen.

Hoofdstuk 5

In 2008 is de richtlijn 'Triage op de spoedeisende hulp' (2004) herzien. In hoofdstuk 5 wordt een cluster RCT beschreven waarin werd onderzocht of een interactief educatief programma bijdraagt aan de implementatie van de 2008-triagerichtlijn op SEH's. Het interactief educatief programma werd aan acht geselecteerde SEH-verpleegkundigen van acht verschillende Nederlandse SEH's (de interventiegroep) aangeboden. Hierin werd een stapsgewijze aanpak voor implementatie gehanteerd: het implementatiemodel van Grol en Wensing (2005).[3] Tijdens elke bijeenkomst werd één stap van het model geïntroduceerd. Vervolgens voerden de verpleegkundigen deze stap op hun eigen SEH afdeling uit. Tijdens de volgende bijeenkomst werden de uitvoering en resultaten van deze stap besproken met de overige SEH-verpleegkundigen. Een ander belangrijk element was het uitwisselen van ervaringen tijdens de implementatie, met elkaar en met een SEH-verpleegkundige van een zogenaamde best-practice: een SEH waarbij triage volgens de richtlijn goed was ingevoerd. Ook werden op basis van behoefte van de deelnemers workshops georganiseerd met een aantal door hen gewenste onderwerpen. Naast de deelnemende SEH's, werden negen andere SEH's gevolgd, die geen extra interactief educatief programma aangeboden kregen, de zogenoemde controlegroep.
Om inzicht te krijgen in het proces en de resultaten voor opvolging van de aanbevelingen uit de 2008-triagerichtlijn, zijn metingen op drie momenten in de tijd verricht. Dit gebeurde met behulp van vragenlijsten (T0, T1, T2), observaties (T0, T1) en notulen van de bijeenkomsten. Primaire uitkomsten waren het percentage patiënten dat werd getrieerd, het percentage patiënten dat binnen 10 minuten na aankomst op de SEH werd getrieerd en het percentage patiënten dat binnen de targettijd (urgentiecode) door de arts werd gezien. Secundaire uitkomsten waren percentages voor opvolging van de overige aanbevelingen uit de richtlijn.
We vonden geen significante verschillen tussen de twee groepen met betrekking tot de primaire uitkomsten. In beide groepen werden bij de vervolgmetingen meer patiënten getrieerd en meer patiënten werden binnen targettijd door de artsen gezien. De SEH's in de interventiegroep hadden ten opzichte van SEH's in de controlegroep wél vaker een context analyse uitgevoerd, resulterend in op maat gerichte strategieën en activiteiten. Bij de interventiegroep werden, in tegenstelling tot de controlegroep, ook meer verbeteringen gevonden met betrekking tot enkele secundaire uitkomsten.

Deze studie toonde niet aan dat het interactief scholen van verpleegkundigen in implementatie leidt tot een hoger percentage opvolgen van de aanbevelingen uit de triagerichtlijn. Andere factoren lijken de implementatie van triage te beïnvloeden, zoals het promoten van de triagerichtlijn door de NVSHV ten tijde van het programma, de individuele karaktereigenschappen van de deelnemende verpleegkundige (zoals werkervaring of eerdere ervaringen met implementeren van innovaties) en de gekregen ondersteuning vanuit de organisatie of het management. Desondanks lijkt interactief scholen van verpleegkundigen om op een systematische manier triage in te voeren, wel tot een beter implementatieproces te leiden.

Hoofdstuk 6

In hoofdstuk 6 wordt een kwalitatieve studie beschreven, waarin we onderzochten welke factoren de implementatie van de 2008 triagerichtlijn op SEH's belemmerden en welke acties SEH's vervolgens hebben ondernomen om deze belemmerende factoren te overwinnen. Deze studie was ingebed in de cluster-RCT zoals beschreven in hoofdstuk 5.
In deze studie werden op twee momenten, in april 2009 en in december 2009, interviews gehouden onder 17 verpleegkundigen werkzaam binnen verschillende SEH's in Nederland. Acht van deze SEH's vormden de interventiegroep (interactief educatief programma) en negen SEH's de controlegroep.
In beide groepen vonden we soortgelijke belemmerende factoren voor de implementatie van triage. Wel zochten SEH-verpleegkundigen van de interventiegroep gestructureerder naar oplossingen om de belemmerende factoren te verhelpen. In totaal werden tien factoren gevonden die de implementatie van triage belemmerden, namelijk: geen registratie van triage- en targettijd; problemen in het triageproces (niet consequent uitvoeren van triage of ontbreken van een taakbeschrijving); niet correct uitvoeren van pijnmanagement; ontbreken van motivatie; ontbreken van kennis; patiënten niet geïnformeerd; ontbreken van samenwerking en/of ondersteuning van artsen; ontbreken van samenwerking en/of ondersteuning van leidinggevenden; ontbreken van voorzieningen; en werkdruk. Gebrek aan motivatie onder collega's en gebrek aan voorzieningen waren de meest belemmerende factoren. Er werd een aantal acties ondernomen, namelijk: collega's erop wijzen wanneer zij triage niet uitvoeren; ontwikkeling van protocollen; evaluatie van triage; integratie van triage binnen

het ICT systeem, het betrekken van collega's gedurende de implementatie van triage, het volgen van een triagetraining; en ontwikkelen van informatiemateriaal.

Hoofdstuk 7

In hoofdstuk 7 wordt de patiëntervaring met betrekking tot triage geëvalueerd. De vraag was of patiënten de zorgverlening op SEH's als beter ervoeren indien de hulpvragen getrieerd werden.
Deze longitudinale studie werd bij 15 SEH's in Nederland uitgevoerd. SEH's werden geïncludeerd indien zij in 2008 niet trieerden volgens de aanbevelingen uit de 2008 triage-richtlijn, maar de richtlijn wel zouden invoeren in 2009. Een vragenlijst, gebaseerd op de Consumer Quality Index (CQI), werd gehanteerd om de patiëntervaring voor en na implementatie van triage te meten. Patiënten die de SEH bezochten gedurende twee weken in oktober 2008 (de voormeting) en twee weken in november 2009 (de nameting), werden geïncludeerd.
In totaal deden 645 patiënten mee aan deze studie: 328 patiënten in 2008 en 317 in 2009. Na implementatie van triage, ervoeren significant meer patiënten dat zij snel een urgentiecode kregen, dat een pijnbeoordeling direct na aankomst was uitgevoerd, dat zij binnen de targettijd door artsen werden gezien en dat zij geïnformeerd werden wanneer de targettijd uitliep. Ook voelden patiënten zich minder ongerust wanneer zij, na gezien te zijn door een SEH-verpleegkundige, moesten wachten in de wachtkamer.
Over het algemeen hadden meer patiënten een positieve ervaring met het bezoek aan de SEH nadat triage geïmplementeerd was. Desondanks lieten de resultaten zien, dat er verbeteringen mogelijk zijn met betrekking tot informatievoorziening, pijnbeoordeling en pijnbehandeling.

Hoofdstuk 8

In het laatste hoofdstuk worden de verschillende studies van dit proefschrift (*hoofdstuk 2 tot en met 7*) kritisch bekeken.
Eerst worden de belangrijkste resultaten besproken en bediscussieerd. Hierbij gaat het om factoren die voor verpleegkundigen van invloed zijn op het gebruik van wetenschappelijke kennis in de praktijk en het opvolging van richtlijnen voor triage. Ook worden de effecten van een interactief educatief programma op implementatie van triage besproken en de ervaringen van patiënten met triage.

Vervolgens komen de onderzoeksmethoden van de uitgevoerde studies aan bod. Tot slot worden eindconclusies geformuleerd en worden aanbevelingen voor verder onderzoek en de praktijk gegeven.

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List of abbreviations

List of abbreviations

ATS	Australasian Triage Scale
CBO	The Dutch Institute for Healthcare improvement
CG	Control group
CQI A&E	Consumer Quality Index for the accident and emergency departments
CTAS	Canadian Emergency Department Triage and Acuity Scale
EBP	Evidence-based practice
ED	Emergency Department
ENPC	Emergency Nursing Paediatric Course
EP	Educational Program
EROS	Edmonton Research Orientation Survey
ESI	Emergency Severity Index
GGZ Nederland	The Netherlands Mental Healthcare Association
GP	General Practice
ICT	Information Communication Technology system
IG	Intervention group
IGZ	The Netherlands Healthcare Inspectorate
LAIZ	Department of Critical Care
LEVV	The Netherlands Centre for Excellence in Nursing
MTS	Manchester Triage System
NHG	The Dutch College of General Practitioners
NIVEL	The Netherlands Institute for Health Services Research
NPQ	Nursing Practice Questionnaire
NTS	Dutch Triage System
NVSHV	The Dutch Society of emergency and Accident nurses
PARIHS	The Promoting Action on Research Implementation in Health Services
QI	Quality improvement
RCT	Randomised controlled trial
RPQ	Research Participation Questionnaire
RU	Research utilisation
RUQ	Research Utilisation Questionnaire
SPSS	Statistical Package for Social Sciences
Stichting LAMP	The National institute for Guidelines EMS
STNN	The Dutch Community Trauma Nursing
TNCC	Trauma Nursing Core Course

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List of publications

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Last, but definitely not least, Ralph. Wat hebben we veel meegemaakt de afgelopen jaren, zowel mooie als minder leuke momenten. Maar vooral de mooie momenten overheersen. Eerst in 2009 de geboorte van onze geweldige dochter Imke, toen even 'tussendoor' getrouwd en in 2012 kregen we onze prachtige zoon Ties. Je hebt me altijd ondersteund tijdens het gehele traject. Indien ik ruimte nodig had, nam je Imke en Ties mee, zodat ik toch nog wat uurtjes rustig kon werken.
Nu staat ons nog een mooie toekomst tegemoet met ons derde kindje op komst. Ben benieuwd wat het ons allemaal gaat brengen, maar zie er vol vertrouwen naar uit! Dank je wel schatje!

Curriculum Vitae

Curriculum Vitae

Maaike Janssen werd geboren op 2 augustus 1976 in Nijmegen. Na haar middelbare schoolopleiding (MAVO, Eckart college te Eindhoven en HAVO-MBO, Kempenpoort te Eindhoven) startte zij in 1994 met de opleiding Verpleegkunde aan de Fontys Hogeschool in Eindhoven. Na haar diplomering (1998) werkte zij als verpleegkundige op de afdeling Algemene interne van het Catharina Ziekenhuis in Eindhoven (1998-1999; 2001-2004) en op de afdeling Oncologie van het Sint Joseph ziekenhuis in Veldhoven (1999-2001).

Vanaf 2001 studeerde zij Gezondheidswetenschappen met als afstudeerrichting Zorgwetenschappen aan de Universiteit in Maastricht en behaalde in 2004 haar diploma. Haar afstudeerscriptie deed zij aan de University of Alberta in Canada (Knowledge Utilization Study Program), waarbij zij onderzocht welke factoren van invloed zijn op het implementeren van wetenschappelijk onderzoek door verpleegkundigen.

In 2004 werd zij op de Universiteit van Maastricht afdeling Zorgwetenschappen aangesteld als onderzoeker voor de Landelijke Prevalentiemeting Zorgproblemen, waarbij zij onderzoek deed naar het beleid, prevalentie, preventie en behandeling van decubitus, incontinentie, ondervoeding en smetten binnen Nederlandse gezondheidszorginstellingen.

In 2006 werd zij aangenomen op de Hogeschool van Arnhem en Nijmegen (HAN) als docent bij Instituut Verpleegkundige Studies (IVS) en promovendus bij het Lectoraat Acute Intensieve Zorg. Haar onderzoek resulteerde uiteindelijk in dit proefschrift getiteld: ‘Mind the gap: Triage guidelines and their utilisation

at the emergency department'. Het onderzoek werd begeleid door prof. dr T. Van Achterberg, dr J Mintjes-de Groot en dr M Adriaansen.
Tijdens haar onderzoeksperiode ontving zij voor de projecten Try Triage en Do Triage twee RAAK award prijzen (2012).

Maaike Janssen werkt momenteel als docent bij IVS. Hier richt zij zich op de onderzoek leerlijn 'Kwaliteit en Innovatie' binnen het onderwijs aan verpleegkunde studenten en medisch hulpverleners. Daarnaast is zij onderzoeker/ kenniskringlid bij het Lectoraat Acute Intensieve Zorg. Hier verricht zij momenteel onderzoek naar familiegerichte interventies binnen de Algemene, Geestelijke en Maatschappelijke Gezondheidzorg en de Verpleegkundigen Gerontologie en Geriatrie.

Maaike Janssen is getrouwd met Ralph Hamers en samen hebben zij twee kinderen, een dochter Imke (2009) en een zoon Ties (2012). Ze wonen in Eindhoven.

Radboudumc

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