Quality of Pressure Ulcer Care in Indonesian Hospitals

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“Let her do her PhD!”
My father’s last and only wish in his final days
November 6, 2009 – November 10, 2015

This thesis is my special gift to my late father
and is dedicated to my mother and all Indonesian nurses.

Contents

Chapter 1

General introduction

Introduction

A pressure ulcer (PU), also called “bedsore”, “decubitus ulcer” or “pressure sore”, is a localised injury to the skin and/or underlying tissue usually over a bony prominence that results from pressure or pressure in combination with shear.[1] PUs are complex and one of the most expensive health care problems in hospitals internationally.[2-5] Hospitalised patients who are seriously ill, with multiple diseases and/or severe disabilities, are often immobile and prone to PUs.[6] PUs are generally indicated by categories I (non-blanchable redness of intact skin), II (partial thickness skin loss or blister), III (full thickness skin loss) to IV (full thickness tissue loss).[1]

Patients with a category I PU feel pain, discomfort and warmth around their skin.[1] Most category II, III and IV PUs are open wounds,[1] and need wound treatment and infection preventive measures.[7] Severe PU wounds and their treatment reduce patients’ quality of life,[8] prolong their hospital stay, and increase hospital costs and health care expenditure.[2]

Pressure ulcer prevalence and incidence

During the past decade (1999 to 2011), the number of published studies related to PU prevalence and incidence has increased worldwide. PU prevalence, hospital acquired (nosocomial) PU prevalence, and incidence rates have been shown to vary over countries.

PU prevalence rates in hospitals ranged from 0.18[9] to 23.3%.[10] Most national prevalence studies were conducted in Europe. Retrospective national data of Hungarian hospitals from 1993 to 1998 showed, for example, that the PU prevalence in ranged from 0.18-0.21%.[9] The national PU prevalence in other European countries was higher; the first Dutch PU measurement in 1998 showed a PU prevalence of 13.2% in university hospitals and 23.3% in general hospitals.[10] A pilot survey on PU prevalence in European hospitals across five countries (Portugal, Belgium, UK, Sweden and Italy) in 2001 showed an overall prevalence of 18.1%.[11] The Japanese national PU surveillance study in 2003 found that PU prevalence was 2.5% in university hospitals and 3.5% in acute care hospitals.[12] A national survey in acute hospitals in the United States showed a PU prevalence of 14.6% in 2005.[13] National PU prevalence rates were 8.8% in Spanish hospitals in 2006,[14] 7.3% in German hospitals in 2007,[15] 8.9% in French hospitals in 2008,[16] and 12.1% in Belgian hospitals in 2011.[17]

Other studies reported about PU prevalence in only one or some hospitals. PU prevalence was found to be 1.8% in a 3000-bed teaching hospital in China,[18] 4.9% in a uni-

versity hospital in India,[19] 10.3% in one Brazilian hospital,[20] 11.6% in a university hospital in Turkey,[21] 18.1% in a tertiary hospital in Singapore,[22] and 28.2% in a Swedish university hospital. [23] Two hospitals in Jordan showed a PU prevalence of 11.9%.[24] The PU prevalence was 8.5% in three university teaching hospitals in Ireland,[25] 12% in Western Australian hospitals,[26] and 22.9% in 13 Canadian acute hospitals.[27]

The nosocomial PU prevalence over 3 quarters in one hospital in the United States ranged from 1.0% to 3.3%.[28] The nosocomial PU prevalence rate in a 3000-bed teaching hospital in China was 1.54% and excluding category I 0.8%.[18] The nosocomial PU prevalence excluding category I within 207 hospitals in the USA was 0.9% (0%-2.4%), 5.1% in a Swedish university hospital, and 4.4% in a Swedish general hospital.[29]

PU incidence rates have been reported for specific care units or specific patient conditions such as a rehabilitation unit,[30] intensive care,[31,32] hip fractures patients,[33] surgery patients,[34-36] spinal cord injury,[37] and orthopaedic patients.[38] PU incidence in the intensive care unit in general was higher than in other hospital units.[31] PU incidence figures in intensive care units varied from 2.9% in a German hospital[32] to 33.4% in an Indonesian hospital.[39]

PU incidence of hospitalized patients in Washington was 7.0-8.0 per 100.000 population.[40] PU incidence in Northern Californian hospitals ranged from 0% to 5.4%,[41] 0.6% in one hospital in German,[42] and 8.1% in one hospital in Singapore.[22] The overall weekly incidence rate was 0.06 per week in two large hospitals in the Netherlands.[43] A national incidence study held in American hospitals found a PU incidence of 7%.[44,45]

Despite the numerous studies published on (nosocomial) PU prevalence and incidence, most of these rates are difficult to compare because these studies used different definitions on prevalence and incidence, different sources of data, and different measurement methods, inclusion of participants and settings. Nevertheless, these studies have increased the awareness of the PU problem in health care all over the world.

Quality of pressure ulcer care

It is generally acknowledged that many PUs can be prevented[1] therefore (nosocomial) PU prevalence and incidence rates are considered to be one of the performance indicators of patient safety and quality of nursing care in hospitals.[46-48] However, the development of PUs or the quality of PU care is not solely based on preventive measures. Bates-Jensen et al. (2003) compared home care organisations with low and high PU prevalence, but did not find many differences in PU preventive care activities.[49] In a series of comparative studies (2004, 2006, 2008 and 2009), Tannen et al.[50] found fac-

tors other than PU prevention measures that were related to PU prevalence, such as the proportion of patients at risk of PUs[51,52] and the availability of structural quality indicators (e.g. the use of a (regularly updated) PU protocol, internal PU expert groups/teams, information leaflets for patients, nurses' training and a system of central PU registration).[53]

This indicates that the development of PUs is not only related to preventive measures, but also on other factors such as patient characteristics, health care supporting facilities, and health care policy. All these relevant components must therefore be included when measuring and evaluating the quality of PU care.

A well-known model, often used as a theoretical framework for assessing the quality of care in hospitals, is the Donabedian Model.[54] The Donabedian Model defines quality of care as "the kind of care which is expected to maximise an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts".[55] There are three main components in the Donabedian Model: structure, process and outcome.[54] According to Donabedian, each component has a direct or indirect contribution to the other component and therefore all components are important for assessing the integral quality of care to improve daily care.[54]

The central topic in this thesis is the measurement and evaluation of the quality of PU care in hospitals, based on an extended Donabedian model; extended means by including patient characteristics. This extended Donabedian Model will be described in the next section below and information from the literature about measuring the components of the extended Donabedian Model with regard to PU care will be discussed in this chapter. Thereafter, the first study will explore the quality of PU care based on this extended Donabedian Model in Dutch general hospitals (chapter 6). The studies thereafter will address the measurement and evaluation of the quality of PU care, based on this extended Donabedian Model, in Indonesian hospitals (chapter 2 to 5). Therefore, information about Indonesian hospitals and health care policy related to PUs in Indonesia will be described in this chapter as well. The main aim, the structure of the thesis, detailed outlines and research questions of the thesis will be presented in the last paragraphs.

The extended Donabedian Model

Donabedian classified the assessment of quality of care into three components: structure, process and outcome.[54] *Structure* refers to the attributes of the hospital in which health care is delivered, including material resources (support surfaces, redressing

material and money), organisational structure (PU committee, PU guideline and PU registration) and human resources (the number and qualifications of professionals, including education, training and experience).[54] The *process of care* is defined as what is actually done in terms of giving and receiving care. It includes both patients' and healthcare professionals' activities related to PU prevention and treatment measures.[54] *Outcome* measures include the effect of care on patients' health status. Nosocomial PU prevalence is considered as outcome measure in this thesis.

Numerous studies have shown that patient characteristics are associated risk factors for the occurrence of PUs[56] and that they influence PU prevention and treatment measures.[47,57] These patient-related PU risk factors involve age, gender, skin condition, number of admission days, general physical and psychological condition, diseases, severity of illness, surgery, mobility, activity, sensory perception, moisture, nutrition, friction, shear, incontinence and care dependency.[58,59] Some of these risk factors are included in specific PU risk assessment scales such as Braden Scale.[58] Outcome and process indicators should be adjusted for relevant patient characteristics in order to have fair evaluation and comparison results.[60] The Donabedian Model does not explicitly mention patient characteristics in the structure-process-outcome model. Patient characteristics have therefore been added into the theoretical framework that underlies this thesis. Figure 1 illustrates the extended theoretical framework of the Donabedian Model of structure, process and outcome to measure the quality of PU care indicators.

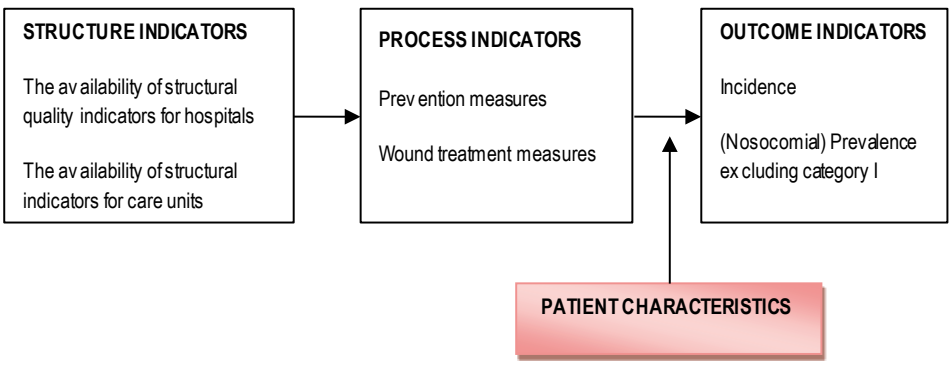

Figure 1. An extended theoretical framework of the Donabedian Model of Structure, Process and Outcome in addition to patient characteristics

Measurement indicators of quality of pressure ulcer care

A quality indicator is defined as "a measurable element of practice performance for which there is evidence or consensus that it can be used to assess quality, and hence change in the quality, of care provided".[61] In the following paragraphs, relevant studies published from 1999 to 2011 that measured one or more indicators related to the structure, process and outcome of PU care are described.

Structure indicators

In 1999, Bours et al. conducted a literature review and convened a Delphi panel to develop questionnaires on structural PU quality indicators.[62] The questionnaires record the presence or absence of the specific indicators.[62] The final hospital structural quality indicator questionnaire involved the availability of a PU committee, a guideline/protocol for the prevention of PUs, a guideline/protocol for the treatment of PUs, a responsible person for updating the guideline/protocol, a regular controlling of the care process based on guideline, a person responsible for registering PU patients, the registration of PU incidence/prevalence, the central management of preventive materials in the institution, a training session or special meeting on the prevention and treatment of PUs, and an information leaflet about the prevention of PUs for patients and/or family care givers.[62] The structural quality indicator questionnaire for care units involved the availability of a specialised PU nurse, a mono-disciplinary discussion on patients at risk or with PUs, a multi-disciplinary discussion on patients at risk or with PUs, a set of guidelines for the prevention of PUs, a set of guidelines for the treatment of PUs, documentation of risk assessment results, documentation on PU prevention and treatment and the availability of the necessary preventive materials within 24 hours.[62] The questionnaires on structural PU quality indicators in care units and hospitals are completed by the heads of care units and hospital representatives respectively.[62] The literature furthermore describes the California Nursing Outcomes Coalition (CalNOC), which registers nurses' staffing (hours of care and skill mix) and workload (admission, discharge and transfers) as structural quality indicators of PU care.[63]

Process indicators

Process indicators of PU care are measured by the presence or absence of PU prevention and treatment measures.

Pressure ulcer prevention indicators

Several studies have assessed preventive measures used in hospitals. Before measuring PU preventive indicators, we need to pay particular attention to (1) data collection methods for valid and reliable measurement results, (2) the evaluation of PU prevention activities and (3) the identification of patients at risk for PUs.

According to the data collection method, a number of researchers have collected data using questionnaires sent to nurses in care units,[64-68] but the response rates were often low and many of the questionnaires were returned incomplete.[65] Audits of both paper-based and electronic clinical documentation have also been conducted.[69-71] Most nurses, however, do not document their PU prevention activities in daily practice very well.[67,72] As a result of this incoherence in reporting and observing prevention activities,[67] patient records have not been a valid and reliable data source.[69] In addition, 24-hour observation of nursing activities related to PU prevention has shown to be time consuming and to require numerous observers.[32,67,73] Another data collection method involved a patient survey on PU preventive measures and the use of PU preventive devices. The patients who participated were all surveyed by a team of nurses acting as data collectors[10,11,50,74,75] or by an independent research team that did not work in the hospitals.[76-78] This method requires a well-trained data collection team, but produces valid and reliable results and a high patient response rate.[10,11,74]

In those studies, the evaluation of the appropriate PU preventive measures was based on the recommended and non-recommended prevention measures in national or international guidelines.[10,17,74,79,80] Some studies assessed only two main preventive measures: support surfaces (mattress and cushion) and repositioning.[11,17,74,75] Other studies surveyed more preventive measures.[10,65,68,81,82] In 2009, the European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) developed evidence-based recommendations for PU prevention.[1] The recommended preventive measures involve identifying patients at risk for PUs, regularly inspecting patients' skin, emollients to hydrate dry skin, nutrition support (high-protein diet), repositioning based on patient condition and support surface, transfer aids, limiting the time patients spend in wheelchairs, pressure redistribution mattresses and cushions, heel protectors and natural sheep skin pads.[1] The guideline does not recommend massage, vigorous rubbing of the skin, 90º side-lying or semi recumbent position, small-cell alternating pressure air mattress, synthetic sheep skin pad, cut-out, ring or donut type device, or water-filled gloves.[1]

PU preventive measures only need to be applied for patients who are at risk of developing PUs. Many studies have also assessed the proportion of patients at risk for PUs who receive preventive measures. Many of these used the Braden Scale (in more than

30 countries).[83] However, the literature describes different cut-off points for defining the risk groups. The Braden Scale cut-off point ranged from 20[10,84,79] to 18[74], 17[82] and 16.[11,17]

Pressure ulcer treatment indicators

Nowadays a huge array of advanced wound treatment products is available. At least 103 randomised controlled trial studies have been conducted to collect evidence for supporting treatment interventions for PUs.[85] These studies have been summarised in the clinical practice guidelines by EPUAP and NPUAP.[7] However, only a small number of observational studies have been conducted to assess actual PU treatment and PU wound care practice in hospitals over the past decade. The data collection procedures used in those studies to assess actual PU treatment and wound care practices involved a questionnaire survey among nurses,[65,68] an audit of patient records[72] and a direct patient survey.[10,72,78,81,86] Several studies have assessed the application of wound dressings based on PU categories.[10,32,68,72,86] Some studies have also assessed more treatment measures. [72,81]

Outcome indicators

Numerous studies have reported results on prevalence, nosocomial PU prevalence and incidence measurements. Various issues have been identified in relation to the measurement of the PU incidence/prevalence rate in hospitals such as a) the inclusion and exclusion of participating care units, b) the categorisation of PUs, c) the inclusion and exclusion of non-blanchable redness of intact skin in the PU incidence/prevalence rate, and d) data collection procedures (e.g. direct examination of patients, administrative data bases, audits of medical records, and nurses' reports).[11,26,87,88]

Most studies did a one-day cross sectional survey and indicated their result as "prevalence" which is the proportion of a defined set of people who have a PU (developed before and after admission) at a particular moment in time.[89,90] The defined population could be patients at risk for PUs, specific patients or hospitalised patients in general.[89,91] The nosocomial PU prevalence is defined as the percentage of patients who developed a PU during their stay in hospital.[89] Nosocomial PU prevalence data are increasingly being used as outcome indicators of the quality of PU care in hospitals.[89] Results of category I PU assessments are less reliable,[92,93] and they are frequently excluded in the nosocomial PU prevalence report for the quality of care performance.[90,94] Incidence estimates the occurrence rate of new PUs over time, and refers to the proportion of the study population that develops a new PU within a particular time.[89,90]

Incidence measurements need to be repeated, are time consuming and require more data collectors over time. Incidence measurements are therefore difficult to apply reliably in larger measurement studies.

Measuring the quality of pressure ulcer care in hospitals

Several studies have conducted nationwide prevalence surveys to define national hospital benchmarking rates in countries such as in the Netherlands,[10] Germany,[15,95] Belgium,[17] Japan,[12] Canada[27] and the United States.[13,96,97] Some of these studies focused on measuring the PU prevalence and/or nosocomial PU prevalence and others surveyed additional data related to the quality of PU care.[26,27,44] A Japanese PU surveillance study surveyed the number of PU patients before and after admission, hospital type, number of patients, number of bed-bound patients, length of stay, hospital occupancy rate and the condition of bedding support.[12] A PU prevalence survey in the United States surveyed PU prevalence, nosocomial PU prevalence, patient demographics, department type, nutritional status and PU risk.[13] The EPUAP working group developed a European Pressure Ulcer Prevalence Survey Minimum Data Set to assess PU prevalence, severity, risk and prevention measures (pressure redistributing support surface and repositioning).[98] This mini data collection form was used in a European pilot study[11,99-101] and a number of PU prevalence studies over countries.[17,23,24,75,102] The data collection procedure of this European pilot study was based on the annual Dutch national prevalence survey.[11,99-101]

The Dutch National Prevalence Survey of Care Problems, known as Landelijke Prevalentiemeting Zorgproblemen (LPZ) and later as LPZ-International,[103] has measured health care problems such as PUs annually since 1998. This particular prevalence study assesses more integrated data related to PU care among all available questionnaires, such as the structural quality indicators for institutions, the structural quality indicators for wards, patient characteristics, PU risk based on the Braden Scale, the use of preventive measures (e.g. type of support surface, repositioning, prevention of malnutrition and education for patients and/or relatives) and the use of wound dressings.

In the LPZ survey, hospitals are invited by mail to participate.[10] Each participating hospital is responsible for appointing a qualified hospital coordinator. The hospital coordinator receives a written protocol for the survey, data collection forms, and a training package. The hospital coordinators are trained collectively by the LPZ research team. The hospital coordinator selects and trains a team of nurses to collect data. Each patient is assessed both by a nurse from his or her own care unit and by a nurse from another care unit. Patients on each participating care unit who give their permission

are included in the survey.[10] The LPZ study currently has been adopted by several countries as the LPZ-international measurement.[15,95,103,104]

Indonesian hospitals and health care policy related to pressure ulcers

Indonesia is the largest archipelago country between the Asian and Australian continent.[105] It has five major islands: Sumatera, Java, Kalimantan, Sulawesi and Papua and is administratively divided into 33 provinces. The number of Indonesian hospitals has increased rapidly from 1,033 in 2007 to 1,721 in 2011.[105] Almost half of the hospitals (48.9%) are located in Java, 23.4% are in Sumatera, 9.3% in Sulawesi, 6.6% in Kalimantan, 2.3% in Papua and 9.6% are on the other islands.[105] Most hospitals (81.7%) are public hospitals managed by the government and non-profit legal entities. These hospitals provide referral health care services for 241,182,182 Indonesian people with a total of 170,656 bed capacities.[105] The bed occupancy rate is 58.7% and the average length of stays is 4.3 days.[105]

The Indonesian Ministry of Health regulates the classification of hospitals based on their services, human resources and facilities.[106] Hospitals are categorised into general hospitals and specialized hospitals. Most Indonesian hospitals (79.8%) are general hospitals.[105] General hospitals provide health care services for various types of diseases.[106] Specialised hospitals cover medical service in one specialised field or disease based on specialisation, age group or disease types. These include specialised hospitals for obstetrics, cardiology, oncology, orthopaedics, neurology, psychiatry, leprosy, ophthalmology, infectious disease and surgery.[106]

The registration and classification of the hospitals are recorded in the Hospital Information System (in Indonesian: Sistem Informasi Rumah Sakit).[107] General hospitals are classified into classes A, B, C and D; specialised hospitals are classified into classes A, B and C.[106] Class A and B general hospitals are large hospitals with a capacity of over 200 beds and have the most complete facilities.[108] Almost all provinces (93.9%) have at least one Class B hospital.[107] In 2011, there were 43 (2.38%) Class A hospitals, 217 (12.6%) Class B hospitals and 447 (26.0%) Class C hospitals (25.8%).[107]

The Indonesian Ministry of Health encourages the hospitals to provide excellent health care and to continuously improve the quality and safety of care. The Ministry of Health has established a minimum standard for hospital care[109] and supports hospitals in achieving this standard. Furthermore, the ministry also requires hospitals to acquire national[110] and/or international health care accreditation (Rumah Sakit Indonesia Kelas Dunia).[111] Concerning the safety of care, hospitals must have a nosocomial infection

control team (Tim Pengendalian Infeksi Nosokomial Rumah Sakit)[112] and a patient safety team (Tim Keselamatan Pasien Rumah Sakit).[113] The nosocomial infection control teams have been recording the number of nosocomial PU patients in each care unit every month since 2003. The data are reported in the Hospital Information System.[112]

The exemplary sample study in this thesis will be in Indonesian hospitals for several reasons. First, few published studies about PU occurrence were available[39,114] and there was an indication of high incidence in an intensive care unit.[39] PU could be a hidden health care problem in other wards or in hospitals. Second, the quality of PU care study has not been conducted yet. Third, there was no standardised questionnaire and measurement on PU prevalence at national level.

Aim of this thesis

The main aim of this thesis is to investigate how to measure and evaluate the quality of PU care in hospitals based on the extended Model of Donabedian. The specific focus is on the Indonesian hospital sector.

Outline of the thesis and research questions

Chapter 2 describes the first experiences in measuring the quality of PU care in stroke patients in an Indonesian hospital. The purpose of this study was to gather preliminary information about the quality of PU care. The research questions were:

a. How prevalent are PUs in stroke patients in an Indonesian stroke-specialised hospital?
b. Which interventions do nurses use to prevent and treat PU wounds in these hospitals?
c. Which structural quality indicators of PU care are available on the ward and institutional levels?

Chapter 3 introduces the LPZ-international measurement and evaluates the psychometric properties of the LPZ-International methodology and the Indonesian version of the LPZ-International questionnaire on measuring the quality of PU care indicators. The main research questions were:

a. What are the results of the content validity of the Indonesian version of the LPZ-International questionnaire based on Indonesian expert opinions?
b. What are the results of the interrater agreement and reliability of the PU categorisation, the Braden Scale and the Care Dependency Scale?

Chapter 4 evaluates the quality of PU care in Indonesian hospitals using an extended Donabedian model of quality of care, including structure (structural ward and hospital quality indicators), process (PU preventive measures), outcome (nosocomial PU prevalence excluding category I) indicators and patient characteristics. The following research questions were addressed to give an overview of the quality of PU care:

a. What is the nosocomial PU prevalence rate in Indonesian hospitals?
b. What are the characteristics of PU patients in Indonesian hospitals?
c. What PU preventive measures are used in Indonesian hospitals?
d. What structural quality indicators are available in Indonesian hospitals at ward and institutional level?
e. Are patient characteristics, preventive measures and structural quality indicators at ward and institutional level associated with nosocomial PUs?

Chapter 5 describes the characteristics of PU patients, their ulcers, and the PU preventive and treatment measures in four Indonesian general hospitals. The research questions are:

a. What is the prevalence of PUs in Indonesian general hospitals?
b. What are the specific characteristics of PU patients?
c. What are the characteristics of the PUs themselves?
d. What are the actual PU preventive and treatment measures applied for Indonesian PU patients?

Chapter 6 In this chapter, the extended theoretical framework of the Donabedian Model of Structure, Process and Outcome was used to evaluate the Dutch Health Care policy on obliging care institutions to publish PU prevalence data since 2004. The research questions were:

a. Which factors (e.g. patient characteristics, PU prevention strategies and structural quality indicators used by institutions and wards) are related to the prevalence of PUs in Dutch general hospitals?
b. Are there any differences in these related factors between the periods 2001-2004 (before publication PU rates) and 2005-2008 (after publication PU rates?

Finally, **Chapter 7** provides the general discussion, recommendations for clinical practice and further research. The chapter discusses the major findings related to the measurement of quality of PU care in Indonesia and the evaluation of quality of PU care in Indonesian and Dutch hospitals.

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Chapter 2

Pressure ulcer prevalence and quality of care in stroke patients in an Indonesian hospital

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Abstract

Objective: To explore the quality of pressure ulcer (PU) care in stroke patients in an Indonesian stroke-specialised hospital. The prevalence, prevention, wound treatment and hospital facilities related to PU structural quality indicators at the ward and institutional levels were assessed.

Method: A multi-level cross-sectional survey was performed over three days in an Indonesian stroke-specialised hospital. All stroke patients present on the day of the measurement were included. The European Pressure Ulcer Prevalence Survey Minimum Data Set and the Dutch National Prevalence Measurement of Care Problems (Landelijke Prevalentiemeting Zorgproblemen, LPZ) questionnaire were used.

Results: The prevalence rates of PUs, including and excluding category I were high in this hospital (28% and 17%, respectively). More than half of the patients/families (56%) received education about PU prevention and 74% of the patients were repositioned, although irregularly, by nurses or families. No treatment was applied to category I PUs. Category II PUs were treated by using NaCl 0.9% solution to cleanse the wound without dressings. Category III PUs were mainly treated by using anti-microbial gauze dressing. No patient suffered a category IV PU. Only a few structural quality indicators of PU care at ward and hospital level were met.

Conclusion: PUs were quite prevalent in these stroke patients. The quality of PU care in this hospital could be improved, especially in the areas of prevention, treatment and structural quality indicators.

Key words: pressure ulcer; stroke; prevalence; prevention; treatment; quality indicator

Introduction

The European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) define a pressure ulcer (PU) as 'a localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure or pressure in combination with shear'.[1] PUs are an expensive health-care problem that negatively impact the length of hospitalisation and cause extra nursing care time.[2,3] More importantly, PUs negatively impact patients' health-related quality of life.[4]

The European Pressure Ulcer Prevalence Survey Minimum Data Set was used to measure PU prevalence rates in hospitals; findings ranged from 12.0–20.3% (including category I PUs) and 7.0–12.7% (excluding category I PUs).[5-7] High PU prevalence figures were found in specialised hospital units such as intensive care,[8] orthopaedics,[5] and surgery care.[9] PUs are also a health-care problem in particular patient groups such as cardiac surgery patients,[10] paediatric patients,[11] critically ill patients with traumatic spinal cord injuries,[12] and stroke patients.[13] PUs are the most prevalent medical complication after a stroke during hospital admission (21%) and create extra problems for the patients, nurses, families and hospitals.[14] Almost half of elderly stroke patients (47.6%) who lived in urban communities in Thailand developed PUs.[13]

A lot of effort has been put into reducing this problem on an international level. For example, performing annual PU prevalence measurements,[15,16] exploring risk factors for PUs in hospitals,[17] organising international prevalence measurements and doing comparison studies for better quality PU care.[18] Furthermore, EPUAP and NPUAP have developed an international clinical practice guideline based on evidence-based PU prevention and treatment interventions.[1,19]

However, PUs are a hidden care problem in Indonesian hospitals. Only four published studies about PUs in Indonesia are available, resulting in a lack of awareness about this problem.[20-23] A 2007 study on PUs showed that the incidence was high (33.4%) at an ICU unit in one Indonesian public hospital.[20]

The purpose of this study was to get more information about the quality of PU care by exploring the PU prevalence, prevention, treatment and quality indicators of PU in stroke patients in an Indonesian stroke-specialised hospital. The research questions were:

a. How prevalent are PUs in stroke patients in an Indonesian stroke-specialised hospital?
b. Which interventions do nurses use to prevent and treat PU wounds in this hospital?
c. Which structural quality indicators of PU care are available on the ward and institutional levels?

Methods

Design

A multi-level cross-sectional survey was performed over three days. Data were gathered at patient, ward and hospital levels in an Indonesian stroke-specialised hospital.

Study population

All stroke patients who were staying in the neurology and intensive care unit/cardiovascular care unit (ICU/CVCU) wards on the day of the measurement were included in the study. Patients had been admitted in the hospital for at least one day. This public, rural hospital is managed and supervised by the district government and has 145 beds in total, with 7 beds in the ICU and 39 beds in neurological wards.

The hospital's research and ethics committee gave permission to conduct this study. Participants were assessed after giving written, informed consent. A legal representative of the patients gave permission for comatose patients. The information regarding patients, wards and hospital was kept confidential and all data were processed anonymously.

Questionnaires

The European Pressure Ulcer Prevalence Survey Minimum Data Set questionnaire (European PU Prevalence Study MDS questionnaire) and the Dutch National Prevalence Measurement of Care Problems (Landelijke Prevalentiemeting Zorgproblemen [LPZ]) questionnaire were used to gather the required data.[24-26]

Patient demographics (age, gender, expected length of stay), PU risk (Braden scale) and an actual skin observation (category and location of PUs) were assessed using the European PU Prevalence Survey MDS questionnaire. PUs were categorised into the four categories of the EPUAP-NPUAP pressure ulcer classification system.[1] PU prevention, wound treatment and hospital facilities related to structural quality indicators of PU care at the ward and institutional levels were assessed by the LPZ questionnaire.[25] English versions of both questionnaires were used, as no Indonesian version was available.

Data collection

Each patient was assessed by an independent nurse (YA), who was not employed by the hospital, and was familiar with the questionnaires and understood the English

versions. Patients on the neurology ward were assessed on 26–27 November 2011 and patients on the ICU/CVCU ward on 28 November 2011. Each patient was only assessed once.

Statistical analysis

Descriptive analysis was done using IBM SPSS statistics (v19; IBM Corporation). A cut-off point of 20 on the Braden scale was used to classify the at-risk (6-20) versus non-risk patients (21-23).[27] PU prevalence and hospital-acquired PU prevalence, including and excluding category I PUs, were calculated for all patients. The proportions of PU prevention measures and PU wound treatment given to at-risk PU patients were presented. The availability of structural quality indicators regarding PUs at the ward and institutional levels were dichotomously (yes/no) measured.

Results

All stroke patients (36 patients) in the hospital participated in the study (four in the ICU/CVCU ward and 32 in the neurological ward; Table 1). Mean age of the participants was 57.8 ±11.1 years (range 34-75 years). Mean length of stay was 4.4 days ± 3.6 days (range 1–13 days), with over 97% (n=35) of participants expected to stay in hospital for more than 6 days. Most participants (n=34; 94%) were considered to be at risk of PU development, according to the Braden scale, with an average score of 13.3 ±4.4. Two neurological ward patients were not at risk of PUs (score>20).

Table 1. Patient characteristics

Patient characteristics	Results
No. of patients	36
Gender (male/female)	18/18 (50%/50%)
Age (years)	57.8 ±11.1
Range	34–75
19–39	1 (2.8 %)
40-59	15 (42%)
60-69	15 (42%)
70-79	5 (14%)
Length of stay (days)	4.4 ±3.6
Range	1–13
< 2	9 (25%)
2–7	19 (53%)
8–14	8 (22%)
Expected length of stay	
< 6 days	1 (2.8%)
6 days–1 month	35 (97%)
Distribution of diseases	
Haemorrhagic stroke	22 (61%)
Non-haemorrhagic stroke	14 (39%)
Braden scale score	13.3 ±4.4
Patient at risk (≤ 20)	34 (94%)

Pressure ulcer prevalence

Of 36 participants, 10 patients suffered from a PU. The overall prevalence of PU, including category 1, was 28% (95% confidence interval (CI) 15%-44%). Six of them (17%; 95% CI 7%-32%) had a category II PU or higher. Table 2 presents the PU characteristics and wound treatment.

Pressure ulcer prevention and treatment

Most at-risk patients (n=31, 91%) were treated for malnutrition (Table 3). According to patients/families, more than half of them (n=19, 56%) had received information and instruction about PU prevention and 74% (n=25) of the patients had been repositioned by nurses or families. All ICU/CVCU ward patients and one neurology ward patient (n=5; 15%) had a special PU preventing mattress, while the other patients had foam or kapok mattresses (common Indonesian mattresses that are filled with silky fibers from the seed pods of the kapok tree). The ICU/CVCU and neurology ward nurses used palm or coconut oil to moisturise and protect the patients' skin.

Table 2. Pressure ulcer characteristics and wound treatment

Pressure ulcer characteristics and wound treatment	Results
No. of patients with PUs	10 (28%)
Neurology	8 (80%)
ICU/CVCU	2 (20%)
PU prevalence	
Including category 1	10 (28%)
Excluding category 1	6 (17%)
Hospital-acquired prevalence	
Including category I	8 (22%)
Excluding category I	4 (11%)
PU wounds by category	
Category I	8 (57%)
Category II	4 (29%)
Category III	2 (14%)
Category IV	0 (0.0%)
Total	14 (100%)
Location of PU wounds	
Sacrum	10 (71%)
Elbow	4(29%)
PU wound treatment	
Category I (n=8)	No treatment
Category II (n=4)	Wound cleaning (NaCl 0.9% solution)
Category III (n=2)	Anti-microbial dressing
Category IV (n=0)	Not applicable

No treatment was applied to category I PUs (Table 2). Category II PUs were treated by using sodium chloride (NaCl) 0.9% solution, without dressings, to cleanse the wound and subsequently applying mercurochrome solution. For cleaning category III wounds, NaCl 0.9% and anti-microbial solution were used and anti-microbial gauze dressings were applied. No patient presented a category IV PU.

Hospital facilities related to structural quality indicators of care at ward and institutional levels

Most structural quality indicators of PU care at the ward and hospital levels were not fulfilled (Tables 4 and 5). The hospital already performed a monthly registration of PU wounds on each ward. At the ward level, patients with PUs were managed in mono- and multidisciplinary consultations. Every bed on the ICU/CVCU ward had a special mattress designed for the prevention of PUs. The neurology ward only had five PU mattresses for all their patients.

Table 3. Pressure ulcer preventive measures for at-risk patients (n=34)

Preventive measures	n (%)
Repositioning (irregularly)	25 (74%)
Special PU preventing mattress (mattress overlay)	5 (15%)
Prevent or treat malnutrition (high protein food)	31 (91%)
Provide health education to the participant/family	19 (56%)
Floating heels (pillow under lower leg)	3 (8.8%)
Massage with the intention to stimulate skin perfusion	2 (5.8%)
Using moisture to protect the skin	8 (24%)

Table 4. Institutional structural quality indicators

Quality indicator	Yes/No
Does your institution have a pressure ulcer committee?	No
Does your institution have guidelines (a protocol) for the prevention of pressure ulcers?	No
Does your institution have guidelines for the treatment of pressure ulcers?	No
Does your institution have a person who is responsible for keeping the prevention and/or treatment guidelines up-to-date and bringing them to the staff's attention?	No
Does your institution check staff work in accordance with the guidelines?	No
Will patients with pressure ulcers be reported to a central person in the institution?	No
Does your institution regularly register the incidence or prevalence of pressure ulcers?	Yes
Are the preventive materials, such as support surfaces, managed centrally in the institution?	No
Has the institution organized an extra training or a special meeting on the prevention and treatment of pressure ulcers?	No
Does the institution have a leaflet with information about the prevention of pressure ulcers for patients and/or family caregivers?	No

Table 5. Ward structural quality indicators

Quality indicator	ICU/CVCU	Neurology
There is at least one person on the ward who is specialised in the field of pressure ulcers	No	No
Patients at risk or with pressure ulcers on the ward are discussed in a mono-disciplinary way	Yes	Yes
Patients at risk or with pressure ulcers on the ward are discussed in a multi-disciplinary way	Yes	Yes
Guideline for the prevention of pressure ulcers is used on the ward	No	No
Guideline for the treatment of pressure ulcers is used on the ward	No	No
The results of risk assessment are documented in nursing records for each patient	No	No
The activities that have to be done for the prevention or treatment of pressure ulcers for those at risk are documented in the nursing record	No	No
The necessary preventive materials are delivered to the patient within 24 hours	Yes	No

Discussion

Even though this study involved only one Indonesian hospital and looked at a small sample, it provides a first insight into the PU issues related to the prevalence, prevention, treatment and structural quality indicators in Indonesia. Moreover it provides evidence of some experience in using two standardised questionnaires in an Indonesian hospital setting.

Comparing the overall PU prevalence, including category 1, in this hospital (28%) with the overall PU prevalence from other studies using the European PU Prevalence Survey Minimum MDS (12.0–20.3%), the PU prevalence in this Indonesian stroke-specialised hospital could be considered high.[5-7] However, almost all stroke patients in this hospital were at risk of PUs, which may be one reason for the high prevalence. Other reasons are differences in prevention, treatment and structural quality indicators between health-care facilities.[15]

Despite the differences in culture, it is interesting that the same fundamental problem to other settings in preventive care is highlighted—namely that care has a good level of evidence of effectiveness (pressure relief) is rarely provided, while most patients receive care with limited evidence of benefit (such us using oil for skin moisturising) or indeed care which that the majority of studies have found to be ineffective (such as massage).[28]

In the European PU Prevalence Survey MDS questionnaire, no questions are formulated about when the PU was developed—before or during admittance. However, in this study, as it was set in just one hospital, the hospital-acquired PU prevalence rate could be calculated. It showed that, in this hospital, eight of 10 PU patients developed a PU during hospital admittance (Table 2). The hospital-acquired PU prevalence rates, including and excluding category I, were 22% (n=8; 95%CI:11%-38%) and 11% (n=4; 95%CI: 4%-25%), respectively.

More than half of the patients and/or families received information and instruction about PU prevention and more than half of the patients were repositioned. However the quality of the information and instruction is unknown because no PU leaflet or PU prevention guideline was used. Most patients (n=29; 85%) did not use a special PU preventing mattress and should be repositioned every 2–3 hours.[29] However, repositioning was done irregularly, which is inadequate. It is necessary to introduce the recent EPUAP-NPUAP evidence-based guideline in this hospital and update the nurses' knowledge about PU prevention and treatment.[30,31]

Category III PUs were mainly treated by applying anti-microbial gauze dressing. Due to the need for frequent changes, the gauze dressing should not be used frequently. However, other dressings are expensive. Therefore the saline-impregnated-anti-microbial gauze is still preferable for moisturising the wound.[19] The Indonesian honey dressing can be a cheap option for dressing wounds in hospitals;[23] however, the mercuro solution is not recommended for PU treatment,[19] as it dries and stains the skin, making it difficult to evaluate the evolution of the wound.

This hospital paid special attention to PUs by performing a monthly registration of PU cases in wards. However, registration alone may result in a suboptimal effort to enhance the quality of PU care and reduce the number of PU cases. Regular and independent audits about prevalence and multi-factor-related PUs care may result in higher quality health care that prevents PUs.[32,33]

Limitations

We had some difficulty in completing some items on the European PU Prevalence Survey MDS questionnaire, such as expected length of stay and prevention. Most participants did not precisely know their expected length of stay in the hospital; therefore, the data were based on both researcher's and head nurse's judgments. Due to the limited number of nurses in Indonesian hospitals, the patients' family members were involved in providing daily care, except in the ICU/CVCU ward.[34] It was difficult to make an objective judgment about how often nurses and/or families repositioned patients (every two, three or four hours) because there was no nurse documentation on repositioning and no information from nurses about the regularity of repositioning.

Each patient was assessed by an independent nurse who was not involved in their daily care, which made data collection more time consuming. Although Kottner et al. suggests that one data collector is as reliable as two,[35] in practice it would be helpful to have more than one data collector working in the ward for practical reasons such as turning the patient, getting permission to open the wound dressing when assessing a PU patient and preventing bias on the Braden scale measurement. The benefits of the measurement will increase if the nurses and the head of nursing are involved in organising the measurement.

The small number of patients makes it difficult to generalise the results even though the response rate was 100%. We recommend conducting a larger study to explore the prevalence of PUs and the quality of PU care in Indonesian hospitals using a standardised questionnaire. We used both the European PU Prevalence Survey MDS questionnaire and the LPZ questionnaire. Since the European PU Prevalence Survey MDS ques-

tionnaire has a limited number of questions about PU preventions and no questions about hospital-acquired PU, the treatment of PU and structural quality indicators, we recommend using the LPZ questionnaire because it provides a more in-depth overview of the quality of PU care indicators, such as the characteristics of patients, the characteristics of PUs, prevention and treatment of PUs and the structural quality indicators. As Indonesia is not an English-speaking country, an Indonesian version of the LPZ questionnaire is needed for further research and a psychometric evaluation is necessary.

Conclusions

The prevalence of PUs in this hospital was high, but the results cannot be generalised to all Indonesian hospitals. The quality of PU care in stroke patients in this hospital was not optimum, but the quality could be enhanced by improving the prevention, treatment and structural quality indicators. A first step in improving the quality of PU care should be improving the awareness of this health care problem in the hospital, and also in Indonesia. Therefore, starting with a larger study to explore the prevalence of PUs and the quality of PU care in Indonesian hospitals using an Indonesian version of the LPZ questionnaire is recommended.

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Chapter 3

Psychometric properties of the Dutch national prevalence measurement of care problems used to measure quality of pressure ulcer care in Indonesian hospitals

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Abstract

Objective:to evaluate the psychometric properties of the Indonesian version of the Dutch National Prevalence Measurement of Care Problems. The questionnaire consists of 6 parts: patient characteristics (including Pressure Ulcer [PU] risk; assessed by the Braden Scale) and care dependency (assessed by the Care Dependency Scale [CDS]), PU categorization, prevention, treatment, and structural quality indicators at ward and hospital level.

Method: A 3-phase design was used, including questionnaire translation and psychometric testing. The questionnaire was translated into Indonesian on March 2012. Content validity was assessed by 18 Indonesian experts on July 2012. The interrater agreement and reliability of the PU categories, Braden Scale, and CDS were assessed on October 2012 in 4 Indonesian large public general hospitals.

Results: Most Indonesian experts (91.8%) rated the Indonesian version of the questionnaire as "good" on clarity of wording. The content validity indices of the questionnaire ranged from 0.50 to 1.00. The PU categories assessed, showed an interrater reliability of $\kappa = 0.92$ (95% confidence interval (CI), 0.87-0.97) and an interrater agreement of $p_o = 98.6\%$ (95% CI, 97.5-99.3). The interrater reliability intraclass correlation coefficient (1,1) of the Braden Scale sum score was 0.90 (95% CI, 0.85-0.93). The exact proportion of agreement sum score was 39%. The interrater reliability intraclass correlation coefficient (1,1) of the CDS sum score was 0.88 (95% CI, 0.83-0.92). There was a 45% exact agreement on the Care Dependency Scale sum scores.

Conclusions: The questionnaire can be used in Indonesian hospitals to measure the PU prevalence and quality of PU care.

Keywords: pressure ulcers, quality of healthcare, validation studies

Introduction

Hospitalized patients frequently develop pressure ulcers (PUs), which negatively impact their health-related quality of life and their length of hospitalization.[1,2] The extra nursing care time and wound care materials necessary to treat them lead to extra healthcare costs, so PU prevention intervention saves nursing care time and money.[3] Most PUs are preventable if patients receive adequate preventive care and high-quality daily nursing care.[4] Therefore, PU occurrence is considered to be an international indicator of the quality of care. Reported international PU prevalence figures vary from 1.8% to 15.8% in hospitals.[5-10]

The prevalence of hospital-acquired PUs was introduced in 2012 as a new nursing sensitive care indicator for Indonesian hospital accreditation. Currently, Indonesian hospitals measure PU prevalence differently because there are no national standardized data collection procedures and questionnaires about PU prevalence. Therefore, it is difficult to compare data between hospitals, and benchmarking does not seem feasible at the moment.[11] Most hospitals measure PU incidence and do not evaluate the quality of PU care indicators.[12] This compromises effective quality of care improvement interventions in hospitals.[13] Furthermore, standardized measurements over consecutive years are necessary to evaluate and optimize the quality of PU management over time.[14]

The use of existing standardized measurements and the assessment of their psychometric properties in an Indonesian hospital setting might save the time, materials, and human resources that would be needed to develop new data collection forms and procedures. The Dutch National Prevalence Survey of Care Problems (*Landelijke Prevalentiemeting Zorgproblemen*, [LPZ]) measurement questionnaire might be an option for Indonesia. It is a well-known standardized measurement questionnaire and procedure for measuring PU prevalence and other relevant indicators of the quality of PU care according to the Donabedian model's structure, process, and outcome indicators.[15] Furthermore, the LPZ questionnaire, developed in 1997,[16] has been adopted by several countries and has been validated and tested in various healthcare settings like home care and hospitals in different countries.[17-22]

Indonesia would be the first Asian country to adopt the LPZ questionnaire. However, psychometric evaluations of the Indonesian translation of the LPZ questionnaire are required. It is unknown whether the questionnaire can be appropriately applied to Indonesian hospital settings and whether the validly would reflect the quality of PU care indicators there. The European Pressure Ulcer Advisory Panel-The National Pressure Ulcer Advisory Panel (EPUAP-NPUAP) PU categorization, the Braden Scale, and the Care Dependency Scale (CDS) are all included in the LPZ questionnaire. High interrater

agreement and reliability of measurement result of those scales among the data collectors are prerequisites for accurate LPZ measurement results. Because most Indonesian nurses are unfamiliar with these scales and do not use them in their daily routines, the assessment of interrater agreement and reliability is especially important and it would support the LPZ tool's overall validity for use in the Indonesian hospital setting.

Objectives

The objectives of this study are: (1) to describe the process and the results of translating the LPZ questionnaire into the Indonesian language; and (2) to perform psychometric testing of the Indonesian version of the LPZ questionnaire.

Methods

A 3-phase design was used. Phase I involved the translation of the LPZ questionnaire from English to Indonesian and back to English. Phase II assessed the content validity of the Indonesian version of the LPZ questionnaire. Phase III assessed the interrater agreement and reliability of the PU categories, the Braden Scale, and the CDS.

Instrument

The LPZ questionnaire is used to measure quality of PU care base on the Donabedian model's structure, process, and outcome indicators.[15,22] A more in-depth description of the LPZ instrument and methodology can be found in van Nie-Visser et al.[22] As described in van Nie-Visser et al,[22] the LPZ questionnaire consists of 6 parts: (1) the characteristics of patients related to PU risk, (2) PU characteristics, (3) PU prevention, (4) PU treatment, (5) the structural quality indicators related to PUs at the ward, and (6) hospital levels.[22]

Pressure ulcer prevalence is considered to be an outcome indicator.[23] In the LPZ measurement, PU prevalence is defined as the proportion of participants with category II or higher PUs recorded in the 1-day prevalence survey in the hospital. The EPUAP-NPUAP PU categorization system uses 4 categories: "non-blanchable erythema," "partial thickness skin loss," "full thickness skin loss" and "full thickness tissue loss".[24] Pressure ulcer prevention and treatment measures are considered to be process indicators, such us repositioning, usability of a PU preventing mattress, nutrition care, health education, and wound care dressing. Structural quality indicators involve hospital/ward facilities and resources related to PU care, such as having a PU/wound care nurse, the availability of pressure-redistributing mattresses, PU prevention and treatment guidelines, and information leaflets for patients and families. Furthermore, rele-

vant patient characteristics are assessed, such as the risk of developing PUs (assessed by the Braden Scale) and the patient's care dependency (assessed by the CDS).

Identification of patients at risk of developed PUs is related to process indicators with further analysis on prevention and treatment measures. The Braden Scale, incorporated in the LPZ-instrument, is the most widely applied tool for PU risk assessment.[25] It consists of 6 sub-scales: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. The total score ranges from 6 to 23. A low Braden scale score indicates a high risk of PUs. A Braden score of 20 or less can be classified as representing a patient at PU risk.[26]

The self-care abilities of patients are measured with the CDS.[27] The CDS was developed in the Netherlands in 1994 as an instrument for care planning in long-term-care facilities and may be used internationally to estimate care dependency among hospital patients.[28,29] It consists of 15 care dependency items; each item has 5 Likert-type categories. Responses range from "1 = completely dependent" to "5 = almost independent." This scale is easy to use and takes less than 5 minutes to complete.[30] Patients with a CDS sum score less than or equal to 68 can be classified as care-dependent patients.[31] The PU "risk" and "no risk" patients also can be categorized by their CDS scores.[32]

Phase I: The Indonesian translation of the LPZ questionnaire

The original LPZ questionnaire was written in Dutch and has been translated into German, English, French, and Italian.[22] The English version was translated into Indonesian by the first author (YA) in March 2012 with the permission of the leader of LPZ. The Dutch LPZ project group (R.J.G.H and J.M.G.A.S.) and the first author (Y.A.) discussed every item on the questionnaire to ensure that every person had the same perceptions about the questionnaire items. Items specific to the Indonesian situation were added, such as the type of hospital (hospital provider and hospital accreditation), hospital ward categories, and patient characteristics (ethnic group, skin color, infectious/tropical diseases). The CDS included in the LPZ questionnaire was translated with the developers' permission. Apart from the Braden Scale, which had already been translated into Indonesian,[33] the rest of the LPZ questionnaire was translated from English to Indonesian.

Subsequently, the Indonesian version was translated back into English by an independent certified English translator in Indonesia to verify the translation.[34] Each item in the English translation was compared with and evaluated with the original English questionnaire by 8 European researchers who are experts on PUs or other healthcare problems

and proficient in English. Differences, ambiguous items, and unclear translations were discussed within the LPZ-International research group and subsequently revised.

Phase II: Content validity of the LPZ questionnaire

Participants

In July 2012, 18 Indonesian experts were invited via email to evaluate the content validity of the LPZ questionnaire. The experts were purposefully sampled to gain a comprehensive view. Experts from several Indonesian islands were invited**:** 4 ward leader nurses, 2 members of hospital nosocomial infection teams, 2 hospital directors, 4 wound care nurses, 2 medical surgical nurses, 2 internists, a surgeon and a general practitioner. All experts had experience with PU care and had more than 5 years' experience working in Indonesian hospitals.

Data collection and analysis

Each expert was sent a package of materials including an invitation email/letter; background information about the questionnaire; Donabedian model's structure, process and outcome indicators; measurement and target patients; reviewers' instructions; and a questionnaire soliciting their opinion. They were sent both the original English and Indonesian versions of the LPZ questionnaire.

They assessed the clarity of wording on the questionnaire and the relevance of each question for measuring the quality of PU care in Indonesian hospitals. To quantify their judgments, the items were rated on a 4-point Likert scale as follows:

– Clarity of wording
  (1 = drop item entirely, 2 = make major revisions to the item, 3 = make minor revisions to the item, 4 = retain the item exactly as worded)
– Relevance of the item to the aim/construct within Indonesian hospitals
  (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant)

The experts provided their opinions and revision suggestions for items rated less than 3. The questionnaire's content validity was analyzed at the item and scale levels. The item content validity index (I-CVI) was calculated to evaluate individual items on the LPZ questionnaire. Experts' agreement on individual items (the number of experts giving a rating of either 3 or 4, divided by the total number of experts) was calculated. If more than 80% agreed on an item (I-CVI >0.80), it was used on the final LPZ Indonesian version of questionnaire. Items assessed as irrelevant (I-CVI ≤0.80) for the Indonesian hospital setting were revised or deleted.

Scale content validities index (S-CVIs) were calculated as the proportion of items rated as relevant (3 or 4) across all expert judgments. A standard value of 0.90 was used to establish excellent content validity.[35] The S-CVIs were calculated for the characteristics of patients related to PU risk, PU categorization, the PU prevention, PU treatment and the structural quality indicators related to PUs at the ward and hospital levels.

Phase III: Interrater agreement and reliability of pressure ulcer categorization, the Braden scale, and the CDS

Participants

A convenience sample of 15 large public general hospitals located on different Indonesian islands was invited to participate. Interrater agreement and reliability were investigated in 4 hospitals who agreed to participate from October 2012 to December 2012. A rater team doing the assessments in a specific ward consisted of a pair of nurses (1 from the ward itself and 1 from another ward) to increase the objectivity of measurement and to minimize the measurement error. The head of the nursing department chose the team of raters based on the number of patients in the medical, surgical and intensive care wards and the availability of nurses from these wards on the day of measurement. A rater pair assessed a maximum of 30 patients and each patient was assessed by 2 rater pairs. The minimum sample size for interrater reliability for PU categorization was 120 patients; for interrater reliability of the CDS and the Braden Scale it was 60 patients.[36,37]

Data collection and analysis

All raters received a 2-hour training session: the researcher explained the NPUAP–EPUAP PU categorization (a 30-minute explanation about types of ulcers and a 30-minute evaluation using pictures in the Pressure Ulcer Classification version 2 (PUCLAS 2),[38] the CDS (30 minutes) and the Braden Scale (30 minutes). The raters also received a written instruction manual containing an explanation of the scales and how to complete them in the LPZ questionnaire.

All patients who agreed to participate had their PU categorization reassessed on the same day. The researcher randomly selected 2 or 3 patients based on patient medical record numbers without knowing the patients or their medical record files. These patients' Braden Scale and CDS scores were reassessed by the second raters on the same day; they had no opportunity to communicate with the other rater team.

The Kappa coefficient was used to analyze the interrater reliability of PU categorization. The results were interpreted according to Altman[39] as follows: 0.81-1.00 (very

good agreement), 0.61-0.80 (good agreement), 0.41-0.60 (moderate agreement), 0.21-0.40 (fair agreement) and less than 0.21 (poor agreement).

Intraclass correlation coefficients (ICC) were used to calculate interrater reliability; this is the preferred method for the Braden Scale and the CDS.[40,41] Raters (nurses) and rated patients were regarded as a random selection. The ICC was calculated using a 1-way random-effect model (ICC [1,1]).[42] The ICC values were interpreted similarly to the PU classification. Proportions of observed agreement (p_o) were used to indicate the interrater agreement for the item categories and sum scores. Bland-Altman plots provided a detailed insight into the distribution of agreements for Braden Scale and CDS sum scores. All analyses were performed with SPSS version 19.0 (IBM, Armonk, New York), and Bland-Altman plots were created using MS Excel (Microsoft, Redmond, Washington).

Ethical considerations

Each hospital's ethics committee gave permission for this study to be conducted. Only patients who gave their verbal informed consent were included. If they were unable to decide because of their condition, their relatives or legal guardians were asked to give permission. The medical record numbers were used for practical reasons for patient randomization and the researchers did not have access to the medical record files. The names of hospitals were kept anonymous.

Results

Content validity of the LPZ questionnaire

Eighteen invited Indonesian experts agreed to participate. The I-CVIs for the Indonesian version of the LPZ ranged from 0.67 to 1.00 for clarity of wording and from 0.50 to 1.00 for the relevance of the items as indicators of quality of PU care (Table 1). Of 49 items, 45 (91.8%) were found to be appropriately translated with respect to the clarity of wording. Only 4 items had an I-CVI of 0.80 or less: 1 institutional quality item ("the institution follows a standard policy in the handover during admission and discharge of a patient with a pressure ulcer") and 3 wound care items ("none," "transparent film," and "negative pressure therapy"). The experts suggested changing the word "institution" to "hospital," changing the word "none" to "no wound care" and using the English terms for the types of wound care dressings.

Table 1. Item and scale content validity index of the LPZ questionnaire

Part of LPZ questionnaire	Question number	I-CVI		S-CVI
		Clarity of wording	Relevance of the item to the aim	
Institutional quality indicators	9	0.78 – 1.00	0.83 – 1.00	0.92
Ward quality indicators	9	0.89 – 1.00	0.83 – 1.00	0.90
Patient characteristic (demographic data, Braden Scale and CDS)	3	0.83 – 0.94	0.83 – 0.89	0.87
Pressure ulcer prevention measures	8	0.83 – 1.00	0.50 – 1.00	0.86
Pressure ulcer treatment measures	13	0.67 – 1.00	0.56 – 1.00	0.79
Pressure ulcer characteristics	7	0.83 – 1.00	0.89 – 1.00	0.93

Abbreviations: I-CVI, item content validity index; LPZ, Dutch National Prevalence Survey of Care Problems; S-CVI, scale content validity index.

Most experts who evaluated the questionnaire found it to be relevant for measuring the quality of PU care based on the Donabedian model and feasible to apply in Indonesian hospitals. Most items (77.5%) had a good I-CVI (>0.80); the ones that did not were “beds and mattresses as preventive measures” (0.78), “cushions in wheelchairs as preventive measures” (0.50), “other preventive measures, such as elbow protectors, heel protectors, and sheep skin” (0.72) and “wound treatment” (0.56 to 0.74). The authors deleted the “cushions in wheelchairs as preventive measures” item and revised the others.

Scale CVIs ranged from 0.79 to 0.93 (Table 1); the individual scores were institutional quality indicators (0.92), ward quality indicators (0.90), patient characteristics (0.87), PU prevention (0.86), PU wound care treatment (0.79), and PU characteristics (0.93). The parts on patient characteristics, PU prevention and PU wound care treatment part were revised.

The S-CVIs for the patient characteristics, PU preventive measures and PU treatment measures were less than 0.90. Several items were added to the patient characteristics part (“skin allergies,” “duration of time a patient was bedridden,” and “previous PUs”). The item “cushions in wheelchairs as preventive measures” was deleted from the PU prevention measures because of a very low I-CVI score (0.50). Some items were added to the preventive measures (eg, “oil to protect the skin,” “massage for PU prevention,” “using cutout, ring, or donut-shaped devices” and “water-filled gloves”); even though those measures are not recommended by the EPUAP-NPUAP Pressure Ulcer Prevention Guideline,[24] they can be applied by nurses in Indonesia.[11] In the wound treatment area, the LPZ questionnaire focused on wound dressings. The Indonesian experts suggested that wound cleansing, debridement, and wound infections are also important for PU wound treatment. The recent EPUAP-NPUAP guidelines were used as references for the recommendations.[43]

The Interrater agreement and reliability of pressure ulcer categories, the Braden Scale and the Care Dependency Scale

Rater characteristics

Four large Indonesian hospitals participated in this study; 18 nurses from each hospital took part. Half of the raters had more than 3 years of nursing education and more than 10 years of working experience. Few of them (n = 7, 3%) had received wound care training; the length of their training varied from 7 days to 3 months. The rater characteristics are presented in Table 2.

Table 2 Rater characteristics (n=72)

Rater characteristics	n (%)
Women	64 (89)
Age	
Min-max	23-55
Mean (SD)	37.3 (8.9)
Education in nursing	
Diploma (3 year of education)	38 (53)
Bachelor's degree (4 year of education)	8 (11)
Ners (bachelor's degree plus 1 year of clinical training)	24 (33)
Master degree	2 (3)
Length of work experience (years)	
Min-max	2-33
Mean (SD)	14.6 (8.6)
Experience	
< 5 year	5 (7)
5-10 year	25 (35)
11-20 year	25 (35)
> 20 year	17 (23)
Wound training (7 day to 3 months)	7 (3)
Job	
Head of nursing unit	27 (38)
Nurse	45 (63)

Participant characteristics

Of 740 patients, 734 agreed to have their skin reassessed for PUs by a second rater. The reasons for non-participation varied: (1) 3 patients refused to be reassessed, (2) 1 patient was sleeping, and (3) the wound dressing could not be reopened for the others. Patient characteristics are shown in Table 3. Sixty-six patients suffered from at least 1 PU.

Table 3 Participant characteristics

Participant Characteristics	Interrater Study of PU (n=734)	Interrater Study of Braden Scale and CDS Scores (n=105)
Age mean/SD (year)	49.4/17.2	52.4/17.2
Female (n,%)	115 (65)	40 (38.1)
Skin color (n,%)		
white	42 (5.7)	6 (5.7)
light brown	509 (69.3)	75 (71.4)
brown	80 (10.9)	15 (14.3)
dark brown	12 (1.6)	0 (0.0)
black	5 (0.7)	2 (1.9)
yellowish	35 (4.8)	5 (4.8)
unknown	51 (6.9)	2 (1.9)
Length of stay mean/SD (day)	9.6/9.1	14.3/26.9
Surgery (n,%)	153 (20.8)	34 (32.4)
Skin allergy (n,%)	53 (7.2)	10 (9.5)
Bed rest history of more than 3 days (n,%)	143 (19.5)	32 (30.5)
Pressure ulcer history in the last 5 years (n,%)	29 (4.0)	8 (7.6)
Highest PU category per patient (n,%)		
No PU	668 (91.0)	80 (76.2)
Category 1	10 (1.4)	4 (3.8)
Category 2	27 (3.7)	11 (10.5)
Category 3	15 (2.0)	7 (6.7)
Category 4	14 (1.9)	3 (2.9)
PU developed after admission (n,%)	40 (60.6)	19 (18.1)
Care Dependency Scale (mean/SD)	56.2 (17.8)	48.1/19.1
CDS categorization (n,%)		
completely dependent (15-24)	69 (9.4)	18 (17.1)
dependent to a great extent (25-44)	98 (13.4)	21 (20.0)
partially dependent (45-59)	182 (24.8)	30 (28.6)
independent to a great extent (60-69)	166 (22.6)	21 (20.0)
completely independent (70-75)	219 (29.8)	15 (14.3)
Total Braden Score (mean/SD)	180 (4.5)	16.3/4.63
Braden Scale categorization		
high risk (6-14)	157 (21.4)	36 (34.3)
low risk (15-20)	299 (40.7)	44 (41.9)
no risk (21-23)	275 (37.5)	18 (17.1)
unknown	3 (0.4)	7 (6.7)

Abbreviations: CDS, Care Dependency Scale; PU, pressure ulcer

A total of 105 patients were randomly selected and agreed to have their CDS and Braden Scale scores reassessed. Seven Braden Scale scores were missing and were therefore excluded in the final analysis. Table 3 presents the patients' demographic characteristics and the distribution of the PU categories, the level of care dependency and the Braden Scale scores.

Interrater agreement and reliability of pressure ulcer categories

Interrater agreement for diagnosis of "pressure ulcer (yes/no)" was p_o = 91.0% (95% confidence interval (CI), 0.88-0.92) and the interrater reliability was kappa (κ) = 0.98 (95% CI, 0.93-0.99). Interrater agreement across all 5 PU categories was p_o = 98.6% (95% CI, 0.97-0.99) and the interrater reliability was κ = 0.92 (95% CI, 0.87-0.97).

Interrater agreement and reliability of the Braden Scale

Interrater agreement using the Braden Scale items varied between p_o = 0.68 and p_o = 0.84 (Table 4). The exact agreement on the total sum score between raters was 39%. Differences between the nurses' ratings and the total Braden Scale score ranged from 0 to 7 points. The interrater reliability ICC (1,1) varied from 0.52 (95% CI, 0.35-0.65) for the "nutrition" item to 0.85 (95% CI, 0.79-0.90) for the "friction and shear" item. The interrater reliability ICC (1,1) of the Braden Scale sum score was 0.90 (95% CI, 0.85-0.93). The Bland-Altman plot for the Braden Scale sum scores is shown in Figure 1; the size of the bubbles indicates the number of identical ratings. Scores were equally distributed across the total scale range and limits of agreement were between -4 and 4, indicating that 5% of ratings differed by more than 4 using the total Braden Scale score.

Table 4 Interrater agreement and reliability coefficients for the Braden scale

Characteristic	p_o	ICC (1,1) (95% CI)
Braden Scale (n = 98)		
Sensory perception	0.68	0.83 (0.75-0.88)
Activity	0.70	0.83 (0.76-0.89)
Nutrition	0.71	0.52 (0.35-0.65)
Moisture	0.77	0.72 (0.60-0.80)
Mobility	0.71	0.75 (0.64-0.82)
Friction and shear	0.84	0.85 (0.79-0.90)
Sum score	0.39	0.90 (0.85-0.93)

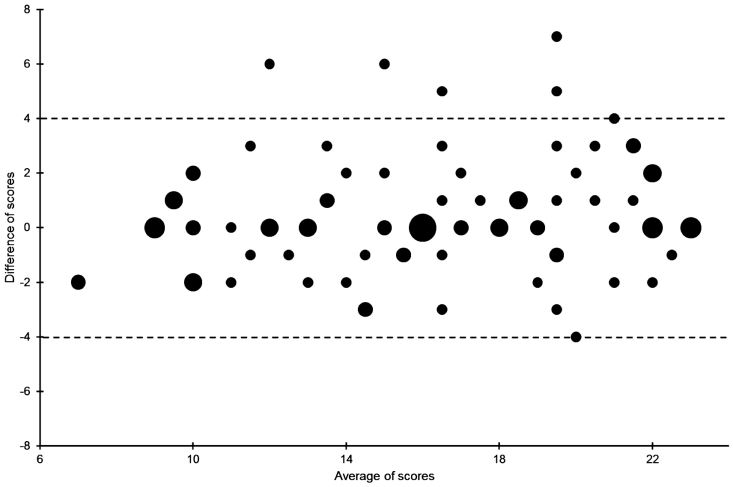

Figure 1 Braden scale: difference of rating scores versus average scores of both ratings (n=98)

Interrater Agreement and Reliability of the Care Dependency Scale

Interrater agreement and reliability coefficients are presented in Table 5. There was a 45% exact agreement on the CDS sum scores between 2 raters; the highest exact agreement on item level was on "the sense of rule and values" item ($p_o = 0.74$) and the lowest agreement was on "the daily activities" item ($p_o = 0.58$). The minimum interrater reliability ICC (1,1) was 0.68 (95% CI: 0.57-0.77) on "recreational activities" and the maximum ICC (1,1) was 0.87 (95% CI: 0.81-0.91) on "eating and drinking." The interrater reliability of the sum score was ICC (1,1) = 0.88 (95% CI: 0.83-0.92).

The Bland-Altman plot for CDS sum scores is shown in Figure 2. There was an equal distribution of scores across the total range from 15 to 75 and limits of agreement were between -18.2 and 18.2, indicating that 95% of scores were within this range. The range of score differences was 0 to 37. There were 13 (12.4%) rating scores that differed by more than 15 points. The 3 largest CDS score differences between 2 raters were 27, 30, and 37.

Table 5. Interrater agreement and reliability coefficients for CDS

Characteristic	p_o	ICC (1,1) (95% CI)
CDS (n = 105)		
Eating and drinking	0.64	0.87 (0.81-0.91)
Incontinence	0.69	0.86 (0.80-0.90)
Body posture	0.71	0.86 (0.80-0.90)
Mobility	0.66	0.80 (0.72-0.86)
Day and night patterns	0.64	0.80 (0.72-0.86)
Getting dressed and undressed	0.69	0.85 (0.79-0.90)
Body temperature	0.69	0.81 (0.73-0.87)
Hygiene	0.65	0.82 (0.75-0.88)
Avoidance of danger	0.63	0.75 (0.66-0.83)
Communication	0.67	0.77 (0.68-0.84)
Contact with others	0.69	0.81 (0.73-0.86)
Sense of rule and values	0.74	0.83 (0.76-0.88)
Daily activities	0.58	0.73 (0.63-0.81)
Recreational activities	0.66	0.68 (0.57-0.77)
Learning ability	0.66	0.82 (0.75-0.99)
Sum score	0.45	0.88 (0.83-0.92)

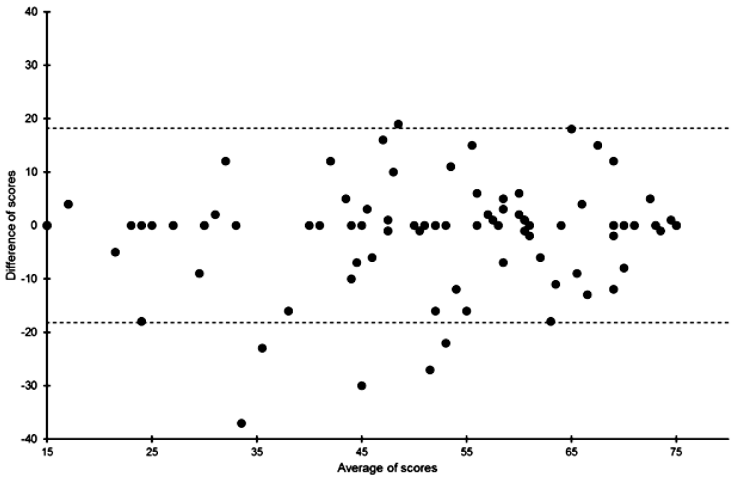

Figure 2. Care Dependency Scale: difference of rating scores versus average scores of both ratings (n=105)

Discussion

Four hospitals located on different islands showed their willingness to support and facilitate this study. The hospitals allowed the authors to conduct the interrater study by inviting nurses to serve as raters, training the raters before the measurement day, informing the patients about the assessment and reassessment on the measurement day, and adjusting the measurement schedule with the PU wound care treatment schedule in the wards. These actions made the reassessment of patients and their wounds possible. Nurses and patients were very interested in participating; almost all the patients (99%) agreed to be reassessed by nurses.

The authors used the English version of the LPZ questionnaire instead of the original Dutch version. Because the researcher (YA) and the Indonesian experts did not understand the Dutch language very well, it would have been difficult to recheck the clarity of wording. The authors deleted the lowest I-CVI score item "cushions in wheelchairs as preventive measures" from the original questionnaire because Indonesian experts stated that few wheelchair-bound patients are taken care of in Indonesian hospitals.

The interrater agreement and reliability of PU categories in large Indonesian hospitals were very good (98.6% and 92.0%). These high results are similar to those found in other PU categorization reliability studies in the clinical setting.[44] Furthermore, this high score is probably due to adequate training of raters as a standard procedure of the LPZ measurement and the fact that most raters had more than 10 years' working experience in a hospital setting.[45,46]

The interrater reliability of Braden Scale scores was also very good (0.90). The exact interrater agreement was 39% and most score differences were between -4 and 4. This small range of difference might not have a major influence on categorization of PU risk patients in a clinical setting. The interrater reliability for the "nutrition" item was the lowest, followed by "moisture" and "mobility." This result was comparable to previous findings from research that was conducted in the home care setting using the same statistical analysis.[46] The categories of "moisture" and "nutrition" also had the largest numbers of measurement errors; these could be caused by unclear operational definitions of these factors and the need for a detailed explanation about these items in the training session.[46]

The interrater reliability of the CDS sum scores was very good (0.88) and the exact interrater agreement was 45%. Most score differences were between -18.2 and 18.2, which was acceptable considering the possible wide CDS range of 15 to 75 points. This result showed that the participating nurses were able to assess the degree of patients'

(in)dependence or nursing care needs. These interrater agreement and reliability scores are comparable with the results found by Kottner et al. [47]

Still, some items scored low on interrater agreement and reliability: “daily activities,” “avoiding danger,” “day/night pattern” and “recreational activities.” Because Indonesian nurses are not familiar with the CDS, the low scores might reflect the difficulties nurses had in rating these factors. Therefore, extra training about those factors and in-depth clarification of their definitions are needed.[47] However, introducing this scale in Indonesian hospitals is beneficial to nursing care and can be recommended for use in hospitals as a quick and easy instrument.[48] The CDS helps nurses to assess patients in a comprehensive (physical and psychosocial) way and the items with low interrater agreement and reliability scores are often unnoticed aspects of caring for hospitalized patients.[29]

Limitations

This study had several limitations. The second raters were not involved in daily patient care activities; this could make assessment difficult and time consuming, especially if the patient is unable to communicate or has limited communication capabilities. Nevertheless, the interrater results were still good. It was also difficult to do the interrater study on the same day at all hospitals because they were located on different islands.

Conclusions

This study supports the use of the LPZ questionnaire in an Indonesian hospital setting. The content validity of the Indonesian version of the LPZ was established for measuring PU prevalence and the quality of PU care in Indonesian hospitals. Furthermore the results show that the EPUAP-NPUAP PU categories, the Braden Scale, and the CDS, which are incorporated into the LPZ questionnaire, can be used as valid and reliable instruments for assessing PU care and for identifying PU patients, patients who are at risk of developing PUs, and the degree of patients’ care dependency.

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Chapter 4

Quality of pressure ulcer care using an extended Donabedian model:
an evaluation study in four Indonesian hospitals

This chapter is submitted as:

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Quality of pressure ulcer care using an extended Donabedian model: an evaluation study in four Indonesian hospitals
Ostomy Wound Management 2015

Abstract

Objective: Although reporting studies on pressure ulcer (PU) occurrences have increased tremendously, studies about quality of PU care are still limited. The objectives of this study were to evaluate the quality of PU care in Indonesian hospitals using an extended Donabedian model of quality of care, including structure (structural ward and hospital quality indicators), process (PU preventive measures) and outcome (nosocomial PU prevalence excluding category I) indicators in addition to patient characteristics.

Method: This study followed a multi-centre and multi-level cross sectional design. The measurements were done in four Indonesian hospitals involving 1132 adult patients within 66 wards.

Results: The nosocomial PU prevalence (excluding category I) was 3.6%. All hospitals centrally registered the number of nosocomial PU patients but limited other structural indicators were present such as a PU guideline. The most frequently used PU preventive measures were patient education, repositioning, and skin moisturizing. Most factors associated with the outcome or quality of PU care were the inclusion of PU care activities in the patient care files, repositioning, skin moisturising, age, admission days, Care Dependency scores, immobility, sensory perception limitation, moist skin and finally friction and shear problems.

Conclusions: The quality of PU care in these hospitals can be improved by fulfilling the absence of relevant structure and process indicators.

Keywords: Pressure Ulcer, Prevalence, Prevention, Treatment, Structural Quality

Introduction

A pressure ulcer (PU) is defined as a localised injury to the skin and/or underlying tissue usually over a bony prominence that results from pressure and/or shear.[1,2] PUs can be classified into four categories: Category I (non-blanchable erythema), Category II (partial thickness), Category III (full thickness skin loss) and Category IV (full thickness tissue loss).[1] A PU is harmful, painful and reduces patients' quality of life.[3] Due to the need for extra wound care materials, prolonged nursing care time, and longer admission days in hospital, PUs are the most costly medical problem in the US, especially for elderly patients.[4] PU care accounts for 1% of the total Dutch health care budget,[5] and approximately 2.6% of the total National Health Service budget in the UK.[6]

The hospital-acquired (nosocomial) PU prevalence excluding category I is considered to be a relevant indicator of nursing-sensitive care.[7,8] Category I PUs are less reliable to diagnose,[9] and therefore frequently excluded in nosocomial PU prevalence reports on the quality of care performance.[10,11] Various health care policies related to PUs have been implemented to stimulate hospital awareness on decreasing nosocomial PU rates and to provide high-quality PU care. In the Netherlands, for example, publications are made of PU prevalence rates,[12] in the UK evaluations are conducted on avoidable and unavoidable PUs[13] and in the US and Japan financial penalties are issued for nosocomial PUs.[14, 15]

Published nosocomial PU prevalence rates excluding category I show a wide range from almost zero (0.5%) in Austrian hospitals,[16] 0.8 % in a Chinese hospital,[17] 0.9% in US hospitals,[18] 2.1% in Swiss hospitals,[16] 3.9% in Dutch hospitals[16] to 5.1% in Swedish hospitals.[18]

Adequate preventive measures such us identifying patients at risk for PUs, repositioning, assessing tissue viability, moisturising skin, providing nutrition support, and using pressure redistribution devices are required and should be practised in daily nursing care in hospitals.[2] However, PU occurrence does not depend exclusively on the quality of nursing interventions; it is also related to the availability of hospital resources such us PU prevention protocols/guidelines, staff training, specialised wound care nurses and pressure redistribution devices.

In Indonesia, PUs have been highlighted as one of the main health care problems in hospitals and the number of nosocomial PU patients is registered monthly through the Hospital Information System.[19, 20] Nevertheless, there are very few publications on PU occurrence,[20, 21] PU preventive measures and other relevant aspects of the quality of PU care.[20] This is also the case on international level. Even though the number of studies on PU prevalence/incidence has increased tremendously internationally,[2] very few

published studies have evaluated the actual prevention measures and the availability of resources or facilities for PU care.[16, 20, 22, 23] Assessing PU rates together with relevant aspects of PU care can provide more accurate and comprehensive information for monitoring the quality of care and prioritising the quality of PU care improvement programmes in hospitals.

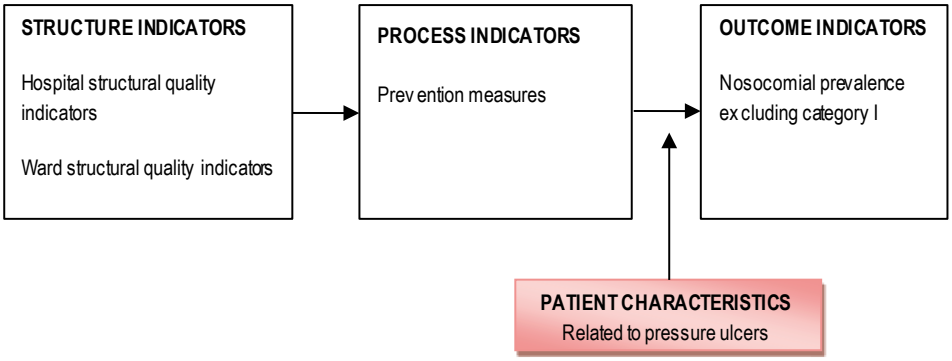

Figure 1. An extended theoretical framework of Donabedian's model of structure, process, outcome and patient characteristics

The Dutch National Prevalence Survey of Care Problems (in Dutch: Landelijke Prevalentiemeting Zorgproblemen, LPZ) has measured PU prevalence and some relevant indicators of the quality of PU care in the Netherlands annually since 1998[23] and has included other countries in Europe and New Zealand as well in the past few years.[24,25] The measurement follows Donabedian's model of quality of care (structure, process and outcome indicators).[26] The outcome indicator is the nosocomial PU prevalence (excluding category I). Process indicators involve preventive measures and structure indicators are assessed as hospital and ward structural quality indicators.

Since patient characteristics are highly associated with PU occurrence and PU preventive measures,[27] we added them and developed an extended Donabedian model (Figure 1). Patient characteristics can differ between hospitals/countries and therefore influence the nosocomial PU rates.[28]

Objectives

This study aimed to evaluate the outcome indicator (nosocomial PU prevalence excluding category I), process indicators (PU preventive measures) and structural quality indicators (hospital/ward facilities and PU care resources) as well as relevant patient characteristics related to PUs in Indonesian hospitals. This involved identifying specific determinant indicators and patient characteristics associated with the quality of PU care in Indonesian hospitals using the extended Donabedian model (Figure 1).

Research questions

The following research questions were addressed:

1. What is the nosocomial PU prevalence rate in Indonesian hospitals?
2. What are the characteristics of PU patients in Indonesian hospitals?
3. What PU preventive measures are used in Indonesian hospitals?
4. What structural quality indicators are available in Indonesian hospitals at ward and institutional level?
5. Are patient characteristics, preventive measures and structural quality indicators at ward and institutional level associated with nosocomial PUs?

Methods

Design

This study followed a multi-centre, multi-level cross sectional design.[24,25] A one-day measurement was performed at patient, ward and institutional level. All adult patients (≥ 18 years old) in the medical, surgical and intensive care units were included. The maternity/obstetric, psychiatric, rehabilitation, skin, eye, and nose and throat care units were excluded, due to an expected low prevalence rate.[29]

Setting

Indonesia counts 260 public and private referral hospitals located in 31 provinces,[30] each offering a complete range of facilities with over 200 beds.[31] These hospitals are managed by public and private sectors.[32] Because of Indonesian communal culture, patients' family members are directly involved in providing daily care, except in the intensive care unit.[33]

This study used a convenience sample. Fifteen large general hospitals (10 public and 5 private hospitals) located on different islands and provinces in Indonesia were invited to participate by registered mail sent from the Nursing Program of Riau University in Indonesia on 6 August 2012. The research proposal and LPZ data collection procedure were enclosed with the invitation letter.[29] The recruitment of participating hospitals took two months.

Measurement instrument

The original LPZ questionnaire was translated into Indonesian by YA.[34] The Indonesian experts evaluated the content validity of the questionnaire for measuring the quality

of PU care in Indonesian hospitals.[34] Other psychometric properties (interrater agreement and reliability) of the categorisation of PUs, the Braden Scale and the Care Dependency Scale (CDS) were evaluated as good.[34]

Patient characteristics, PU preventive measures and nosocomial PU prevalence were assessed at patient level. The availability of structural quality indicators related to PU prevention was assessed at ward and institutional level. Patient characteristics were assessed related to PUs such us age, sex, skin colour, number of admission days, diseases, surgery in the past 2 weeks, length of surgery, PU history in the past 5 years, morbidity, care dependency (CDS scale)[35] and PU risk scale score (Braden Scale).[36] The patient's diseases were listed based on the patient's medical record and categorised according to the adapted version of the Tenth Revision of the International Classification of Diseases (ICD-10).[37]

The patients' Braden Scale score was assessed to determine their PU risk. The scores ranged from 6 to 23; a low score indicates a high risk of PU.[36] A cut-off point of 21 was used to classify the at-risk versus non-risk patients.[16,38] Care dependency was assessed with the Care Dependency Scale (CDS). The CDS assesses 15 care dependency items using five Likert scale categories from 1 (completely dependent) to 5 (almost independent). Patients with a CDS sum score of less than or equal to 68 can be classified as care-dependent patients.[39]

Data collection procedure

The first author trained a team of ward nurses to participate in the patient assessment on the selected measurement day. This involved training about the measurement procedure, specific instructions on the practical use of PU categories, the Braden Scale and the CDS. The team of ward nurses received a written data collection manual containing all the information provided during training. Each patient was assessed by two trained nurses together (one from the patient's own care unit and one from another care unit) to increase the reliability of the measurement results[24, 34] and to preclude underreporting of PU patients and their categories.[10] The heads of the nursing units in the hospital or their representatives filled in the questionnaire on structural quality indicators at the institutional level. The heads of the wards completed the structural quality indicator questionnaires at ward level.

Data analysis

Nosocomial PU prevalence excluding category I was calculated as the proportion of patients who had developed a category II or higher PU during their hospital stay.[8] Descriptive analyses (frequencies and proportions) were performed on patient character-

istics. Evaluation of preventive measures was conducted on interventions that included both recommended and non-recommended preventive measures based on the EPUAP-NPUAP guideline[1,2] and on the availability of structural quality indicators at the care unit and hospital level.

Furthermore, bivariate analyses (independent t-test or chi square test) were performed to evaluate the association between all variables (patient characteristics, the recommended preventive measures or process indicators and structural indicators) and the outcome indicator (nosocomial PU excluding category I).

Subsequently, the significant variables (p value < 0.05) from bivariate analysis were used for further analysis. The analysis was conducted using a multi-level logistic regression modelling according to the generalised estimating equation (GEE) approach and multiple imputation for the missing data. All data analyses were run using IBM SPSS Statistics 19.

Ethical considerations

The ethics committee in all four participating hospitals gave permission to conduct the study. Patients were not obligated to participate. The identities of hospitals and patients were kept anonymous. Patients were asked about their willingness to participate in the first question on the questionnaire. Patients who gave oral informed consent were included. They were also given the option to terminate their participation during the assessment procedure with or without a reason. If they were unable to decide because of their condition, their relatives or legal representatives were asked to give permission.

The assessment of the skin, especially above bony prominences, and the assessment of ulcers is universally recommended in daily nursing care practice to detect the occurrence of PUs and to evaluate the progression of wound healing.[11] The trained nurses in this study assessed all patients using the standardised questionnaire and no additional interventions were organised for patients.

Results

Of the 15 invited large hospitals, four public hospitals from four provinces located on three islands responded positively to the invitation letter. One private hospital refused to participate without mentioning a reason and the other hospitals had not replied by 30 September 2012.

Two weeks were spent preparing the measurements (training organisation and recruiting nurses as data collectors) for each hospital. The actual data collection took one day for each hospital. This means that the measurements for these four hospitals took a total of two months (from 9 October to 9 December 2012).

Sixty-six care units participated and 36 pairs of nurses (72 care unit nurses) were involved in the data collection. Most patients (n = 1132, 95.7%) agreed to participate. Reasons for non-participation included refusal (9 patients), being unavailable (21 patients), too ill/terminal patients (10 patients) and unknown (10 patients). The assessment time lasted between 3 and 30 minutes per patient depending on the patient's condition; the average assessment time was 9.2 minutes (SD 5.9).

Outcome indicator: nosocomial pressure ulcer prevalence

Of the 91 PU patients, 51 patients had developed one or more PUs (category 1 to 4) during their hospital stay. The highest PU categories per patient were category I (10 patients), category II (22 patients), category III (12 patients) and category IV (7 patients). The nosocomial PU prevalence rate (excluding category I) for all patients was 3.6% (95% CI 2.5-4.7).

Patient characteristics

The mean age of patients was 48.7 years (SD 17.4) (Table 1). The top three patient diseases/disorders were digestive disorders (13.8%), genitourinary disorders (13.0%) and neoplasms (11.4%). The mean duration of hospital stay was 9.5 days (SD 9.4). Just over a quarter (25.7%) of the patients had a bedridden history, with an average of 3.7 bedridden days (SD 15.5). Most patients (70.7%) were at-risk PU patients (Braden Score ≤ 20) and care dependent (70.7%).

The expected frequencies of patient diseases, PU history, skin colour, skin allergy in relation to nosocomial PUs were lower than 5. Age, length of admission, bedridden days, care dependency (CDS score) and Braden Scale scores had significant P-values. The items of the Braden Scale are described in Table 2.

Table 1. Characteristics of patients and variables associated with nosocomial pressure ulcers excluding category I in the four participating hospitals (n=1132 patients)

Patient characteristics	Result	Missing value (%)	Bivariate analysis T test /X^2 (P value)
Age (mean/SD)	48.7 (17.4)	6.0	**0.007**
Female (n,%)	453 (40.9)	2.2	0.943
Patient diseases/disorders (n,%)			
Digestive system	156 (13.8)	-	0.092
Genitourinary system	147 (13.0)	-	0.878
Neoplasms	129 (11.4)	-	0.218*
Injury, poisoning and others	107 (9.5)	-	0.100*
Respiratory system	95 (8.5)	-	0.075*
Surgery in the past two weeks (n,%)	230 (20.3)	-	0.432
Length of surgery in minutes (mean/ SD)	28.36 (96.3)	-	0.758
Length of admission days (mean /SD)	9.5 (9.4)	1.2	**0.001**
History of being bedridden (n,%)	291 (25.7)	-	**0.001**
Bedridden days (mean/ SD)	3.7 (15.5)	-	**0.008**
History of having PU in past 5 years (n,%)	36 (3.2)	-	0.001*
Skin colour (n, %)			
White	52 (4.6)	0.7	0.658*
Light brown	863 (76.8)		
Brown	115 (10.2)		
Dark brown	14 (1.2)		
Black	9 (0.8)		
Yellow	71 (6.3)		
Skin allergy (n,%)	81 (7.2)	-	0.066*
Care Dependency Scale total score (mean, SD)	55.7 (17.2)	0.08	**0.001**
Dependent patients (CDS ≤68) (n,%)	800 (70.7)	0.08	**0.001**
Braden Scale total score (mean /SD)	17.7 (4.2)	0.4	**0.001**
At-risk patient (Braden score >20) (n,%)	771 (70.7)	0.4	**0.001**

*expected frequencies less than 5

Table 2. Items of the Braden Scale (n=1128 patients)

Sensory perception n (%)	1. Completely limited	2. Very limited	3. Slightly limited	4. No impairment
	83 (7.4)	127 (11.3)	313 (27.7)	605 (53.4)
Moisture n (%)	1.Constantly moist	2. Very moist	3.Occasionally moist	4.Rarely moist
	42 (3.7)	108 (9.5)	401 (35.4)	577 (51.0)
Activity n (%)	1. Bedfast	2. Chair fast	3.Walks occasionally	4.Walks frequently
	242 (21.5)	224 (19.9)	256 (22.7)	406 (36.0)
Mobility n (%)	1.Completely immobile	2. Very limited	3. Slightly limited	4.No limitation
	64 (5.7)	344 (30.5)	397 (35.2)	323 (28.5)
Nutrition n(%)	1.Very poor	2.Probably inadequate	3. Adequate	4. Excellent
	28 (2.5)	228 (20.2)	608 (53.9)	264 (23.4)
Friction and shear n(%)	1.Problem	2. Potential problem	3.No apparent problem	
	134 (11.9)	289 (25.6)	705 (62.5)	

Process indicators: pressure ulcer preventive measures

The proportion of preventive measures related to specific patient circumstances (Braden Scale items) is described in Table 3. Of 771 at-risk PU patients (Braden Scale ≤ 20), 30% received information on PU prevention. Almost half of the bedridden patients (46.3%) received repositioning from nurses and or family members. Skin moisturising was applied for 35.9% patient with friction and shear problem. One of four patients with a poor or probable inadequate nutrition status received nutrition support for preventing PUs. A small percentage of bedridden patients (11.2%) used a pressure-redistributing mattress (mattress overlay, air fluidised/low air loss, alternating air, visco-elastic foam mattress). Floating heels for bedridden patients were less common (16.5%) although it is relatively easy to apply. The hospitals also used the following non-recommended preventive measures: massage, donuts and water-filled gloves. Preventive measures associated with nosocomial PUs were repositioning, skin moisturising and nutrition support.

Table 3. Pressure ulcer preventive measures and their association with nosocomial pressure ulcers excluding category I in the four participating hospitals

Preventive measures	n (%)	Bivariate analysis X^2 (P value)
Recommended preventive measures		
Provide information and instruction to the patient and/or family members		
hospitalised patients (n=1132)	329 (29.1)	0.465
at-risk PU patient (Braden Scale ≤ 20) (n=771)	231 (30.0)	0.548
Repositioning		
hospitalised patients (n=1132)	269 (23.8)	0.001
at-risk patients (n=771)	222 (28.8)	0.001
completely limited sensory perception patients (n=83)	51 (61.4)	0.212
bedridden patients (n=242)	112 (46.3)	0.003
completely immobile patients (n=64)	38 (59.4)	0.378
Moisture cream/oil to protect the skin (skin moisturising)		
hospitalised patients (n=1132)	266 (23.5)	0.001
at-risk patients (n=771)	214 (27.8)	0.001
potential patient with friction and shear problem (n=423)	152 (35.9)	0.005
Prevent or treat dehydration and malnutrition (nutrition support)		
hospitalised patients (n=1132)	226 (20.0)	0.021
at-risk patients (n=771)	173 (22.4)	0.065
poor or probable inadequate nutrition status (n=256)	66 (25.8)	0.829*
PU redistributing mattresses		
hospitalised patients (n=1132)	76 (6.7)	0.001*
at-risk patients (n=771)	47 (6.1)	0.001*
completely limited sensory perception patients (n=83)	16 (19.3)	0.117*
bedridden patients (n=242)	27 (11.2)	0.002*
completely immobile patients (n=64)	15 (23.4)	0.173*
Floating heels pillow under lower leg		
hospitalised patients (n=1132)	82 (7.2)	0.001*
at-risk patients (n=771)	62 (8.0)	0.001*
completely limited sensory perception patients (n=83)	21 (25.3)	0.298*
bedridden patients (n=242)	40 (16.5)	0.018*
completely immobile patients (n=64)	17 (26.6)	0.329*
Heel protectors		
hospitalised patients (n=1132)	17 (1.5)	0.003*
at-risk patients (n=771)	14 (1.8)	0.005*
Elbow protector		
hospitalised patients (n=1132)	14 (1.5)	0.012*
at-risk patients (n=771)	12 (1.6)	0.022*

Preventive measures	n (%)	Bivariate analysis X^2 (P value)
Non-recommended preventive measures		
Massage		
hospitalised patients (n=1132)	142 (12.5)	NA
at-risk patients (n=771)	121 (15.7)	NA
Donut-shaped device		
hospitalised patients (n=1132)	176 (15.5)	NA
at-risk patients (n=771)	137 (17.8)	NA
Water-filled gloves		
hospitalised patients (n=1132)	90 (8.0)	NA
at-risk patients (n=771)	70 (9.1)	NA

*expected frequencies less than 5
NA Not applicable

Structural quality indicators

More than half of the wards had an admission and discharge handover policy (72.7%), included PU care in their patient care files (62.1%) and held nursing care team discussions about PU care (51.5%). Almost half of the wards had implemented multidisciplinary discussions on PU care (48.5%), had PU risk assessment files (45.5%) and monitored the implementation of PU care (40.9%). The availability of a PU/wound care nurse (25.8%) and PU prevention products (25.8%) were limited. Only one ward had a patient information brochure about PU prevention. Structural indicators associated with nosocomial PUs were the monitoring of prevention and treatment at ward level, the availability of patient risk assessment in the care files, the availability of prevention and/or treatment of PUs in the care files, and the provision of discharge planning (Table 4).

At institutional level, numbers of nosocomial PU patients were centrally registered in all hospitals. Only one of the four hospitals had a PU protocol/guideline. This hospital also organised a course for nurses about PU prevention and treatment.

Table 4. Structural quality indicators and variables associated with nosocomial pressure ulcers excluding category I in the four participating hospitals

Structural quality indicators	Total (n,%)	Bivariate analysis chi square (P value)
At ward level (n=66)		
At least one nurse (e.g. a PU link nurse) in the department/basic care unit/team is specialised in the field of PUs	17 (25.8)	0.258
Patients who are at risk of and/or suffering from PUs in the department are discussed by the nursing care team	34 (51.5)	0.390
Patients who are at risk of and/or suffering from PUs are discussed in the department's multi-disciplinary meetings	32 (48.5)	0.132
Work in the department is done in a controlled fashion or in accordance with the protocol/guidelines	27 (40.9)	0.056
The care file for each patient includes an assessment of their risk of developing a PU	30 (45.5)	0.033
The care file specifies which actions must be taken for the prevention and/or treatment of PU for at-risk patients	41 (62.1)	0.005
The prescribed PU prevention products are delivered to the patient within 24 hours	17 (25.8)	0.086
For every patient with an increased risk of developing a PU, the patient and/or family/unpaid caregivers receive an informational brochure about PU prevention	1 (1.5)	0.383
During admission and discharge, members of the care team always review all patients' PU statuses	48 (72.7)	0.047
At institutional level (n=4)		
There is a pressure ulcer prevention committee within the institution	0 (0)	NA
There is an agreed upon protocol/guidelines for PU prevention/treatment within the institution	1 (25)	0.123
Someone within the institution has been appointed to update and ensure that the necessary attention is devoted to the prevention and/or treatment protocol	1 (25)	0.123
Patients with PUs (Category II and higher) are reported to a central contact person (e.g. a wound care nurse specialist)	3 (75)	0.123
The number of patients with PUs is centrally registered	4 (100)	NA
A protocol is in place for managing PU prevention products at the institutional and department levels	2 (50)	0.156
Over the past two years, a refresher course and/or meeting was organised for caregivers at the institution that was specifically devoted to PU prevention and treatment	1 (25)	0.123
An informational brochure about PU prevention is available at the institution for patients and/or unpaid caregivers	2 (50)	0.707
The institution follows a standard handover policy during the admission and discharge of a patient with a PU	3 (75)	0.999

NA not applicable

Multi-level analysis

Thirteen significant variables at patient level were selected for further multi-level logistic regression modelling according to the GEE approach. These variables are age, admission days, bedrest days, total CDS score, sensory perception, moisture, activity, mobility, nutrition, friction and shear, repositioning, skin moisturising, nutrition support and 4 significant variables at ward level (i.e. the monitoring of PU care, patient risk assessment in the care files, inclusion of PU care in the patient care files, and discharge planning documentation files). We categorised 'mobility' into two categories (1. completely immobile and 2. very limited, slightly limited, no limitation) because of no PU patient with slightly limitation and no limitation on mobility.

The data were sampled according to a two-level design because patients were nested within wards. In total, there were 83 missing observations (7.3%). Assuming these were missing at random, a multiple imputations (with 5 imputations) procedure was performed. The imputed data were then analysed using a GEE logistic regression method. When compared with the standard logistic regression, no substantial differences were found. This is because the ward differences (within-ward correlation) were very small and not significantly different than zero and the results did not differ from the standard logistic regression analysis. Moreover, the results based on the imputed data did not change much when compared to the data based on the non-imputed complete case situation.

Subsequently, the imputed data was analysed using the standard logistic regression (backward stepwise LR methods) with a threshold p value of less than 0.05 to identify the specific patient characteristic and determinant indicators of quality of PU care associated with the nosocomial PUs.

Table 5 identifies the most significant variables related to the outcome indicator (nosocomial PU excluding category I). This table also shows the association of patient characteristics with nosocomial PUs excluding category I with a correction for structural quality indicators and preventive measure at ward and hospital levels. A variation was found in nosocomial PU prevalence rates and quality of PU care among the hospitals. The variables associated with the outcome indicator (nosocomial PUs excluding category I) were the inclusion of PU care in patient care files (OR 8.171;95% CI 2.322-28.752), repositioning (OR 4.573;95% CI1.749-11.953) and skin moisturising with cream or oil (OR 3.629;95% CI1.382-9.533), age (OR 1.036;95% CI 1.008-1.065), number of admission days (OR 1.079;95% CI 1.040-1.120), CDS (OR 1.041;95% CI 1.001-1.083), mobility (OR 0.055;95% CI 0.013-0.232), completely limited sensory perception versus no limitation (OR 0.055;95% CI 0.009-0.326), occasionally moist versus rarely

moist skin (OR 13.738;95% CI 1.247-151.370), friction and shear problem versus no friction and shear problem (OR 24.456;95% CI 3.757-159.209).

Table 5. Determinant variables associated with nosocomial pressure ulcers in the four participating hospitals (n=1049)

Variables	P value	B (SE)	95% CI for exp B		
			Lower	Exp B	Upper
Hospital a	0.010	1.953 (0.755)	1.606	7.051	30.960
Hospital b	0.025	1.736 (0.775)	1.243	5.674	25.893
Hospital c	0.084	1.317 (0.763)	0.836	3.733	16.663
Hospital d	0.044				
Ward structural quality indicators					
Documentation on PU care	0.001	2.101 (0.642)	2.322	8.171	28.752
Patient characteristics					
Age	0.013	0.035 (0.014)	1.008	1.036	1.065
Admission days	0.001	0.076 (0.019)	1.040	1.079	1.120
Sensory perception: completely limited	0.001	-2.901 (0.908)	0.009	0.055	0.326
Sensory perception: very limited	0.423	-0.543 (0.679)	0.154	0.581	2.197
Sensory perception: slightly limited	0.152	-1.125 (0.786)	0.070	0.325	1.514
Sensory perception: no impairment	0.004				
Moisture: constantly moist	0.173	1.894 (1.391)	0.435	6.646	101.493
Moisture: very moist	0.208	1.661 (1.318)	0.398	5.265	69.742
Moisture: occasionally moist	0.032	2.620 (1.224)	1.247	13.738	151.370
Moisture: rarely moist	0.103				
Mobility: very limited, slightly limited, no limitation	0.001	-2.892 (0.730)	0.013	0.055	0.232
Friction and shear:problem	0.001	3.197 (0.956)	3.757	24.456	159.209
Friction and shear: potential problem	0.633	0.452 (0.948)	0.245	1.571	10.071
Friction and shear: no apparent	0.001				
CDS score	0.047	0.040 (0.020)	1.001	1.041	1.083
Preventive measures					
Repositioning	0.002	1.520 (0.490)	1.749	4.573	11.953
Moisturising skin with cream or oil	0.009	1.289 (0.493)	1.382	3.629	9.533
constant	0.001	-8.447 (2.145)			

Discussion

This study gives a first picture of the quality of PU care in four Indonesian hospitals using a multi-centre study involving a large number of patients (n = 1132). The quality of PU care was evaluated by an extended Donabedian model of quality of care including patient characteristics. The overall nosocomial PU prevalence excluding category I was 3.6%. Despite the lower availability of structural quality indicators in these Indonesian hospitals, the nosocomial PU prevalence in these Indonesian hospitals (3.6%) was lower than in Swedish hospitals (5.1%)[18] and comparable with Dutch hospitals (3.9%).[16] The rather low PU prevalence in these four Indonesian hospitals might be explained by the patient characteristics: the average age of patients hospitalised in Indonesia (mean 48.7 years, percentile 25%–75%; 35-61 years) was much lower than the hospitalised patients in the Netherlands (67.8 years).[16] Since the Indonesian economy is growing, life expectancy is also increasing;[32] this may result in an increasing number of elderly patients in Indonesian hospitals who will be more likely to have a PU.[40-42]

The preventive measures used in the four Indonesian hospitals can be best compared with the results from the LPZ-International study in the Netherlands.[16] Fewer pressure-redistributing mattresses were used for at-risk patients (6.1%) than in Dutch (94.5%). When fewer pressure-redistributing mattresses are used, repositioning should be performed more frequently. The proportion of repositioning for at-risk patients in these Indonesian hospitals (28.8%) was almost similar with the Dutch hospitals (27.9%). However, not all at-risk patients need repositioning. Half of the bedridden patients in the four Indonesian hospitals (46.3%) received repositioning from nurses and or family members. Providing information on PU prevention can improve the proportion of repositioning measures. In this study, one third (30.0%) of at-risk PU patients and/or their family received information and instructions on PU prevention measures. This is similar to the Dutch hospitals (30.3%). At-risk PU patients in Dutch hospitals received more prevention measures for dehydration and/or malnutrition (47.9%) than patients in the Indonesian hospitals (22.4%). The proportion of skin moisturising in the Indonesian hospitals was slightly higher than in Dutch hospitals (18.5%).

Although all four hospitals centrally registered the number of PU patients, there were limited numbers of PU/wound care nurses and a limited availability of guidelines, PU courses/training, PU preventive products and information brochures at institutional level. Only one of the four hospitals had a PU prevention protocol, even though international evidence-based PU guidelines are available[1,43] and have recently been updated.[2] As a result, outdated preventive measures such as massage, donuts and water-filled gloves were still applied. Translating the most recent evidence-based guidelines

into Indonesian, disseminating them to all hospitals, and providing refresher courses about PU care may contribute to a better PU prevention in clinical practice.

In the multi-level analysis, we found that the ward differences were very small and not significantly different from zero. One of possible reasons could be some patients stayed in more than one wards during their admission time in the hospitals. However, we did not register which patients stayed in more than one ward.

The inclusion PU care in patient care files (OR 8.171), repositioning (OR 4.573) and skin moisturising with cream or oil (OR 3.629) were more than 1. In this study, we concluded that nosocomial PU patients received more repositioning and skin moisturising and had PU care activities in their care files.

In the literature, the Braden scale items are risk factors for PUs.[36] In this study, mobility (OR 0.055;95% CI 0.013-0.232) and sensory perception (OR 0.055;95% CI 0.009-0.326) seem to be a protective variable because they are adjusted or corrected with the preventive measures such us repositioning. Patients with rather completely limited mobility and limited sensory perception stayed in the intensive care units and were repositioned regularly and had pressure-redistributing mattresses. Interestingly, occasionally moist versus rarely moist skin (OR 13.738; 95% CI 1.247-151.370), friction and shear problem versus no friction and shear problem (OR 24.456;95% CI 3.757-159.209) remained risk factors even though these variables were also adjusted by applying moisture cream/oil to protect the skin. However, other preventive measures such us floating heels, elbow protector, heel protectors, changing linen, patient lifting, non-using diapers may influence skin moisture and friction and shear problems.

Furthermore, Indonesia has a warm and humid climate that could influence patients' skin moisture and increase the risk of developing PUs and moisture lesions.[44] An improvement is therefore needed of preventive measures related to patients with skin moisture and friction and shear problems.

Limitations and recommendations for further research

Of the 15 large hospitals we invited to participate, only four (26.6%) responded positively to the invitation letter. The results of this study therefore cannot be generalised to represent the quality of PU care in all Indonesian hospitals. The low response rate could be improved by personal follow up to every invited hospital, but the transportation costs would be high due to the location of the hospitals broadly dispersed over many islands.

Furthermore, random sampling was not possible in this study, because we need the willingness of hospitals to support the measurement. A central organisation of measurements and the support and recommendation by the Ministry of Health would be much more effective for evaluating the quality of PU care at a national level.

The hospitals in this study were not all measured on the same day, which is not in line with the LPZ-International study protocol.[24] Distance learning for the institutional coordinators may be helpful to realize that in the future.

A national measurement about the outcome of PU care is already possible. Indonesian hospitals already register the number of nosocomial PU patients monthly through the Hospital Information System under the coordination of the Ministry of Health. This means a prospective quality of PU care measurement could be organised at national level.

Even though this study involved a large number of patients, some patient characteristic variables and preventive measure indicators had expected frequencies of less than 5, and we therefore excluded them in the further multi-level analyses. A larger national measurement might increase the proportion of the variables, meaning additional analyses could be done on the interaction between patient characteristics and preventive measures. Furthermore, the extended theoretical framework of Donabedian's model showed an association between structural indicators and prevention measures. However, in this study, we could not evaluate the association between structure and process indicators as suggested in the Donabedian model because of the limited number of participating hospitals.

Conclusions

PUs represent a relevant health care problem in Indonesian hospitals. This study reveals several quality indicator issues related to PU care in these hospitals. The prevalence of nosocomial PUs in this study was comparable to Dutch hospitals, even though we found limited structural indicators and sub optimal preventive measures. Also, a number of outdated preventive measures were still applied in these Indonesian hospitals.

Taking into account the future demography of more old people, we concluded that steps are needed to improve the quality of PU care, starting with the availability of an evidence-based guideline. Also, courses on PU prevention should be offered and relevant process and structural quality indicators must be implemented and improved. A well-designed prevention programme is also needed that focuses on skin moisture and

patients with friction and shear problems to reduce the occurrence of PUs. Larger studies using this standardised method of measuring the quality of PU care are recommended to provide data-driven decision-making at hospital/country level and for continuous monitoring of care quality.

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Chapter 5

Pressure ulcers in four Indonesian hospitals: prevalence, patient characteristics, ulcer characteristics, prevention, and treatment

This chapter is submitted as:

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Pressure ulcers in four Indonesian hospitals: prevalence, patient characteristics, ulcer characteristics, prevention, and treatment
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Abstract

Objective: to study characteristics of pressure ulcer patients and their ulcers, pressure ulcer preventive, and treatment measures in four Indonesian general hospitals.

Method: A multicenter cross-sectional design was applied to assess pressure ulcers and pressure ulcer care in adult patients in medical, surgical, specialized, and intensive care units.

Results: Ninety-one of the 1132 patients had a total of 142 ulcers. Half (44.0%) already had pressure ulcers before admission. The overall prevalence of category I-IV pressure ulcers was 8.0% (95% CI 6.4-9.6) and the overall nosocomial pressure ulcer prevalence was 4.5% (95% CI 3.3-5.7). Most pressure ulcer patients had friction and shear problems, were bedfast, had diabetes, and had more bedridden days. Most ulcers (42.3%) were category III and IV. One third of the patients had both pressure ulcers and moisture lesions (36.3%) and suffered from pain (45.1%). The most frequently used prevention measures were repositioning (61.5%), skin moisturizing (47.3%), patient education (36.3%), and massage (35.2%). Most pressure ulcer dressings involved saline-impregnated or anti-microbial gauzes.

Conclusions: This study shows the complexities of pressure ulcers in Indonesian general hospitals and reveals that the quality of pressure ulcer care (prevention and treatment) could be improved by implementing the recent evidence-based international guideline.

Keywords: pressure ulcers, patient characteristics, nursing, prevention, treatment, hospital

Introduction

A pressure ulcer (PU) is a localised injury to the skin and/or the underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear.[1] PUs are frequently seen in immobile hospitalized patients[2] and have a significant negative impact on patients' quality of life because of pain,[3] prolonged hospital stays,[4] and a high risk of wound infection.[5] PUs are also the most expensive of all medical errors that occur among elderly United States populations, and they increase the workload of nurses considerably.[6]

Effective PU prevention is the best approach to this problem. A low hospital-acquired (nosocomial) PU prevalence reflects the success of PU preventive management, high quality nursing care, and patient safety.[7] However, the nosocomial PU prevalence excluding category I in hospitals still varies across countries, from 0.5% in Austrian hospitals,[8] 0.8% in a teaching hospital in China,[9] 0.9% in American hospitals,[10] 2.1 in Swiss hospitals,[8] 3.9% in Dutch hospitals,[8] to 4.4% in one Swedish general hospital.[10]

Health-care providers agree that most but not all PUs are avoidable or preventable by adequately evaluating the patient's clinical condition and PU risk factors, planning and implementing interventions that are consistent with the patient's needs and goals; recognizing standards of practice; monitoring and evaluating the impact of interventions; and revising interventions as appropriate.[11,12] However, patient circumstances may hinder preventive measures such as turning/repositioning,[2] and therefore lead to unavoidable PUs.[12]

Furthermore, patients sometimes develop PUs before hospital admission. The Swedish national PU prevalence survey held in 2011 showed a PU prevalence of 16.6%. Eleven percent of patients with PUs had developed the PU before admission to the hospital.[13] Those patients need both adequate PU treatment and PU prevention measures to prevent the development of new ulcers on other body sites.

In recent years, an increasing number of observational studies have been published about the prevalence and incidence of PUs,[1,14] but only a few studies[15-21] have reported results about actual PU prevention and treatment in hospitals, and none of these studies were conducted in Asian care settings.

Objectives

The objectives of this study were to report on the prevalence of PUs, the specific characteristics of PU patients, the characteristics of their ulcers, and the preventive and treatment measures used in Indonesian general hospitals.
The research questions were:

1. What is the prevalence of PUs in Indonesian general hospitals?
2. What are the specific characteristics of PU patients?
3. What are the characteristics of the PUs themselves?
4. What are the actual PU preventive and treatment measures are applied for Indonesian PU patients?

Methods

Design and setting

A multi-center cross sectional design was applied in this study.[22] Indonesia is divided into 33 provinces.[23] Most provinces (93.9%) have at least one large general hospital (>200 beds). Researchers on behalf of the nursing department of Riau University sent invitation letters to 15 large general hospitals located in 11 provinces and on four large islands on August 6, 2012. Hospitals that responded to the invitation letter before October 6, 2012 were included. All adult patients (≥ 18 years old) in the medical surgical, specialized care (neurology, cardiology, elderly, infection, respiratory, and trauma care), and intensive care units were eligible to participate and were assessed on one day by a trained nursing team. The maternity/obstetric; psychiatric; rehabilitation; skin; and eye, nose, and throat care units were excluded because we expected very few PU cases in those units.[17]

Measurement instrument

The Indonesian version of the International Prevalence Measurement of Care Problems (LPZ-International) questionnaire was used in this study.[24] Patients' demographic data and their PU-related characteristics such us age, sex, skin color, diseases, number of admission days, surgery in the past 2 weeks, length of surgery, PU history in the last 5 years, bedrest history, PU risk scale score (Braden scale)[25] and care dependency score (Care Dependency Scale/CDS scale)[26] were documented in the LPZ questionnaire.

The Braden scale is known as a user-friendly PU risk-screening instrument and is widely used in several Asian countries. Its validity and reliability have been verified.[24,27,28] It has six sub-scales: sensory perception, moisture, activity, mobility, nutrition, and fric-

tion and shear. All sub-scales have four interval scales with the exception of friction and shear, which has three interval scales (problem, potential problem, and no apparent problem). The lowest score indicates a significant problem. A patient's total score ranges from 6 to 23.[25]

Dependency on nursing care has also been associated with the occurrence of PUs and was assessed in this study with the Care Dependency Scale (CDS).[29,30] The CDS measures the degree of the patient's physical and psychosocial care dependency. It consists of 15 care dependency items: eating and drinking, continence, body posture, mobility, day and night pattern, dressing and undressing, body temperature, hygiene, avoidance of danger, communication, contact with others, sense of rules and values, daily activities, recreational activities, and learning ability. Each item has 5 Likert-type categories ranging from "1 = completely dependent" to "5 = almost independent." A patient's total score ranges from 15 to 75. The smallest total score indicates the highest level of patient care dependency.[31] Psychometric testing of the scale has been conducted internationally[31] and also in Indonesian hospitals[24] with satisfying results.

The Indonesian version of the LPZ-International questionnaire also evaluates detailed PU characteristics such as PU categories, ulcer locations, place of PU developed (the current care unit/other unit/other institutions/home), duration of suffering from PUs, combination of PUs and moisture lesions, PU infections, and pain related to PUs.

PU categories are divided into category I "non-blanchable erythema," category II "partial thickness," category III "full thickness skin loss," and category IV "full thickness tissue loss" using the European Pressure Ulcer Advisory Panel (EPUAP) category system.[32] The intensity of PU patients' pain was measured from 0 (no pain) to 10 (severe pain) by the Numeric Rating Scale (NRS-11).

Prevention and treatment measures applied to the patients were also assessed. The PU prevention measures involved repositioning, PU-redistributing devices, patient or family education, nutrition support, skin moisturizing, etc. The PU treatment measures involved wound cleaning, debridement, and application of wound dressings.

Data collection procedure

All four hospitals involved in this study had a team of nurses to collect the data. This team received 2-3 hours of training from the first author on using the LPZ-International questionnaire, evaluating PU categorization and moisture lesions, and using the CDS and the Braden scale. The Pressure Ulcer Classification version 2 (PUCLAS 2) education website was used for evaluating both PUs and moisture lesions.[33] The instruction manual for the Indonesian version of the LPZ-International questionnaire was discussed

before conducting the measurements. Nurses were allowed to use data from the patients' registration records to complete patients' demographic data in the questionnaire. After receiving the patient's permission, a pair of nurses examined the patient characteristics at bedside, assessed the patient's skin from head to toe, with special attention for the skin above bony prominences, and evaluated the application of prevention and treatment measures for every patient.

Data analysis

Data was analyzed using IBM SPSS Statistics 22. The characteristics were described of PU patients and their ulcers as well as the implementation of preventive and treatment measures for PU patients. Bivariate comparison analyses were conducted using either the independent t-test (age, length of surgery, length of stay, bedridden days, CDS sum score, Braden Scale sum score) or the chi square test (sex, diseases, surgery, care unit, history of being bedridden, history of PU, skin color, and Braden scale items) in order to test whether PU patient categories I to IV and non-PU patient characteristics were significantly different (< 0.05). The significant items were used for a multivariable comparison analysis (logistic regression: backward LR methods) with a threshold p value of less than 0.01 to explore the main differences between non-PU and PU patient characteristics. The preferred ratio of valid data to independent variables for logistic regression is 50 to 1,[34] meaning a maximum inclusion of 22 variables for further logistic regression.

Ethical considerations

The ethics committee of each participating hospital approved the study to be conducted. The study caused no harm to patients, because the assessments were integrated in the daily nursing assessment. The wound assessments were conducted following the regular wound cleaning schedules. Patients were not obligated to participate. Patients gave their verbal informed consent, or their relatives/legal representatives were asked for permission. The identities of patients were kept anonymous and patients also had the option to refuse to participate during the assessment procedure.

Results

Sixty-six care units within four hospitals agreed to participate and support the measurement procedure. Of the 1183 patients, 1132 agreed to participate (response rate 95.7%). Non-participation reasons were refusal (9 patients), not being available (21 patients), patients being too ill/terminal (10 patients) and unknown (10 patients).

Ninety-one patients had one or more PUs, with a total of 142 ulcers between them. Most PU patients were in medical surgical care (56.0%), intensive care (18.7%), or neurology care (13.2%) units (Table 1).

Table 1. Hospital wards of four participating Indonesian hospitals

Type of wards	Non-PU patients (n=1041)	PU patients (n=91)
Intensive n (%)	60 (5.8)	17 (18.7)
Medical surgical n (%)	835 (80.2)	51 (56.0)
Specialized unit n (%)		
neurology	52 (5.0)	12 (13.2)
cardiology	30 (2.9)	1 (1.1)
elderly	7 (0.7)	2 (2.2)
infection	33 (3.2)	3 (3.3)
trauma	8 (0.8)	3 (3.3)
respiratory	16 (1.4)	2 (2.2)

PU prevalence

The overall prevalence of PU categories I-IV was 8.0% (95% CI 6.4-9.6) and the overall nosocomial PU prevalence was 4.5% (95% CI 3.3-5.7). The prevalence of PUs excluding category I was 6.5% (95% CI 5.1-7.9) and the nosocomial PU prevalence excluding category I was 3.6% (95% CI 2.5-4.7). The prevalence of PUs categories III and IV was 3.8% (95% CI 2.7-4.9) and the nosocomial PU prevalence of categories III and IV was 1.7% (95% CI 0.9-2.5).

The characteristics of pressure ulcer patients

Table 2 describes the characteristics of non-PU patients, PU patients and PU patients with the highest category I to IV PUs, and shows the results of the bivariate and multivariable analyses. There were significant differences between non-PU patients and PU patients with regard to age, diseases (nervous disorder, diabetes mellitus, and respiratory disorder), length of admission days, length of bedridden days, PU history, total CDS score, Braden scale items, and total Braden score. PU patients were older (mean age 55.6 years, SD 17.9) than non-PU patients (mean age 48.1 years, SD 17.3). Most PU patients had a nervous system disorder (19.8%), diabetes mellitus (17.6%), and respiratory problems (14.3%). Admission days for PU patients were longer (mean 14.9 days, SD 12.8) than for non-PU patients (mean 9.1 days, SD 8.8). Most PU patients (60.4%) had a history of being bedridden, and a mean number of 23.9 bedridden days (SD 46.1). Category IV PU patients had longer bedridden days (53.6 days) and admission days (22.7 days). Almost one third of the PU patients (28.5%) had a history of having

PUs in the past 5 years. PU patients (mean total score 32.3, SD 16.4) were more care dependent than non-PU patients (mean total score 57.7, SD 15.7). The mean PU risk score (mean total score 11.3, SD 2.9) based on the Braden scale was lower in PU patients than in non-PU patients (mean total score 18.3, SD 3.8).

Thirteen significant variables (age, nervous disorder, diabetes mellitus, respiratory disorder, length of admission days, length of bedridden days, Braden scale items (sensory perception, moisture, activity, mobility, nutrition, and friction and shear) and total CDS scores were included for further multivariate comparison analysis. Mobility was categorized into two categories because there were no PU patients without limitation mobility. The first category involved patients with completely and very limited mobility and the second category involved patients with slightly limited mobility and no mobility limitation. The specific characteristics of Indonesian PU patients in these four hospitals were: friction and shear problems (OR 17.704; 95% CI 4.765-65.778), bedfast (OR 16.019; 95% CI 1.683-152.510), potential friction and shear problems (OR 4.365; 95% CI 1.239-15.379), diabetes (OR 3.858; 95%CI 1.716-8.676), and more bedridden days (OR 1.038, 95%CI 1.020-1.056).

Table 2. Patient characteristics of four participating Indonesian hospitals (n=1132 patients)

Patient characteristics	Non-PU patients (n=1041)	PU patients (n=91)	Cat I PU patients (n=17)	Cat II PU patients (n=31)	Cat III PU patients (n=22)	Cat IV PU patients (n=21)	Missing value (n=1132)	Bivariate analysis X2 /t-test (p value)	Multivariable analysis Logistic regression	
									P value	Exp B (95% CI)
Age (mean/SD)	48.1 (17.3)	55.6 (17.9)	52.1 (15.8)	59.1 (16.7)	55.8 (18.6)	52.3 (15.3)	68 (6.0)	**0.001**	**NS**	-
Female (n,%)	411 (39.5)	42 (46.2)	12 (70.6)	13 (41.9)	19 (86.4)	8 (38.1)	25 (2.2)	0.247	-	-
Patient's diseases/disorders (n,%)										
Nervous disorder	67 (6.4)	18 (19.8)	4 (23.5)	7 (22.6)	3 (13.6)	4 (19.0)	-	**0.001**	**NS**	-
Diabetes mellitus	65 (6.2)	16 (17.6)	4 (23.5)	5 (16.1)	3 (13.6)	4 (19.0)	-	**0.001**	**0.001**	**3.858 (1.716-8.676)**
Respiratory	82 (7.9)	13 (14.3)	3 (17.6)	4 (12.9)	4 (18.2)	2 (9.5)	-	**0.034**	**NS**	-
Neoplasms	117 (11.2)	12 (13.2)	2 (11.8)	2 (6.5)	4 (18.2)	4 (19.0)	-	0.575	-	-
Injury, accident, and others	98 (9.4)	9 (9.9)	0 (0.0)	4 (12.9)	3 (13.6)	2 (9.5)	-	0.882	-	-
Genitourinary	139 (13.4)	8 (8.8)	1 (5.9)	5 (16.1)	1 (4.5)	1 (4.8)	-	0.214	-	-
Infectious disease	67 (6.4)	8 (8.8)	1 (5.9)	2 (6.5)	3 (13.6)	2 (9.5)	-	0.386	-	-
Digestive	149 (14.3)	7 (7.7)	1 (5.9)	1 (3.2)	3 (13.6)	2 (9.5)	-	0.079	-	-
Circulatory	85 (8.2)	6 (6.6)	2 (11.8)	3 (9.7)	1 (4.5)	0 (0.0)	-	0.597	-	-
Surgery in the past two weeks (n,%)	216 (20.7)	14 (15.4)	1 (5.9)	5 (16.1)	4 (18.2)	4 (19.0)	-	0.223	-	-
Admission days (mean /SD)	9.1 (8.8)	14.9 (12.8)	6.7 (5.3)	14.0 (11.6)	14.9 (11.7)	22.7 (15.2)	14 (1.2)	**0.001**	**NS**	-
Bedridden days (mean/ SD)	1.9 (6.3)	23.9 (46.1)	2.2 (5.2)	24.4 (45.6)	11.6 (15.6)	53.6 (68.4)	-	**0.001**	**0.001**	**1.038 (1.020-1.056)**
PU history in past 5 years (n,%)	10 (1.0)	26 (28.6)	1 (5.9)	6 (19.4)	10 (45.5)	9 (42.9)	-	**0.001***	-	-

Patient characteristics	Non-PU patients (n=1041)	PU patients (n=91)	Cat I PU patients (n=17)	Cat II PU patients (n=31)	Cat III PU patients (n=22)	Cat IV PU patients (n=21)	Missing value (n=1132)	Bivariate analysis X2 /t-test (p value)	Multivariable analysis Logistic regression P value	Exp B (95% CI)
Skin color (n, %)										
White	46 (4.4)	6 (6.6)	0 (0.0)	3 (9.7)	1 (4.5)	2 (9.5)	8 (0.7)	0.614*	-	-
Light brown	797 (76.6)	66 (72.5)	13 (76.5)	21 (67.7)	15 (68.2)	17 (81.0)				
Brown	105 (10.1)	10 (11.0)	0 (0.0)	4 (12.9)	5 (22.7)	1 (4.8)				
Dark brown	14 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)				
Black	9 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)				
Yellow	63 (6.1)	8 (8.8)	3 (17.6)	3 (9.7)	1 (4.5)	1 (4.8)				
Skin allergy (n,%)	73 (7.0)	8 (8.7)	0 (0.0)	3 (9.7)	2 (9.1)	3 (14.3)	-	0.528	-	-
Total Care Dependency Care score (mean, SD)	57.7 (15.7)	32.3 (16.4)	35.1 (19.2)	30.5 (15.4)	36.7 (17.3)	28.2 (13.7)	1 (0.1)	**0.001**	**NS**	
Total Braden Scale score (mean /SD)	18.3 (3.8)	11.3 (2.9)	11.7 (3.8)	11.1 (2.6)	11.7 (2.7)	10.7 (2.7)	4 (0.4)	**0.001**	**-**	-
Braden scale item										
Sensory perception							4 (0.4)	**0.001**	**NS**	-
Completely limited	45 (4.3)	38 (41.8)	7 (41.2)	10 (32.3)	7 (31.8)	14 (66.7)				
Very limited	101 (9.7)	26 (28.6)	5 (29.4)	12 (38.7)	7 (31.8)	2 (9.5)				
Slightly limited	299 (28.7)	14 (15.4)	2 (11.8)	4 (12.9)	4 (18.2)	4 (19.0)				
No impairment	592 (56.9)	13 (14.3)	3 (17.6)	5 (16.1)	4 (18.2)	1 (4.8)				
Moisture							4 (0.4)	**0.001**	**NS**	-
Constantly moist	29 (2.8)	13 (14.3)	2 (11.8)	5 (16.1)	4 (18.2)	2 (9.5)				
Very moist	88 (8.5)	20 (22.0)	5 (29.4)	7 (22.6)	4 (18.2)	4 (19.0)				
Occasionally moist	349 (33.5)	52 (57.1)	8 (47.1)	18 (58.1)	14 (63.6)	12 (57.1)				
Rarely moist	571 (54.9)	6 (6.6)	2 (11.8)	1 (3.2)	0 (0.0)	3 (14.3)				

Patient characteristics	Non-PU patients (n=1041)	PU patients (n=91)	Cat I PU patients (n=17)	Cat II PU patients (n=31)	Cat III PU patients (n=22)	Cat IV PU patients (n=21)	Missing value (n=1132)	Bivariate analysis X2 /t-test (p value)	Multivariable analysis Logistic regression	
									P value	Exp B (95% CI)
Activity										
Bedfast	166 (15.9)	76 (83.5)	11 (64.7)	27 (87.1)	20 (90.9)	18 (85.7)	4 (0.4)	**0.001**	**0.016**	**16.019 (1.683-152.510)**
Chair fast	214 (20.6)	10 (11.0)	4 (23.5	4 (12.9)	0 (0.0)	2 (9.5)			**0.211**	**4.262 (0.439-41.346)**
Walks occasionally	252 (24.2)	4 (4.4)	2 (11.8)	0 (0.0)	1 (4.5)	1 (4.8)			**0.327**	**3.130 (0.319-30.685)**
Walks frequently	405 (38.9)	1 (1,1)	0 (0.0)	0 (0.0)	1 (4.5)	0 (0.0)			**0.001**	
Mobility										
Completely immobile	28 (2.7)	36 (39.6)	6 (35.3)	13 (41.9)	5 (22.7)	12 (57.1)	4 (0.4)	**0.001**	**NS**	-
Very limited	293 (28.1)	51 (56.0)	9 (52.9)	18 (58.1)	15 (68.2)	9 (42.9)				
Slightly limited	393 (37.8)	4 (4.4)	2 (11.8)	0 (0.0)	2 (9.1)	0 (0.0)				
No limitation	323 (31.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)				
Nutrition										
Very poor	18 (1.7)	10 (11.0)	3 (17.6)	4 (12.9)	1 (4.5)	2 (9.5)	4 (0.4)	**0.001**	**NS**	-
Probably inadequate	188 (18.1)	40 (44.0)	8 (47.1)	13 (41.9)	12 (54,5)	7 (33.3)				
Adequate	572 (54.9)	36 (39.6)	4 (23.5)	13 (41.9)	8 (36.4)	11 (52.4)				
Excellent	259 (24.9)	5 (5.5)	2 (11.8)	1 (3.2)	1 (4.5)	1 (4.8)				
Friction and shear										
Problem	75 (7.2)	59 (64.8)	10 (58.8)	20 (64.5)	13 (59.1)	16 (76.2)	4 (0.4)	**0.001**	**0.001**	**17.704 (4.765-65.778)**
Potential problem	261 (25.1)	28 (30.8)	5 (29.4)	10 (32.3)	8 (36.4)	5 (23.8)			**0.022**	**4.365 (1.239-15.379)**
No problem	701 (67.3)	4 (4.4)	2 (11.8)	1 (3.2)	1 (4.5)	0 (0.0)			**0.001**	

*expected frequencies less than 5

The characteristics of pressure ulcers

The characteristics of the PUs are described in Table 3. Of the 91 PU patients, half (44.0%) had a PU before admission to the hospital. Four developed a new PU on other body sites. One third (35.2%) suffered from more than one PU and the average number of PUs per patient was 1.6 (SD 0.9). Forty-two patients (46.2%) had the PU for more than 2 weeks. Thirty-three patients (36.3%) suffered from both PUs and moisture lesions. Forty-one patients (45.1%) reported having PU pain.

The patients had a total of 142 ulcers. Most ulcers developed in the current unit (33.1%) and at home (32.4%). Almost half of the ulcers (42.2%) were categories III and IV. The most frequent PU locations were the sacrum (30.3%), buttock (26.1%), and heels (16.9%).

Table 3. Pressure ulcer characteristics of pressure ulcer patients of four participating Indonesian hospitals (n=91 patients and 142 wounds)

Characteristics of PUs	N (%)
The highest PU category per patient (n=91 patients)	
Category I	17 (18.7)
Category II	31 (34.1)
Category III	22 (24.2)
Category IV	21 (23.1)
Category of PU wounds (n=142 wounds)	
Category I	32 (22.5)
Category II	50 (35.2)
Category III	39 (27.5)
Category IV	21 (14.8)
First PU occurrence per patient (n=91 patients)	
Before admission (n=40 patients, 44.0%)	
Category I	7 (17.5)
Category II	9 (22.5)
Category III	10 (25.0)
Category IV	14 (35.0)
After admission (n=51 patients, 56.0%)	
Category I	10 (19.6)
Category II	22 (43.1)
Category III	12 (23.5)
Category IV	7 (13.7)
Occurrence of PU wounds (n=142 wounds)	
current unit	47 (33.1)
home	46 (32.4)
other unit	19 (13.4)
other hospital	16 (11.3)
elderly home	3 (2.1)
unknown	11 (7.7)

Characteristics of PUs	N (%)
Location of PU wounds (n=142 wounds)	
sacrum	43 (30.3)
buttock	37 (26.1)
heel	24 (16.9)
hip	15 (10.6)
ankle	8 (5.6)
elbow	5 (3.5)
occiput	1 (0.7)
Number of PU wounds per patient (n=91 patients)	
1 PU	59 (64.8)
2 PUs	16 (17.6)
3 PUs	12 (13.2)
4 PUs	2 (2.2)
5 PUs	2 (2.2)
Length of PU suffering (n=91 patients)	
<2 weeks	49 (53.8)
2 weeks – 3 months	34 (37.4)
3–6 months	6 (6.6)
6 months – 1 year	1 (1.1)
More than 1 year	1 (1.1)
Number of patients suffering from both PU and moisture lesion (n=91 patients)	
Before admission	14 (15.4)
After admission	19 (20.9)
Number of patients with PU pain (n=91 patients)	41 (45.1)

Pressure ulcer preventive measures for pressure ulcer patients

PU preventive measures were evaluated for PU patients (Table 4). More than half of the PU patients (61.5%) received repositioning from nurses or their family but a much lower percentage (20.9%) used PU-redistributing mattresses. Cream (47.3%) or oil (33.0%) was applied to moisture patient's skin. Less than one third of PU patients (29.7%) were treated for dehydration and malnutrition. Other methods that were applied included massage (35.2%), water-filled gloves (25.3%), and donuts (17.6%).

Table 4. Pressure ulcer preventive measures taken in four participating Indonesian hospitals (n=91 PU patients)

Recommended preventive measures	n (%)
Repositioning	56 (61.5)
Moisture cream to protect the skin	43 (47.3)
Provide information and instruction to the patient and/or family members	33 (36.3)
Oil to moisture and protect the skin	30 (33.0)
Prevent or treat dehydration and malnutrition	27 (29.7)
Floating heels pillow under lower leg	21 (23.1)
PU-redistributing mattresses	19 (20.9)
Heel protectors	7 (7.7)
Elbow protector	6 (6.6)
Non-recommended preventive measures	n (%)
Massage	32 (35.2)
Water-filled gloves	23 (25.3)
Donut	16 (17.6)

Pressure ulcer treatment measures

Four of the 91 PU patients had no information on their PU treatment, which was counted as missing values. Most PUs were cleaned using normal saline (n=131, 92.9%) and the others were cleaned using an anti-microbial solution. The applied PU dressings are presented in Table 5; most involved saline, anti-microbial or impregnated gauze, and hydrocolloid dressings. Negative pressure wound therapy was also used for ulcer treatment (n=2). Some wounds were debrided using surgical techniques (n=4) and autolysis techniques (n=1).

Table 5. Pressure ulcer dressing used in four participating Indonesian hospitals (n=110 PU category II-IV)

Dressing	PU Category II (n=50)	PU Category III (n=28)	PU Category IV (n=32)	Total (n,%)
Saline-impregnated gauze	12	21	2	35 (31.8)
Anti-microbial impregnated gauze	5	7	5	17 (15.5)
Hydrocolloid	4	5	3	12 (10.9)
Anti-microbial ointment	1	3	3	7 (6.4)
Honey	1	2	3	6 (5.5)
Hydrogel	0	0	4	4 (3.6)
Alginate	2	0	1	3 (2.7)
No dressing	25	0	0	25 (22.7)
Unknown	0	1	0	1 (0.9)

Discussion

This study provides detailed information about PUs (prevalence, patients, ulcers, prevention, and treatment) and their related burden (pain and moisture lesion) in four Indonesian general hospitals. Almost half of the PU patients (44.0%) had been admitted with one or more PUs. The nosocomial PU prevalence excluding category I was 3.6% (95% CI 2.5-4.7). This result is comparable to Dutch hospitals[8] and slightly higher than Chinese,[9] American[10] and Austrian hospitals.[8] The nosocomial PU prevalence of categories III and IV in four hospitals was 1.7% (95% CI 0.9-2.5) which is slightly lower than in Swedish hospitals (2.0%) and higher than in American hospitals (0.5%).[10] Possible reasons for these comparable prevalence rates are that the hospitalized Indonesian patients were younger than those in the European studies[8] and that the American hospitalized patients[10] and quality of PU care differs. Indonesian hospitals applied more repositioning, more skin moisturising, more outdated PU preventive actions and more traditional treatments such as old fashioned gauzes.

Almost half of the wounds (42.3%) were categories III and IV, which is somewhat higher than in hospitals of other countries.[13,35,36] Most category III and IV PUs (60%) had developed before hospital admission, and two thirds of those were category IV PUs. Health-care givers must manage their patient's main diseases and treat patient's ulcers and take measures to prevent the development of new ulcers on other body sites.[4] In these hospitals, four of PU patients (4.4%) developed a new PU on the other body sites.

Repositioning is the main PU preventive measure.[1] Fifty-six (61.5%) of the 91 PU patients received repositioning from nurses or family. There were only a few PU patients who did not need repositioning, because they had no activity limitations and could walk occasionally.[5] More than half of the 82 patients (64.6%) with limited activity, mobility, and friction and shear problems received repositioning. The other patients (35.4%) did not receive the necessary repositioning because of patient and health caregiver factors that may have hindered the necessary repositioning.[2] Further research on the use of repositioning and the barriers for repositioning is necessary to identify avoidable/unavoidable PUs.[12]

It appeared that some of the prevention measures applied were outdated (e.g. massage, water-filled gloves, and donut). Since Indonesia has no national PU guidelines, a good starting point would be the translation and adaptation of the recent evidence-based international PU guideline. This adapted guideline should be based on characteristics of PU patients and guideline implementation and on PU prevention programs and education for nursing personnel and caregivers in medical, surgical, and neurology care units.

Most of the PU patients in this study had friction and shear problems, were bedridden, suffered from diabetes, and had more bedridden days. This result should be interpreted carefully because this study used a cross sectional design for comparison between non-PU and PU patients, meaning that no conclusions can be drawn about the causality. The PU patient characteristics could be associated with the location of PU development. Most PUs in these hospitals developed on the sacrum, buttock, and heels, which is similar compared to results of other studies.[13,35,36] Pressure due to a bedridden status and shear and friction on the sacrum and buttock along with Indonesia's warm and humid climate might negatively influence skin moisture and skin temperature, and weaken the stratum corneum.[37] Therefore, many PU patients also had both PUs and moisture lesions (36.3%). Moreover, diabetes is associated with one of the risk factors of PU development and can delay PU healing because of a lack of skin perfusion.[2]

Ulcers were mainly treated by applying saline-impregnated/anti-microbial gauze dressings and only a small number of these were dressed using hydrocolloid, hydrogel, honey, and alginate dressings. Although cheap, the impregnated gauze dressings need to be changed frequently, which increases the infection risk, is painful for the patient, and costly in terms of nursing care time.[38,39] However, advanced modern wound dressings are not in the formulary for the free care services in these Indonesian hospitals. Implementation and a cost-effectiveness analysis are therefore needed on using more innovative dressing applications in the Indonesian hospital setting.

PU history in the past 5 years could be an important indicator for the risk of developing a new PU. Nevertheless, few of the patients in this study (n=36, 3.2%) had recurrent PUs even though the bivariate analysis was significant (p value 0.001) but the expected frequencies less than 5. There was no significant difference in PU prevalence with regard to skin color in this study because most patients had light brown skin.

Study limitations

Despite using a standardize questionnaire, having a consistent data collection procedure,[22,24] and involving a large number of patients (1132 patients), this study has some limitations. The description of PU characteristics in patients cannot be generalized to all Indonesian hospitals since only 4 (1.4%) of the 282 large Indonesian hospitals participated.[40] This was mainly because organizing the measurement at a national level was extremely challenging and expensive due to the geographic location of hospitals. Nevertheless, this study is the first to involve multiple hospitals located on different provinces and islands in Indonesia, and has provided valuable experience and baseline information for future larger studies.

Conclusions

Indonesian nurses deal with the complexities of PUs daily in nursing care. This study highlighted some specific PU patient characteristics in Indonesian hospitals. It involved patients who had friction and shear problems, were bedfast, suffered from diabetes, and had more bedridden days. Almost half of the PUs had already developed before admission to the hospital and half of the ulcers were severe PUs (category III and IV). Some of the preventive measures applied were outdated and the ulcers were mainly treated by applying traditional saline-impregnated/anti-microbial gauze dressings.

It may be concluded that the hospitals can improve their PU care by implementing an evidence-based PU guideline, such as the recent revised version of the Prevention and Treatment of Pressure Ulcers Guideline developed in collaboration between the United States National Pressure Ulcer Advisory Panel (NPUAP), the European Pressure Ulcer Advisory Panel (EPUAP), and the Pan Pacific Pressure Injury Alliance (PPPIA).[1]

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Chapter 6

Retrospective study of pressure ulcer prevalence in Dutch general hospitals since 2001

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Abstract

Objective. To investigate whether factors such as patient characteristics, pressure ulcer (PU) prevention strategies and the structural quality indicators used by institutions and wards can explain an apparent decline in PU prevalence from 2001 to 2008.

Method. The Dutch National Prevalence Survey of Care Problems (known as LPZ) database from 2001 to 2008 was used to explore differences in patient characteristics, PU prevention strategies and structural quality indicators used by institutions and wards between two periods, 2001–2004 (PU as an internal health-care quality indicator) and 2005–2008 (PU as an external health-care quality indicator).

Results. Compared with 2001–2004, fewer participants with CVA/hemiparesis (OR 0.485), infectious diseases (OR 0.861), surgery lasting >2 hours (OR 0.637), at-risk Braden scale scores (OR 0.844), and more participants with diabetes mellitus (OR 1.693) were found in the 2005–2008 group. More special beds/mattresses (OR 2.216) and special cushions in wheelchairs (OR 2.277) were used in the 2005–2008 period, as well as slightly more repositioning, dehydration/malnutrition prevention and PU prevention and treatment information. More institutions had information leaflets (OR 5.894), PU prevention guidelines (OR 4.625), a PU committee (OR 2.503), and a PU-wound care nurse at ward level (OR 2.434) in the 2005–2008 period.

Conclusion. The decline in PU prevalence at Dutch general hospitals after 2004 may be partly explained by differences in patient characteristics, improved structural quality indicators and a slight improvement in PU prevention. Further research is needed to find evidence of which individual factors can explain the decline in PU prevalence after 2004 and whether any changes in health care policy have impacted on these prevalence rates.

Key words: pressure ulcer; prevalence; hospitals; prevention; structural quality indicator

Introduction

At the most conservative health-cost estimation, pressure ulcers (PU) account for approximately 1% of the total Dutch health care budget; this ranges from a low estimate of $362 million to a high estimate of $2.8 billion.[1]

The Dutch National Prevalence Survey of Care Problems (Landelijke Prevalentiemeting Zorgproblemen, LPZ) has measured the prevalence of PUs at health-care institutions each year since 1998. The first survey revealed a total PU prevalence rate, including category I ulcers, of 23.1%. This included rates of 13.2% in university hospitals, 23.3% in general hospitals and 32.4% in nursing homes, which is much higher than rates reported in the literature.[2] The mean prevalence rate excluding category 1 remained steady over the next 5 years (Figure 1).

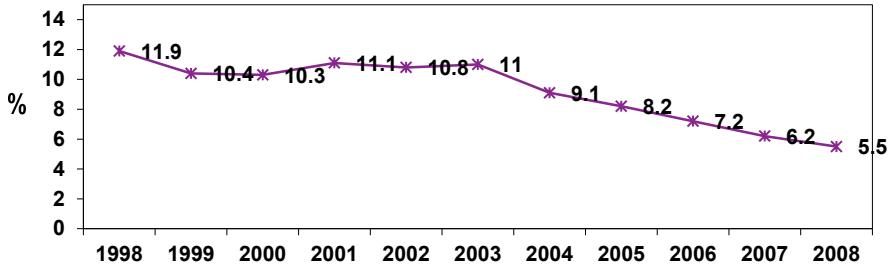

Figure 1. Pressure ulcer prevalence excluding category I in Dutch general hospitals by year[4]

In 2004, the Dutch Health Care Inspectorate (Inspectie Gezondheidszorg) developed a health care policy in which PU prevalence is used as a performance indicator, thus obliging care institutions to publish data.[3] There appears to have been a decline in PU prevalence since 2004 (Figure 1), although the number of at-risk patients, based on Braden scale scores, has not decreased.[4] This suggests that PU prevention and treatment has improved. This is a great achievement, especially when considering that PU prevalence is considered a good indicator for health-care quality performance.[3]

A decline in prevalence rates may be due to several factors. First, the population may have changed due to an increasing number of participants and participating wards after 2004.[4] Another explanation may be that PU prevention has become more effective. Furthermore, the structural quality indicators used by institutions and wards relating to PU prevention and treatment may also have played a role.[5]

Hospital prevalence rates collated by the Dutch Health Care Inspectorate are presented on a website (www.ziekenhuizentransparant.nl), which allows comparisons to be drawn.[3] Several organisations have criticized public performance indicators, claiming that they stimulate defensive reactions and the manipulation of rates, undermining accuracy.[3]

This survey aimed to determine whether or not patient characteristics, PU prevention strategies and the structural quality indicators used by institutions and wards can explain the decline in PU prevalence reported in Dutch general hospitals. We set out to answer the following research questions:

a. Which factors (e.g. patient characteristics, PU prevention strategies and structural quality indicators used by institutions and wards) are related to the prevalence of PU in Dutch general hospitals?
b. Are there any differences in these related factors between the periods 2001–2004 and 2005–2008?

Methods

Study design

This is a retrospective multicentre cross-sectional survey of the Dutch National Prevalence Survey of Care Problems (known as LPZ).

Participants

From 2001 to 2008 a total of 81,481 general hospital patients participated in the LPZ prevalence survey. To ensure homogeneity and representativeness of the sample, we used the following inclusion criteria: participants did not have a PU prior to admission, they had to be at least 18 years old and were admitted to a surgical, non-surgical, intensive care, or medical/cardiac ward for no longer than 3 months. Patients who did not give their informed consent were excluded.

Ethics committees of the participating institutions approved the LPZ study. All data were processed anonymously.

Instrument

The LPZ survey uses a standardised instrument, which includes three questionnaires to collect data from patients, wards and institutions. The questionnaires were all developed by LPZ and their reliability, validity and feasibility were tested in a Dutch general

hospital setting.[5] Questions are in six categories, namely patient characteristics, PU risk assessment based on Braden scale, assessment of PU category, PU prevention, the institution's structural quality indicators for PU and the ward's structural quality indicators for PU.

PU prevalence was defined as the proportion of selected participants with category II or higher PUs recorded in the one-day prevalence survey in the general hospital. A category I ulcer is difficult to diagnose as it needs thorough assessment of the high-risk skin area,[6] and so was excluded. The EPUAP classification system was used.[7]

At the patient level, the questionnaire recorded participant characteristics (age, sex, diseases, duration of surgery and the length of admission), PU category assessment and use of PU prevention strategies. Each individual's risk of developing a PU was measured with the Braden scale;[8] the lower the score, the higher the risk. A cut-off of 20 was used to divide the group into those who were 'at risk' and those who were not, balancing sensitivity and specificity.[9] Furthermore, prevention strategies such as support surfaces, repositioning, prevention of malnutrition and education were investigated for each participant with 'limited activity'.

At the ward level, the structural quality indicators were the presence of a PU/wound care nurse, single and multidisciplinary consultations, utilisation of PU prevention/treatment guidelines, patient assessment files, availability of documentation on the prevention and treatment of PU to the patient and the availability of pressure-redistributing mattresses.[5]

The structural quality indicators for PU at the institutional level were the existence of a PU committee, prevention and treatment guidelines, guideline updating, staff monitoring (to ensure that they are working in accordance with these guidelines), the reporting of PU cases to a central person in the institution, regular central registration of PUs, central management of PU prevention materials, a refresher course and information leaflets.[5]

Data Collection

Each participating institution required a competent survey coordinator, trained by LPZ researchers, to conduct the survey. In turn, this institutional coordinator selected and trained a team of nurses to conduct the survey within the institution. The survey coordinator filled out the structural quality indicator questionnaire at the institutional level. The survey coordinator filled out the structural quality indicator questionnaire at the institutional level. The ward leader completed the structural quality indicator questionnaire at the ward level.

Two selected and trained nurses from different wards assessed the patients' characteristics, the risk of pressure ulceration based on Braden scores, the PU category and the PU prevention measures. The interrater reliability of the PU category system was 0.81 (Cohen's Kappa).[5] To avoid underestimation of the PU rate, it was important to have training in precise PU categorisation before measurements were taken.[10]

Statistical analysis

PU prevalence rates were presented graphically each year. Participants were divided into two groups, depending on the time period of their assessment: 2001–2004 and 2005–2008. The Statistical Package for the Social Sciences (SPSS 15.0) was used. The chi-square test was used to compare differences in PU prevalence between the two periods. Logistic regression (backward LR methods) was used as multivariate analysis to identify the possible factors related to PUs in Dutch general hospitals from 2001 to 2008, with a threshold p value of less than 0.01.

The 'limited activity' participant variable was included in the analysis because of a possible link with the prevention strategies used. The patients considered to have 'limited activity' were bed-or chair-bound and could not bear their own weight, requiring assistance to move.[8] These patients are associated with hospital-acquired PUs and need preventive interventions.[11,12] The fit of the model was assessed using the Hosmer-Lemeshow statistic.

Possible factors related to PU in the Dutch general hospital setting were compared between the two time periods. For descriptive purposes, the proportion/mean was calculated. PU prevention strategies were only analysed when used on participants with limited activity. The use of special beds and mattresses or cushions in wheelchairs, therefore, was calculated only for bed- or chair-bound participants.

A univariate t-test and chi-square test were performed to determine differences between the two periods, and the subsequent analysis used multivariate logistic regression with these periods as dependent variables to predict the differences among variables that could influence prevalence.

Results

A total of 63,336 participants from 414 general hospitals took part in this survey from 2001 to 2008. As shown in Table 1, the number of participants and wards increased enormously after 2004.

Table1. Number of LPZ participants selected per year

Number	Year								
	2001	2002	2003	2004	2005	2006	2007	2008	Total
institutions	36	51	42	52	61	62	57	53	414
wards	277	383	279	391	672	658	616	538	3814
participants	4475	6389	4667	6523	11007	10737	10075	9463	63336

Pressure ulcer prevalence rates

In 2001, the prevalence of PUs excluding category I in Dutch general hospitals was relatively high. This declined from 2001 to 2003, dropping from 8.5% to 7.8% (Figure 2). The strongest downward trend was seen from 2004 to 2005. After 2004, PU prevalence continued to decrease, from 5.0% in 2005 to 3.4% in 2008. Overall, PU prevalence decreased by more than half, from 8.5% in 2001 to 3.4% in 2008.

There was a significant difference in PU prevalence at Dutch general hospitals between the two periods ($p<0.001$) and participants in the 2001–2004 period tended to have a PU prevalence excluding category I that was 1.79 times higher than those in the 2005–2008 group.

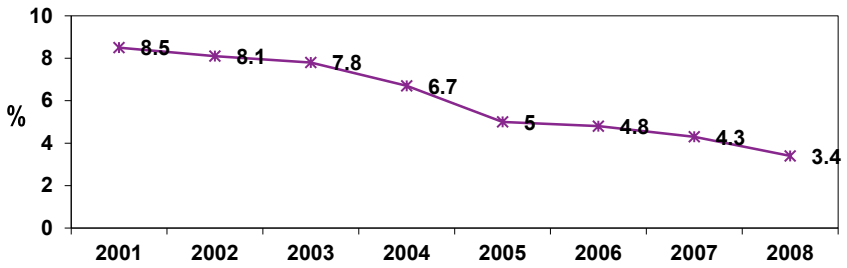

Figure 2. Pressure ulcer prevalence excluding category I of the selected participants included in this survey in Dutch general hospitals by year

Possible factors related to pressure ulceration in Dutch general hospitals

The first multivariate logistic regression analysis identified the possible factors related to the absence and the presence of PUs in Dutch general hospitals (Table 2). Participants who had a Braden score of <20, surgery lasting >2 hours, an infectious disease, limited activity, diabetes mellitus, respiratory disease, cardiovascular disease and cerebrovascular accident (CVA)/hemiparesis all were at risk of pressure ulceration.

An interaction was found between limited activity and PU prevention strategies, which may have influenced the occurrence of PU in participants with limited activity. The structural quality indicators of institutions and wards also contributed to PU prevalence. The goodness of fit of the model is 20.5% (R^2 Hosmer and Lemeshow = 0.205).

Comparison of associated factors

Participant characteristics

The mean age of participants and the sex ratios were comparable during the two periods (Table 3). However, disease proportions varied between them. In both groups, half the participants were at risk of developing a PU (Braden scale score ≤20) and more than 30% had limited activity levels. The proportion of 'at risk' and 'limited activity' participants decreased significantly in 2005–2008, by 4.8% ($p<0.001$).

In the multivariate analysis, the proportion of at-risk participants in the 2005–2008 period was found to be less than in the 2001–2004 period. In 2005–2008, participants' hospital stays were shorter ($p<0.001$) and fewer participants spent longer than 2 hours in surgery ($p<0.001$) compared with the 2001–2004 period.

The proportion of participants with CVA/hemiparesis and infectious diseases was lower in the 2005–2008 group, although the proportion with diabetes mellitus was higher.

Prevention of pressure ulceration in participants with limited activity levels

With the exception of elbow and heel protectors, there was a significant difference in the prevention strategies that were used during the two periods (Table 4). Most participants used a special mattress for the prevention of PUs. In 2005–2008, the use of support surfaces for participants with limited activity increased twofold, which was significant ($p<0.001$). However, in general, only a quarter of the participants with limited activity received information about PU prevention and treatment. A third were regularly repositioned and half the participants received special treatment for the prevention of dehydration and malnutrition. Less than a quarter of the chair-bound participants used a special cushion in their wheelchair.

Table 2 Factors associated with the occurrence of pressure ulcer in the Dutch general hospitals (n=63,336)

Variable	Items	p values
Participant characteristics	Risk participants (Braden scale ≤ 20)	0.001
	Surgery >2 hours	0.001
	Infectious disease	0.001
	Limited activity	0.008
	Diabetes mellitus	0.001
	Respiratory disease	0.001
	Cardiovascular disease	0.005
	CVA/hemiparesis	0.001
PU prevention	Special cushion in wheelchair	0.001
	Provide information and instruction	0.001
	Heel protector	0.001
	Repositioning	0.001
	*Special bed and mattresses	0.002
	*Prevention/treatment of dehydration and malnutrition	0.001
	*Repositioning	0.001
	*Special cushion in wheelchair	0.001
	*Provide information and instruction	0.001
Structural quality indicator used by wards	Documentation on prevention and treatment	0.022
	PU/wound care nurse	0.013
	Single-disciplinary consultations	0.001
	Assessment files about the risk of PU	0.001
Structural quality indicator used by institution	Refresher course	0.009
	PU case reporting to a central person	0.001
	Information leaflet	0.003
	Prevention guideline	0.004
	PU committee	0.001

*Limited activity participants

Note: R^2 = 0.205 (Hosmer & Lemeshow), 0.085 (Cox & Snell), 0.242 (Nagelkerke)

Table 3. Participant characteristics

Characteristics	Univariate analyses			Multivariate analyses Adjusted odds ratio
	Period		P value	
	2001-2004 (22,054 participants)	2005-2008 (41,282 participants)		
Age (years) Mean (SD)	67.4 (16.3)	67.8 (15.9)	0.001	NS*
Female (%)	52.4	52.8	0.324	NS
At-risk participant/ Braden scale ≤20 (%)	58.4	54.4	0.001	0.844 (0.803-0.886)
Infectious disease (%)	6.5	6.9	0.020	0.861 (0.796-0.932)
Diabetes mellitus (%)	7.8	12.6	0.001	1.693 (1.582-1.811)
Cardiovascular disease (%)	20.2	22.4	0.001	NS
CVA/hemiparesis (%)	8.9	5.2	0.001	0.485 (0.448-0.524)
Respiratory disease (%)	12.5	14.1	0.001	NS
Length of admission (days) Mean (SD)	12.4 (14.7)	9.6 (15.9)	0.001	NS
Surgery > 2 hours (%)	7.5	5.7	0.001	NS
Limited activity (%)	36.1	31.3	0.001	NS

* NS = not significant

Table 4. Pressure ulcer prevention strategies used in patients with limited activity

Prevention indicators	Univariate analyses			Multivariate analyses Adjusted odds ratio
	Period		P value	
	2001-2004 (7,937 participants)	2005-2008 (12,420 participants)		
Repositioning (%)	23.1	34.9	0.001	1.533(1.434-1.639)
Prevent or treatment of dehydration and malnutrition (%)	29.3	43.3	0.001	1.404 (1.183-1.666)
Provide information and instruction (%)	15.6	24.9	0.001	1.319 (1.246-1.397)
Special bed and mattresses (%)*	81.9	92.4	0.001	2.277 (2.032-2.556)
Special cushion in wheelchair (%)*	14.7	22.8	0.001	2.160 (1.643-2.842)
Elbow protectors (%)	0.2	0.3	0.090	NS
Heel protectors (%)	5.9	6.8	0.014	NS

* Bed-bound/chair bound participants
NS = not significant

Structural quality indicators of institutions and wards

Table 5 and 6 shows a highly significant difference ($p<0.001$) in the structural quality indicators used by institutions and wards between the two periods. Almost all of the wards in Dutch general hospitals have pressure-redistributing support surfaces. In 2001–2004, more than 70% of wards had satisfactory structural quality indicators, with the exceptions of multidisciplinary consultation (50.2%) and an assessment file about the risk of PU (48.1%). After 2005, an increased number of wards had a PU/wound nurse and assessment files regarding the risk of ulceration.

Table 5. Structural quality indicators used by wards

Structural quality indicators	Univariate analyses			Multivariate analyses Adjusted odds ratio
	Period		P value	
	2001-2004	2005-2008		
Wards	1330 wards	2484 wards		
PU/wound care nurse (%)	70.4	88.9	0.001	2.434 (2.310-2.565)
Single-disciplinary consultations (%)	74.2	78.9	0.001	0.881 (0.840-0.925)
Multi-disciplinary consultations (%)	50.2	55.7	0.001	NS
Assessment file about the risk of PU (%)	48.1	65.6	0.001	1.895 (1.818-1.975)
Documentation about prevention and treatment (%)	76.8	86.3	0.001	1.334 (1.263-1.409)
Availability of reduced pressure support surfaces (%)	94.2	95.7	0.001	NS

NS = not significant

Table 6. Structural quality indicators used by institutions

Structural quality indicators	Univariate analyses			Multivariate analyses Adjusted odds ratio
	Period		P value	
	2001-2004	2005-2008		
Institutions	181 institutions	233 institutions		
PU committee (%)	82.4	100	0.001	2.503 (2.338-2.680)
Prevention guideline (%)	91.2	97.8	0.001	4.625 (4.096-5.221)
Treatment guideline (%)	90.7	93.9	0.001	NS
Guideline updating (%)	95.1	98.7	0.001	NS
PU reporting case to a central person (%)	68.5	62.6	0.001	0.547 (0.525-0.571)
Regular central registration of PU (%)	65.2	59.2	0.001	NS
Refresher course (%)	81.3	87.9	0.001	NS

NS = not significant

At an institutional level, most of the Dutch general hospitals (≥80%) had a PU committee, prevention and treatment guidelines (and updated these) and also organised refresher courses. Before 2004, the availability of information leaflets in these institutions was only 71.9 %, whereas after 2004 almost all of the institutions provided an information leaflet (93.9%). There was a slight decrease in reporting PU cases to a central person in the institution.

Adjusting for all of the variables in the multivariate analysis, at the ward level there was a small decrease in single-disciplinary consultations after 2004 and a twofold increase in the number of PU/wound care nurses and assessment files about the risk of PU. Interestingly, at the institutional level, after 2004 the availability of information leaflets increased six fold, prevention guidelines fivefold and PU committees threefold. There was a decrease in reporting the PU patients to a central person in the institutions after 2004.

Discussion

This survey aimed to investigate whether factors such as patient characteristics, PU prevention strategies and institutions'/wards' structural quality indicators can explain the decline in PU prevalence after 2004 in Dutch general hospitals.

Before performing comparison analyses between the two periods (2001–2004 and 2005–2008), this survey explored which factors are related to the PU prevalence in Dutch general hospitals. The factors related to the presence of PU are Braden scale scores ≤20, surgery >2 hours, infectious diseases, limited activity, diabetes mellitus, respiratory diseases, cardiovascular diseases, PU prevention strategies (support surfaces, repositioning, prevention of malnutrition and education), and some structural quality indicators used by both institutions and wards.

We compared the significant related factors between the 2001–2004 period (internal indicator) and the 2005–2008 period (external indicator). In the 2005–2008 period, fewer at-risk patients (Braden scale ≤20), patients with CVA/hemiparesis, surgical patients operated on for more than 2 hours, infectious disease patients and more patients with diabetes mellitus were included than in the previous period (2001–2004). More special beds/mattresses and special cushions in wheel chairs were used in the 2005–2008 period, as well as slightly better prevention strategies. In this same period, more institutions had information leaflets, prevention guidelines, a PU committee and a PU-wound care nurse at the ward level.

Since 2004, the reported PU prevalence rate has declined and there has been a slight reduction in the proportion of at-risk patients. However, during the last 12 years the

Dutch government has made efforts to reduce PU prevalence.[13] Since 1998, LPZ has been measuring PU prevalence annually.[5] Regular measurement of PU prevalence, together with feedback, may result in higher quality health care and a reduction in PU prevalence.[14,15] The committee of the Dutch Health Inspectorate evaluated the efficacy of PU care[16] and, as a result, the Dutch government initiated quality improvement projects for PU care. Furthermore, the Dutch Health Care Inspectorate established a health care policy using PU prevalence as one of its health care performance indicators. These indicators must be made public (external indicator).[13]

In our results, following the implementation of an external indicator, we found that the number of participants and wards following the LPZ survey increased enormously. After 2004, the number of institutions who provided information leaflets, had prevention guidelines and PU committees rose. Furthermore, more wards had PU/wound care nurses and assessment files about the risk of PU. It seems that health care institutions are paying attention and increasing the structural quality indicators at both the institutional and ward levels.

However, only half of institutions were found to regularly report to a central registration. The reason for this is unclear. It may be that each year a different institution participated in the survey. The structural quality indicator results may be biased, as questionnaires were completed by survey coordinators and ward leaders within the institutions, who were not independent. Further retrospective study is needed to prove the correlation between changing health care policy and an improvement in the structural quality indicators at the ward and institutional levels.

Adequate mattresses and prevention/treatment guidelines were promising tools for the reduction of PU prevalence.[17] The numbers of special beds/mattresses available between the two periods was similar (94.2–95.7%). However, the number of at-risk participants who had special beds/mattresses and special cushions was twice as high in 2005–2008 compared with 2001–2004. During this time, the availability of prevention guidelines increased fivefold at the institutional level and assessment of PU risk doubled. These factors may well have influenced the use of appropriate support surfaces for patients with limited activity.[18]

Despite the encouraging evidence of improved patient care, there still remains room for improvement. Using pressure-redistributing support surfaces alone is suboptimal as bed-bound and immobile patients must regularly be repositioned.[19] Although availability of prevention guidelines increased fivefold at the institutional level, they were not automatically integrated into the prevention of PUs at the patient level. Less than half of the patients with limited activity were regularly repositioned and provided with special treatment for the prevention of dehydration and malnutrition. Despite nearly

all of the institutions having information leaflets on PU prevention (71.9–93.9%), less than a quarter of participants (15.5–24.9%) received this information. There are numerous opportunities for improving PU prevention.

The relationships between structural quality indicators at the institutional level, prevention at the patient level and PU prevalence still need to be examined with a multilevel data analysis, involving all three levels of the hierarchy (patient, ward and institutional levels).

Limitations

Not all of the factors relating to pressure ulceration in Dutch general hospitals were identified (R2 = 0.205 Hosmer & Lemeshow). This low variance could be explained by the complexity of contributing factors, both relating to the patient's condition (pre-admission status, medication, surgical positioning and oxygen saturation) and those independent of the patient's condition (environmental conditions). These variables have not been included, as this is a secondary data analysis.

We were unable to compare the other structural quality indicator variables, including staff monitoring, central management of pressure-redistributing support surfaces and utilisation of the PU prevention/treatment guidelines, as these variables were only measured after 2005.

Because of the large sample size, small differences in the means, proportions and adjusted odds ratio of variables between the two periods became statistically significant.

Although the method of measurement was similar over time, different institutions participated each year, which may have influenced the results. Moreover, this study did not analyse the differences of each possible factor for each year, separately.

Conclusion

In one decade, PU prevalence rates in Dutch general hospitals decreased from 8.5% to 3.4%. At risk status, PU prevention measures in those with limited activity and institutions' and wards' structural quality indicators were significantly associated with the presence of PUs. After 2004, there was a slight decrease in the number of at-risk patients. The decline of PU prevalence rates in Dutch general hospitals since 2004 might partly be explained by differences in patient characteristics, improved structural quality indicators and slightly improved PU prevention measures.

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Chapter 7

General discussion

General discussion

Pressure ulcer (PU) incidence and prevalence rates have been increasingly used as one of hospitals' performance indicators and are associated with patient safety and nursing care in hospitals.[1] Numerous studies have reported PU rates internationally. However the comparison of rates among studies is challenging because of the large variation in definitions, methods, questionnaires, and measurement procedures.[2,3] Nevertheless, studies about the quality of PU care itself are limited (**Chapter 1**) and none have been conducted in Indonesia. Therefore the main aim of this thesis was to measure and evaluate the quality of PU care in Indonesian hospitals.

This general discussion consists of two main parts. First, it discusses the measurement of the quality of PU care in Indonesian hospitals. Second, it examines the evaluation of the quality of PU care in Indonesian and Dutch hospitals in more depth. Additionally, a methodological consideration is performed of all studies and recommendations are given for clinical practice and further research regarding PU care.

In this thesis, the Donabedian model was applied as a theoretical framework. This model was developed 27 years ago to assess the quality of care provided by health services.[4] The assessment of the quality of care was classified under three components: structure, process, and outcome. Recently, this model has been modified and extended for the measurement and evaluation of specific topics related to the quality of care in various health care settings.[5-7] In this thesis, patient characteristics were added into the Donabedian model (**Chapter 1**). Subsequently, the extended model was applied to measure and evaluate the quality of PU care in hospitals. The four main components of the extended Donabedian model in this thesis are 1. structure (structural quality indicators at ward and hospital level), 2. process (preventive and/or treatment measures), 3. outcome (nosocomial PU prevalence), and 4. patient characteristics.

Five sequential studies were conducted with the following specific aims (**Chapters 2-6**).
Part 1: Measurement of the quality of PU care

a. To apply two questionnaires (the European Pressure Ulcer Prevalence Survey Minimum Data Set and the LPZ-International questionnaire) on measuring the quality of PU care in stroke patients in one Indonesian hospital (**Chapter 2**).
b. To evaluate the psychometric properties (content validity and interrater reliability) of the Indonesian version of the LPZ-International questionnaire used for measuring quality of PU care in Indonesian hospitals (**Chapter 3**).

Part 2: Evaluation of the quality of PU care

a. To evaluate the quality of PU care in stroke patients in one Indonesian hospital (**Chapter 2**).

b. To evaluate the quality of PU care in adult patients in four Indonesian hospitals (**Chapter 4**).
c. To evaluate the quality of PU care for PU patients in four Indonesian hospitals (**Chapter 5**).
d. To evaluate the quality of PU care in adult patients in Dutch hospitals (**Chapter 6**).

Measurement of the quality of pressure ulcer care

A small scale study in one Indonesian hospital was conducted to measure the quality of PU care using two questionnaires (**Chapter 3**).[8] This study confirmed that the short, one-page European Pressure Ulcer Prevalence Survey Minimum Data Set was a usable questionnaire. It might have been helpful for measuring PU prevalence, but it did not contain any questions about nosocomial PU prevalence, which is the main outcome of measuring the quality of PU care in the extended Donabedian model. Furthermore, it was not comprehensive enough to measure more relevant aspects of the quality of PU care. Therefore, we used the LPZ-International questionnaire to assess structural quality indicators, preventive measures and wound dressing applications.[9,10] Although the LPZ-International questionnaire is a comprehensive questionnaire for measuring PUs and other health care problems,[10] no Indonesian version of this questionnaire was available. Therefore, a translation of the questionnaire was made and a psychometric evaluation of the Indonesian version of the LPZ-International questionnaire was conducted.[11]

The PU module in the LPZ-International questionnaire was developed based on a literature review and responses from a Delphi panel in 1997 and is now used as a uniform national registration system in the Netherlands to measure annual PU prevalence.[9,10] The module consists of 6 parts: (1) the structural quality indicators at hospital level, (2) the structural quality indicators at ward level (3) the characteristics of patients related to PU risk, including the Braden Scale and Care Dependency Scale (CDS), (4) PU preventive measures, (5) PU characteristics, and (6) PU wound dressings applied.[9] This questionnaire has also been adopted in several European countries in various health care settings,[10,12-17] but the content validity of the questionnaire for measuring the quality of PU care has not been evaluated yet. Therefore, we evaluated the content validity of the questionnaire as part of the psychometric evaluation of the questionnaire in Indonesian hospitals (**Chapter 3**).[11]

Most questions (77.5%) had good Item Content Validity Index (I-CVI) results. The experts suggested adding “number of bedridden days,” “previous PUs,” “skin allergies,” “wound infections,” “wound cleansing,” and “debridement”. This suggestion was also supported by a recent systematic review on patient risk factors for PU develop-

ment[18,19] and the EPUAP-NPUAP PU treatment guideline.[20] The 2009 EPUAP-NPUAP guideline mention that PU treatment not only involves wound dressings but also cleansing, debridement, and treatment of wound infection.[20] In the PU prevention measures "oil to moisturise skin" and some non-recommended PU measures such as "massage," "donut," and "water-filled gloves" were also added. These preventive measures could also be applied in Indonesian hospitals. The item "cushions in wheelchairs as preventive measures" was deleted because it had a low I-CVI (0.50) and the experts pointed out that very few patients in hospitals have wheelchairs.[11]

In addition to content validity, a high interrater reliability of PU categories supports the accuracy of the outcome measurement.[21] Similar to the results of other studies in clinical setting and that used nurses as raters,[22] interrater reliability across all non PU patients and PU patient category I-IV was very good (κ = 0.92). An additional explanation for this good result could be the standardized training the nurses received before performing patient assessment, which is a procedure of the LPZ-International measurement. Moreover, most raters had more than 10 years' work experience in the hospital.

This study also provided some results related to the Braden Scale and the Care Dependency Scale (CDS). The interrater reliability of the Braden Scale and the CDS sum score were very good (Interclass Correlation Coefficients/ICC (1,1) 0.90 and 0.88, respectively). These results are similar to other studies in other settings.[23-25] However, some items had an ICC ≤ 0.80 (Braden Scale; nutrition, moisture, mobility, and CDS; recreational activities, daily activities, avoidance in danger, and communication). These slightly lower ICC scores reflect the nurses' difficulties in rating these items, which were probably due to unclear definitions, categories, and explanations.[23,25] Furthermore, the Indonesian nurses in the four participating hospitals were not familiar with both scales.

Evaluation of the quality of pressure ulcer care

Quality of pressure ulcer care in stroke patients in one Indonesian hospital

In Indonesia, hospitals register the number of PU patients monthly under the coordination of the Ministry of Health.[26] However, comprehensive studies about the quality of PU care are limited.[27] The first attempt to evaluate the quality of PU care was conducted in a small study in one hospital involving 36 patients in 2 wards (**Chapter 2**).[8] The PU prevalence was high (28%), which could be explained by a number of factors. First, almost all patients were at risk of PUs, probably because they were immobile stroke patients. Second, even though nutrition support and repositioning were the most fre-

quent preventive measures taken, the application of other preventive measures was less frequent (e.g. skin moisturizing, pressure redistributing mattress, floating heels). Also, outdated preventive measures (e.g. massage). In addition, there was a lack of structural quality indicators such as the availability of guidelines, refresher courses, information leaflets and dedicated wound care nurses. This might have had an association with the high prevalence rate that was found.

The PU prevalence found (28%) was actually either considerably lower or higher than the PU prevalence in other studies. When comparing the results with other studies using similar questionnaires,[28-30] our prevalence figure can be considered high. This may be explain by the different inclusion criteria for participants in the other studies (e.g. orthopaedic unit patients,[28] all medical, surgical, and intensive care patients,[29] and hospital and nursing home patients[30]). Conversely, when comparing our results with the prevalence rates from a Thai study with stroke patients,[31] our PU prevalence was lower.[31] However, the measurement questionnaire and inclusion criteria used were different.[31] Comparing our prevalence figure with other studies could therefore be biased, and finding similar study with an identical measurement procedure and participant inclusion criteria is problematic.

Furthermore, the results of our small study only gave a general indication because of the small number of participants, and couldnot be generalized as the PU prevalence figure for Indonesian stroke patients or Indonesian hospitals. Nevertheless, this study provided a first insight into the quality of PU care in an Indonesian hospital.

Quality of pressure ulcer care in adult patients in four Indonesian hospitals

The second study that evaluated PU prevalence and the quality of PU care in Indonesian hospitals was conducted in four hospitals with 66 wards, and 1132 patients (**Chapter 4**). This prevalence measurement was part of the feasibility study of the LPZ-International measurement. Similar to another LPZ study,[32] the patient response rate was high (95.7%). The data collectors were nurses who are familiar with patient conditions and the patients felt comfortable with them as the front-line health care professionals in hospitals. Furthermore, the number of missing data values was low because of the mandatory training about patient assessment using the LPZ-International questionnaire as standardized LPZ measurement procedure before performing the measurement.[10]

The results showed that the PU prevalence excluding category I was 6.5%, of which more than half developed within the hospitals themselves. The nosocomial PU prevalence rate excluding category I was rather low (3.6%), similar to the PU prevalence in Dutch hospitals (3.9%),[32] and slightly higher than the prevalence rates in Swiss (2.1%)[32]

and Austrian (0.5%)[32] hospitals. Although all hospitals centrally registered the number of nosocomial PU patients, they had limited other structural quality indicators such as availability of a guideline, informational leaflet/brochure, refresher course, PU/wound care nurses, and pressure redistributing products. The most frequently used PU preventive measures for at-risk PU patients (≤ 25%) were patient education, repositioning, and skin moisturizing. The application of PU redistributing mattresses and other devices such as floating heels were less frequent. Some outdated preventive measures were still applied. The latter findings are similar to the findings of the previous study (**Chapter 2**).[8] Use of outdated preventive measures has also been found in other countries.[33,34] The application of outdated preventive measures may be due to the fact that there was no PU guideline in the wards, or only an outdated one, and that there were no PU refresher courses (e.g. for dissemination of the guideline).

Multi-level and multi-variable analyses identified relevant patient characteristics, process and structural indicators, which are related with nosocomial PU prevalence. The patient characteristics related with nosocomial PU patients were age, number of admission days, care dependency scores, mobility, sensory perception, and presence of friction and shear problems. These results were in line with a systematic review on patient risk factors related to PU development and a number of other studies.[18,27,35] The most frequently performed preventive measures in this analysis were repositioning and adequate skin moisturizing. As stated in the literature[36,37] and in the EPUAP-NPUAP guideline,[3] repositioning is the most fundamental preventive measure for PUs. Although the availability of pressure redistributing mattresses was limited in these hospitals, these mattresses cannot replace repositioning, but only reduce the frequency of repositioning a patient per day.[38] Therefore, repositioning might be one of the reasons for the low PU rate in these four Indonesian hospitals.

Quality of pressure ulcer care for pressure ulcer patients in four Indonesian hospitals

All participating hospitals were general referral hospitals and therefore most patients had severe diseases and some also had one or more PUs. Most PU patients in this study (**Chapter 5**) suffered from diabetes, were bedridden, and had friction and shear problems. Almost half of the PU patients (44.0%) had at least one PU before admission to the hospital. This was higher than the percentage found in another study in Swedish hospitals (11.0%).[30] Moreover, half of the PUs (42.3%) involved severe wounds (PU categories III and IV). This was also higher than the percentages found in other studies.[30,39,40] This is a real burden for the four Indonesian hospitals. The health-care givers must manage both the patients' main diseases as well as their ulcers. The PU patients need both adequate preventive and treatment measures.

Concerning the preventive measures, half of the PU patients received repositioning and adequate skin moisturizing and one third received education related to PU preventive measures and nutrition support. As mentioned earlier, non-recommended measures (e.g. massage, water-filled gloves) were also applied. This indicates that the use of PU preventive measures is not yet optimal.

Almost all ulcers were dressed by applying saline-impregnated/anti-microbial gauze dressings. Other types of dressings such as hydrocolloid, hydrogel, honey dressings, and alginate dressings were not common (2.7%-10.9%). The EPUAP-NPUAP guideline state[3,20] that saline-impregnated/anti-microbial gauze dressings are outdated. Yet, they are present in the formulary for free care services in these Indonesian hospitals. They are cheap, but expensive in terms of nursing care time. Nurses must change the dressings frequently and keep the dressings moist, which increases the infection risk and is painful for the patient.[41] This indicates that the use of treatment measures is not optimal either.

Quality of pressure ulcer care in adult patients in Dutch hospitals

High PU prevalence rates in various Dutch health care settings used to be a national problem in the Netherlands.[42] The Dutch Health Care inspectorate therefore set PU prevalence as an external health-care quality indicator and has obliged hospitals to publish PU prevalence data since 2004.[1] In this study, structural quality indicators in hospitals and wards, patient characteristics, recommended PU preventive measures, and nosocomial PU prevalence excluding category I data were compared between two periods: 2001-2004 (PU as an internal health-care quality indicator) and 2005-2008 (PU as an external health-care quality indicator). The results of the study (**Chapter 2**)[43] showed a declining PU prevalence, less reduction in the number of at-risk PU patients, a slight improvement in the use of PU preventive measures, and a growing presence of structural quality indicators. The availability of information leaflets increased sixfold and the availability of prevention guidelines increased fivefold. The number of institutions and wards participating in the LPZ national measurement also increased enormously after 2004. It seems that the Dutch health care policy stimulated the willingness of institutions to measure their PU rate with a standardized measurement, and to fulfill the lack of structural quality indicators. These findings are similar to the effects of public performance indicators in studies conducted in the United States.[44,45] The public performance indicators there have been associated with a high response of institutional care providers to improve their quality of care, which is associated with an improvement in health care outcomes.[44,45]

Methodological considerations

Design

A multi-center and multi-level cross sectional design (prevalence study) was used in these studies (**chapters 2,4,5,6**) to explore comprehensive data on the quality of PU care (structure-process-outcome) as well as characteristics of PU patients and their ulcers in hospitals. This design was chosen because it is practical and relatively easy to apply in hospital settings with high workloads.[46] Nevertheless, this design is not as robust as a retrospective or prospective design (incidence study) on evaluating the cause of PUs and the effect of structure and process indicators on PU occurrence.[46]

Participants

Of the 15 hospitals invited, only four responded positively within the two month recruitment period (**chapters 4,5**). This low response rate was acceptable because it was the first time the hospitals had ever received a research proposal about their quality performance in a multi-center study. However, the patient response rate was high. Almost all patients at the four hospitals agreed to participate in the measurement.

Questionnaire

Several phases (forward translation, backward translation, evaluation between original English questionnaire and backward translation results, and clarity of Indonesian wording) have been done to reach equivalence between the English version and the Indonesian version of the LPZ questionnaires (**Chapter 3**).[8] After doing a forward-backward translation, which is the most recommended technique for translating questionnaires,[47] we also sent the questionnaire to 18 Indonesian experts for clarity of the Indonesian wording to make sure it was equivalent to the English version in terms of semantics and idiom.[48]

The psychometric evaluation involved content validity and the interrater reliability showed good results (**Chapter 3**).[11] Eighteen experienced Indonesian experts from various health care professions (which is more than the minimum number of required experts) were involved in providing their various perspectives.[49,50] The content validity is a common and basic validity check. It can evaluate whether the LPZ-International questionnaire reflects specific domains of the quality of PU care based on expert judgment on the relevance of items. However, in this study, we conducted no further validity evaluation (criterion or construct validity).[51]

Regarding the interrater reliability study, support from the hospital management team and nurses made random sampling possible. Moreover, almost all patients agreed to be reassessed by nurses, giving us more than the minimum required number of samples (≥ 120 patients for PU categorization; ≥ 60 patients for interrater reliability of the CDS and the Braden Scale).[52,53]

Measurement procedures

Indonesia is the first Asian country to adopt the LPZ-International questionnaire (**chapters 4,5**). The measurement procedure for assessing PU care at patient level can be considered feasible in this setting because of the high patient response rate and the limited number of missing values. In this study, the researcher trained the team of nurses in each hospital. It is good that each hospital received the same training from the same trainer, but this approach also meant that the four hospitals could not all be measured on the same day, which is not in line with the LPZ-International study protocol.[10]

Data analyses

The measurement in one hospital led to a small sample size (**Chapter 2**); we therefore described each quality of PU care indicator to provide a first insight into the quality of PU care in Indonesian hospitals. Numerous participating patients (1132 patients) and more participating wards (66 wards) were involved in our later studies (**chapters 4,5**). As a result we were able to do a more in-depth exploration of the data including an evaluation of the actual preventive measures based on specific patient characteristics such as repositioning on bedridden patients, and we were able to conduct multivariable and multi-level analyses. However the results of the studies could not be generalized to all Indonesian hospitals, since only four hospitals participated.

A secondary data analysis of the LPZ database from 2001 to 2008 was conducted in **Chapter 2**.[43] Analyzing the well-maintained data from the annual standardized Dutch LPZ measurement was efficient in terms of time and resources for the data collection process.[10] It meant we could evaluate the quality of PU care based on the extended Donabedian model in this thesis (**Chapter 1**). However the secondary data analysis had limitations related to the variables measured. Not all indicators of PU care quality were included in the analysis, for example, staff monitoring and utilization of the PU prevention/treatment guidelines were excluded, because neither variables were measured until after 2005 (**Chapter 6**).

Recommendations for clinical practices

Indonesian hospitals

High quality patient and/or family education is very important in Indonesian hospitals, since families are also involved in the patient's daily care.[54] In this study (**chapters 2,4,5**), although patient and/or family education was one of the most frequently used preventive measures for at-risk PU patients, we found that the availability of PU informational brochures was limited.[11] We therefore recommend that a well-prepared evidence-based information brochure should be developed for patients and families.

Moreover, non-recommended prevention measures and some outdated wound treatment were still being used in the participating hospitals (**chapters 2,4,5**). This might be due to the limited availability of protocols/guidelines, and wound care nurses or insufficient nurses with PU/wound training. Other studies have shown that inefficient preventive and treatment measures might be related to the lack of nurses' knowledge,[55,56] absent or outdated standardize protocols/guidelines.[57] Therefore providing both PU protocols/guidelines and tailor-made courses on PU prevention and treatment for nurses might improve the quality of PU care.

Indonesia has a warm and humid climate, which has a negative effect on skin moisture.[58] As a result, many patients suffered from both moisture lesions and PUs (**Chapter 5**). PU treatment as well as moisture lesion treatment are recommended. These findings could also be applied for other countries that have similar climates to Indonesia.

Dutch hospitals

Despite the declining nosocomial PU prevalence excluding category I in Dutch hospitals and the increasing availability of structural quality indicators at ward and institutional levels, we found a number of areas for possible improvements on the quality of preventive measures such us repositioning and education (**Chapter 6**).[43] Only a quarter of at-risk PU patients/families received information and instructions about PU preventive measures, although almost all hospitals had information brochures. One third of at-risk PU patients received adequate repositioning while almost all hospitals had updated PU guidelines.

Recommendations for further research

Indonesian hospitals

The Indonesian version of the LPZ questionnaire is available now. Since the EPUAP-NPUAP-PPPIA PU prevention and treatment guideline was recently published in 2014,[3] we recommend updating this questionnaire based on the recent guidelines. This questionnaire can be used to measure the quality of PU care at a national level, in other health care settings, and also in other Asian countries. We also recommend a further psychometric evaluation (construct validity and criterion validity) and feasibility study in other health care settings or other Asian countries.

Our studies have given a snap picture of the quality of PU care. It is unknown whether PUs are prevalent in other Indonesian hospitals or whether they are a national health care problem in Indonesian hospitals. Therefore, further and larger studies are highly recommended to confirm these results. Moreover, the measurement of other health care problems and their quality of care, such as nosocomial wound infections, malnutrition, and falls could be conducted together when measuring the quality of PU care. Linked with that measurement results, the priority of a national health care improvement program can be identified.

Our studies are preliminary PU studies in Indonesia, but they provide a comprehensive exploration of the quality of PU care in the participating hospitals and the main related issues. There are some possibilities for further PU research in Indonesian hospitals, for example, research on a). the development and effectiveness of PU education brochures for nationwide use, and b). the dissemination and evaluation of the implementation of an evidence-based guideline for PU prevention and treatment. Possibilities for further research concerning PU wound care could be a). a randomized controlled trial on the effectiveness and cost effectiveness between gauze impregnated dressings and other alternative dressings in Indonesian hospitals, b). exploratory research on PUs and moisture lesions in Indonesian hospitals, and c). exploratory research on PUs in Indonesian community settings.

Dutch hospitals

This study (**Chapter 6**)[43] was a comparison study on all quality of PU care components between the periods 2001-2004 (before publication of PU rates) and 2005-2008 (after publication PU rates). However, it did not show the correlation between changing health care policy and improvement in the quality of PU care. A further qualitative study might confirm that health care policy can stimulate both managers and other health care professionals in hospitals to pay more attention to PU care, fulfilling the

lack of structural quality indicators, and to measure their performance indicators with a standardized measurement.

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Summary

Hospital acquired (nosocomial) pressure ulcer (PU) prevalence is used as one of the nursing sensitive care indicators and hospital performance indicators. This requires a standardized tool for measuring nosocomial PU prevalence that yields good validity and reliability results. Numerous studies have reported PU rates internationally. However, comparing rates among studies is challenging because of the large variation in definitions, methods, questionnaires, and measurement procedures. Studies about the quality of PU care itself are limited and none have previously been conducted in Indonesia. The main aim of this thesis is to investigate how to measure and evaluate the quality of PU care in hospitals including nosocomial PU prevalence, with a specific focus on the Indonesian hospital sector.

Chapter 1, the general introduction to this thesis, presents a general literature review on PU occurrence rates, the theoretical framework used to measure and evaluate the quality of PU care, and information about Indonesian hospitals. The Donabedian model was applied as the theoretical framework (Chapter 1). According to Donabedian, quality of care can be measured and evaluated by three components: structure (structural quality indicators at ward and hospital level), process (PU prevention and treatment measures), and outcome indicators (nosocomial PU prevalence). Since patient characteristics are highly associated with PU outcome and process indicators, we added "patient characteristics" to the Donabedian model. This extended Donabedian model was applied to measure and evaluate the quality of PU care in hospitals in the chapters thereafter.

Chapters 2-5 address the measurement and evaluation of the quality of PU care in Indonesian hospitals, based on this extended Donabedian Model. **Chapter 6** describes the results of an evaluation study about the quality of PU care in Dutch hospitals, also using this extended Donabedian model. **Chapter 7** provides the general discussion.

Chapter 2 had two objectives. First, it reports the first attempt to measure the quality of PU care in an Indonesian hospital. This study provided evidence of some experience in using two standardized questionnaires (the European Pressure Ulcer Prevalence Survey Minimum Data Set and the Dutch National Prevalence Measurement of Care Problems, LPZ-International). Second, it provided a first insight into the quality of PU care in an Indonesian hospital involving 36 stroke patients. Ten patients had at least one PU. There were no PU category IV patients. Nosocomial PU prevalence excluding category I was high (11%). Almost all patients were at risk of PUs (Braden Scale score ≤ 20). Most patients received nutrition support (91%), repositioning (74%), and patient/family education (56%). Outdated preventive measures were used such as massage (5.8%) and old fashioned wound dressings. All category III PUs were dressed with anti-microbial impregnated gauzes. Very few structural quality indicators were met for PU care at ward and hospital level. Nevertheless, the hospital did register the number

of PU patients per month and conducted mono-disciplinary and multi-disciplinary PU care discussions. However, there was no PU committee, PU prevention or treatment guideline, central contact person for PU care, central management for PU prevention materials, refresher courses for health care givers, or education brochures for patients/family care givers.

It was not possible to generalize the results of this study **(Chapter 2)** for all Indonesian stroke patients or Indonesian hospitals due to the limited sample. We concluded with the recommendation to conduct a larger study using an Indonesian version of the LPZ questionnaire. The LPZ-International questionnaire was used in the next larger study because it is a comprehensive questionnaire to measure relevant aspects of the quality of PU care.

Chapter 3 describes the results of the psychometric evaluation of the LPZ-International questionnaire in Indonesian hospitals. The LPZ-International questionnaire was translated into the Indonesian language by means of a forward and backward translation. Subsequently, 18 Indonesian experts evaluated the content validity of the Indonesian version of the LPZ-International questionnaire for assessing the quality of PU care in Indonesian hospitals. Most items on the questionnaire (77.5%) had a good item content validity index (I-CVI). Several items were added such as patient characteristics (skin allergies, bedridden days, and previous PUs), preventive measures (oil to protect the skin, massage, donut-shaped devices, rings, and water-filled gloves), treatment measures (wound cleansing, debridement), and wound infections. The 2009 EPUAP-NPUAP guidelines were used as references for the revision of prevention and treatment measure items. All recommended and non-recommended preventive measures were included. The item “cushions in wheelchairs as preventive measures” was deleted because it had a low I-CVI.

Interrater reliability analyses was conducted for the PU categories, Braden Scale, and CDS in four hospitals involving 72 raters. All five PU categories showed a very good interrater reliability ($\kappa = 0.92$). The interrater reliability ICC (1,1) of the Braden Scale sum score was very good ($p_o = 90.0\%$). The interrater reliability ICC (1,1) of the CDS sum score was also very good (0.88). The psychometric evaluation showed that LPZ-International questionnaire was suitable for measuring the quality of PU care in Indonesian hospitals.

A feasibility study of the LPZ-International measurement procedure was conducted in four Indonesian hospitals **(Chapter 4).** Of the 15 invited hospitals, four responded positively within the two month recruitment period. The measurement procedure for assessing PU care at patient level can be considered feasible in this setting because of the high patient response rate (95.7%) and small number of missing values.

Chapter 4 describes the quality of PU care in four Indonesian hospitals. There were 1132 participating patients from 66 different wards. The nosocomial PU prevalence excluding category I was low (3.6%). The average age of patients was 48.7 years. The average number of admission days was 9.5 days. Most patients were at-risk PU patients and were care dependent.

Concerning preventive measures, 30% of the 771 at-risk PU patients (Braden Scale ≤ 20) received information on PU prevention. Almost half of the bedridden patients (46.3%) received repositioning from nurses and or family members. Skin moisturising was applied for 35.9 % of patients with friction and shear problems. One in four patients with a poor or probable inadequate nutrition status received nutrition support for preventing PUs. A small percentage of bedridden patients (11.2%) used a pressure redistribution mattress (mattress overlay, air fluidised/low air loss, alternating air, visco-elastic foam mattress). Floating heels for bedridden patients were less common (16.5%) although these are relatively easy to apply. The hospitals still used non-recommended preventive measures such as massage, donuts, and water-filled gloves.

More than half of the wards had an admission and discharge handover policy (72.7%), included PU care in their patient care files (62.1%), and held nursing care team discussions about PU care (51.5%). Almost half of the wards had implemented multidisciplinary discussions on PU care (48.5%), had PU risk assessment files (45.5%), and monitored the implementation of PU care (40.9%). The availability of a PU/wound care nurse (25.8%) and PU prevention products (25.8%) were limited. Only one ward had a patient information brochure about PU prevention. At institutional level, numbers of nosocomial PU patients were centrally registered in all hospitals. Only one of the four hospitals had a PU protocol/guideline. This hospital also regularly organised a course for nurses about PU prevention and treatment.

Patient characteristics, structure, and process indicators associated with the outcome indicators (nosocomial PU prevalence) were the inclusion of PU care activities in patient care files, repositioning, skin moisturizing, age, number of admission days, CDS scores, immobility, sensory perception limitation, moisture skin, and friction and shear problems.

In the next study **(Chapter 5),** we explored the characteristics of PU patients, their ulcers, and PU preventive and treatment measures. There were 91 PU patients with 142 ulcers. Over half (51 patients) developed the PU(s) while in these hospitals. The characteristics of PU patients were friction and shear problems, bedfast, diabetes, and longer bedridden days. Most ulcers (42.3%) were category III and IV. One third of the patients had both PUs and moisture lesions (36.3%) and suffered from pain (45.1%).

The most frequently used prevention measures were repositioning (61.5%), skin moisturizing (47.3%), patient and or family education (36.3%), and massage (35.2%). Most PU dressings involved saline-impregnated or anti-microbial gauzes.

In **Chapter 6,** the extended Donabedian model was used to evaluate the quality of PU care in Dutch general hospitals. In 2004, the Dutch Health Care inspectorate made it mandatory for hospitals to report their PU prevalence to the public. The nosocomial PU prevalence rates declined rapidly from 2004 to 2008. We compared the patient characteristics, process indicators, and structural indicators between two periods: before PU rates were published (2001-2004) and after (2005-2008). The results showed that there were slight differences in patient characteristics and preventive measures. However, the structural quality indicators/facilities related to PU care improved remarkably after 2004.

Chapter 7 involves the general discussion of the thesis results. The Indonesian version of the LPZ questionnaire is now available and the psychometric evaluation (content validity and interrater reliability) has been conducted with acceptable results. Concerning the evaluation of the quality of PU care in Indonesian hospitals, PUs were prevalent in this Indonesian hospitals but at a lower rate than may be expected. The quality of process and structural indicators of PU care can be further improved by providing:
- more and higher quality education for patients and/or families;
- PU prevention and treatment according to the current guidelines;
- tailor-made courses on PU prevention and treatment for care professionals.

Further larger studies are recommended to identify the necessity of a national improvement program for the quality of PU care.

Regarding the quality of PU care in Dutch hospitals, it was concluded that despite the declining nosocomial PU prevalence excluding category I in Dutch hospitals and the increasing availability of structural quality indicators at ward and institutional level, improvements can still be made to provide a higher quality of preventive measures such as repositioning and education.

Samenvatting (Summary in Dutch)

De prevalentie van decubitus in het ziekenhuis ontstaan (nosocomiale) wordt gebruikt als een van de indicatoren voor de kwaliteit van zorg in het ziekenhuis. Voor een valide meting van de nosocomiale decubitusprevalentie met betrouwbare uitkomsten, is een gestandaardiseerd instrument noodzakelijk. In een groot aantal onderzoeken worden internationale decubituspercentages vermeld. Vergelijking van percentages tussen onderzoeken is echter lastig vanwege de grote variatie in definities, methoden, vragenlijsten en meetprocedures. Onderzoek naar de kwaliteit van de decubituszorg zelf is nog beperkt en ontbreekt in Indonesië tot nu toe geheel. Het voornaamste doel van dit proefschrift is te onderzoeken hoe de kwaliteit van de decubituszorg in ziekenhuizen – inclusief de nosocomiale decubitusprevalentie – moet worden gemeten en beoordeeld, met specifieke aandacht voor de ziekenhuissector in Indonesië.

Hoofdstuk 1, de inleiding van dit proefschrift, geeft een algemeen literatuuroverzicht van het voorkomen van decubitus in ziekenhuizen en presenteert ook het theoretische raamwerk dat wordt gebruikt om de kwaliteit van de decubituszorg te meten en te beoordelen. Verder wordt informatie gegeven over de Indonesische ziekenhuissector. Als theoretisch raamwerk wordt het Donabedian-model toegepast (hoofdstuk 1). Volgens Donabedian kan zorgkwaliteit worden gemeten en beoordeeld aan de hand van drie componenten: structuur (indicatoren voor structurele kwaliteit op afdelings- en ziekenhuisniveau), proces (decubituspreventie en behandeling) en uitkomst (nosocomiale decubitusprevalentie).Aangezien patiëntkenmerken ook sterk samenhangen met de uitkomst- en procesindicatoren, hebben we 'patiëntkenmerken' aan het Donabedian-model toegevoegd. In de andere hoofdstukken is de kwaliteit van de decubituszorg in ziekenhuizen gemeten aan de hand van dit uitgebreide Donabedian-model.

Hoofdstuk 2–5 behandelen de meting en beoordeling van de kwaliteit van de decubituszorg in Indonesische ziekenhuizen op basis van het uitgebreide Donabedian-model, dat ook de basis is voor het gebruikte meetinstrument. **Hoofdstuk 6** beschrijft de uitkomsten van een evaluatieonderzoek naar de kwaliteit van de decubituszorg in Nederlandse ziekenhuizen en is eveneens gebaseerd op dit uitgebreide Donabedian-model. **Hoofdstuk 7** is gewijd aan de algemene discussie met betrekking tot de bevindingen in dit proefschrift.

Hoofdstuk 2 had twee doelstellingen. Ten eerste wordt een eerste poging beschreven om de kwaliteit van de decubituszorg in een Indonesisch ziekenhuis te meten. Dit onderzoek toont ook de ervaringen met betrekking tot de toepassing van twee gestandaardiseerde vragenlijsten (de European Pressure Ulcer Prevalence Survey Minimum Data Set en de vragenlijst van de Nederlandse Landelijke Prevalentiemeting Zorgproblemen, LPZ-International). Ten tweede biedt het hoofdstuk een eerste inzicht in de kwaliteit van de decubituszorg in een Indonesisch ziekenhuis (gespecialiseerd in beroertezorg) bij 36 beroertepatiënten. De nosocomiale decubitusprevalentie exclusief

categorie I was hoog (11%). Bijna alle patiënten hadden een decubitusrisico (Bradenscore ≤ 20). Tien patiënten hadden ten minste één decubitusplek. Er waren geen patiënten met decubitus categorie IV.De meeste patiënten kregen voedingsondersteuning (91%), wisselligging (74%) en voorlichting (56%).Er werden nog ouderwetse en achterhaalde preventieve maatregelen gebruikt, zoals massage (5,8%) en ouderwetse wondverbanden. Alle decubituswonden categorie III werden verbonden met een verband dat was geïmpregneerd met een antibacterieel middel. Op afdelings- en ziekenhuisniveau werd aan zeer weinig structurele kwaliteitsindicatoren voor decubituszorg voldaan. Niettemin registreerde het ziekenhuis wel het aantal decubituspatienten per maand en werden er mono- en multidisciplinaire besprekingen over de decubituszorg gevoerd. Een decubituscommissie, richtlijnen voor decubituspreventie en -behandeling, een centrale contactpersoon voor decubituszorg, een centrale aanpak voor materialen voor decubituspreventie, opfriscursussen voor zorgprofessionals of voorlichtingsbrochures voor patiënten/verzorgende familieleden ontbraken evenwel.

Vanwege de beperkte steekproef was het niet mogelijk de uitkomsten van dit onderzoek **(hoofdstuk 2)** te generaliseren voor alle Indonesische beroertepatiënten of alle Indonesische ziekenhuizen. De aanbeveling was om een groter onderzoek uit te voeren met gebruikmaking van een gevalideerde Indonesische versie van de LPZ-vragenlijst. De vragenlijst van LPZ-International werd in het volgende grotere onderzoek gebruikt omdat het een uitvoerige vragenlijst is waarmee relevante aspecten van de kwaliteit van de decubituszorg kunnen worden gemeten en die zich bewezen had in eerdere onderzoeken elders.

Hoofdstuk 3 beschrijft de uitkomsten van de psychometrische evaluatie van de vragenlijst van LPZ-International in Indonesische ziekenhuizen. De originele vragenlijst werd vertaald in het Indonesisch en weer terugvertaald. Vervolgens beoordeelden 18 Indonesische experts de inhoudsvaliditeit van de Indonesische versie van deze vragenlijst voor het beoordelen van de kwaliteit van de decubituszorg in Indonesische ziekenhuizen. De meeste items van de vragenlijst (77,5%) hadden een goede inhoudsvaliditeitsindex (I-CVI). Er werden nog verscheidene items toegevoegd, waaronder patiëntkenmerken (huidallergieën, dagen van bedlegerigheid en eerdere decubitus), preventieve maatregelen (olie om de huid te beschermen, massage, donutvormige hulpmiddelen, ringen en met water gevulde handschoenen), behandelmaatregelen (wondreiniging, debridement) en wondinfecties. De internationale EPUAP-NPUAP-decubitusrichtlijn uit 2009 werd gebruikt als referentie om de items voor preventie- en behandelmaatregelen te herzien. Alle aanbevolen en niet-aanbevolen preventieve maatregelen werden opgenomen. Het item ‘kussens in rolstoelen als preventieve maatregel’ werd verwijderd omdat dit een lage I-CVI had.

Er werden ook analyses voor interbeoordelaarsbetrouwbaarheid uitgevoerd voor de decubituscategorieën, de Bradenschaal en de zorgafhankelijkheidsschaal (CDS) in vier ziekenhuizen met 72 beoordelaars. Alle vijf decubituscategorieën lieten een zeer goede interbeoordelaarsbetrouwbaarheid zien (κ = 0,92). De ICC van interbeoordelaarsbetrouwbaarheid (1,1) van de Bradenschaal-somscore was zeer goed (po = 90,0%). De ICC van interbeoordelaarsbetrouwbaarheid (1,1) van de CDS-somscore was eveneens zeer goed (0,88). Uit de psychometrische evaluatie bleek dat de vragenlijst van LPZ-International geschikt was voor het meten van de kwaliteit van de decubituszorg in Indonesische ziekenhuizen.

In vier Indonesische ziekenhuizen werd een haalbaarheidsonderzoek van de meetprocedure van LPZ-International uitgevoerd **(hoofdstuk 4).** Van de 15 uitgenodigde ziekenhuizen reageerden er vier positief binnen de rekruteringsperiode van twee maanden. De meetprocedure voor de beoordeling van de decubituszorg op patiëntniveau kan in deze setting als haalbaar worden beschouwd vanwege het hoge responspercentage voor patiënten (95,7%) en het kleine aantal ontbrekende meetwaarden.

Hoofdstuk 4 beschrijft de kwaliteit van de decubituszorg in vier Indonesische ziekenhuizen. Er waren 1132 deelnemende patiënten van 66 verschillende verpleegafdelingen. De nosocomiale decubitusprevalentie exclusief categorie I was laag (3,6%). De gemiddelde leeftijd van de patiënten was 48,7 jaar. Het gemiddelde aantal opnamedagen bedroeg 9,5. De meeste patiënten hadden overigens een decubitusrisico en waren zorgafhankelijk.

Wat betreft de preventieve maatregelen kreeg 30% van de 771 patiënten met een decubitusrisico (Bradenschaal ≤ 20) informatie over decubituspreventie. Bijna de helft van de bedlegerige patiënten (46,3%) kreeg wisselligging door verpleegkundigen en/of familieleden. Zinvolle huidhydratatie werd toegepast bij 35,9% van de patiënten met wrijvings- en schuifproblemen. Eén op de vier patiënten met een slechte of waarschijnlijk ontoereikende voedingsstatus kreeg voedingsondersteuning ter voorkoming van decubitus. Een klein percentage van de bedlegerige patiënten (11,2%) lag op een wisseldrukmatras (oplegmatras, met lucht doorblazen/'low air loss'-matras, luchtwisselsysteem, traagschuimmatras). Vrij leggen van de hielen voor bedlegerige patiënten kwam minder vaak voor (16,5%), hoewel deze maatregel betrekkelijk gemakkelijk uit te voeren is. In de ziekenhuizen gebruikte men nog steeds niet-aanbevolen preventieve maatregelen zoals massage en zitringen.

Meer dan de helft van de afdelingen had een overdrachtsbeleid voor opname en ontslag (72,7%), nam decubituszorg op in de zorgdossiers van de patiënten (62,1%) en hield besprekingen binnen de verpleegteams over de decubituszorg (51,5%). Bijna de helft van de afdelingen hield ook multidisciplinaire besprekingen over de decubitus-

zorg (48,5%), bepaalde structureel het decubitusrisico (45,5%) en monitorde de implementatie van afgesproken decubituszorg (40,9%). De beschikbaarheid van een decubitus/wondzorgverpleegkundige (25,8%) en specifieke producten voor decubituspreventie was beperkt (25,8%). Slechts één afdeling had een informatiebrochure over decubituspreventie voor de patiënten. Op instellingsniveau werd het aantal nosocomiale decubituspatiënten in alle ziekenhuizen centraal geregistreerd. Slechts een van de vier ziekenhuizen had een decubitusprotocol/richtlijn. Dit ziekenhuis organiseerde bovendien regelmatig cursussen over decubituspreventie en -behandeling voor verpleegkundigen.

Patiëntkenmerken en structuur- en procesindicatoren die evident aan de uitkomstindicator (nosocomiale decubitusprevalentie) waren gerelateerd, waren het opnemen van decubituszorgactiviteiten in de zorgdossiers van patiënten, wisselligging, huidhydratatie, leeftijd, het aantal opnamedagen, de CDS-score, immobiliteit, beperking van de sensorische perceptie, vochtige huid en wrijvings- en schuifproblemen.

In het onderzoek beschreven in **hoofdstuk 5** bestudeerden we de kenmerken van decubituspatiënten, hun decubituswonden en de genomen maatregelen voor decubituspreventie en -behandeling. Er waren 91 decubituspatiënten met 142 wonden. Meer dan de helft (51 patiënten) had de decubituswonden tijdens het verblijf in deze ziekenhuizen ontwikkeld. Bij de decubituspatiënten waren de volgende kenmerken opvallend: wrijvings- en schuifproblemen, bedlegerigheid en langere duur daarvan en diabetes. De meeste wonden (42,3%) vielen in categorie III en IV. Eenderde van de patiënten had zowel decubitus- als vochtlaesies (36,3%) en leed pijn (45,1%). De meest gebruikte preventiemaatregelen waren wisselligging (61,5%), huidhydratatie (47,3%), patiëntenvoorlichting (36,3%) en massage (35,2%). De meest gebruikte decubitusverbanden waren met een fysiologische zoutoplossing geïmpregneerde of antibacteriële verbandgazen.

In **hoofdstuk 6** is het uitgebreide Donabedian-model gebruikt om de kwaliteit van de decubituszorg in Nederlandse algemene ziekenhuizen te beoordelen. Sinds 2004 verplicht de Nederlandse Inspectie voor de Gezondheidszorg ziekenhuizen om hun cijfers van de decubitusprevalentie openbaar te maken, waarna de percentages voor nosocomiale decubitusprevalentie tussen 2004 en 2008 snel afnamen. We hebben de patiëntkenmerken, procesindicatoren en structurele indicatoren van twee periodes vergeleken: een periode voordat de decubituspercentages moesten worden gepubliceerd (2001–2004) en een periode erna (2005–2008). De resultaten laten zien dat er lichte verschillen waren in de patiëntkenmerken en het gebruik van preventieve maatregelen. De verbetering van de structurele kwaliteitsindicatoren met betrekking tot de decubituszorg was na 2004 echter opmerkelijk.

Hoofdstuk 7 bevat de algemene discussie van de bevindingen van dit proefschrift. De Indonesische versie van de LPZ-vragenlijst is nu algemeen beschikbaar en de psychometrische beoordeling (inhoudsvaliditeit en interbeoordelaarsbetrouwbaarheid) is uitgevoerd met aanvaardbare uitkomsten. Wat betreft de evaluatie van de kwaliteit van de decubituszorg in Indonesische ziekenhuizen, bleek dat decubitus in Indonesische ziekenhuizen zeker een relevant probleem is maar dat deze ook minder vaak voorkomt dan veelal wordt verondersteld voor zo'n (ontwikkelings)land.
De kwaliteit van de structurele en procesindicatoren voor decubituszorg kan op de volgende wijze worden verbeterd:
- het geven van meer en betere voorlichting aan patiënten en/of naasten;
- het uitvoeren van decubituspreventie en -behandeling overeenkomstig de huidige gangbare (internationale) richtlijnen;
- het aanbieden van speciaal afgestemde bijscholing op het gebied van decubituspreventie en -behandeling voor zorgprofessionals.
Verder wordt aanbevolen om nader en vooral groter opgezet onderzoek uit te voeren om na te gaan in hoeverre een nationaal verbeteringsprogramma voor de kwaliteit van de decubituszorg noodzakelijk is.

Ten aanzien van de kwaliteit van de decubituszorg in Nederlandse ziekenhuizen werd geconcludeerd dat ondanks de dalende nosocomiale decubitusprevalentie exclusief categorie I in Nederlandse ziekenhuizen en de toenemende beschikbaarheid van structurele kwaliteitsindicatoren op afdelings- en instellingsniveau, er nog steeds verbeteringen mogelijk zijn om te komen tot preventie van nog hogere kwaliteit, zoals nog meer aandacht voor wisselligging en preventieve voorlichting.

Kesimpulan (Summary in Indonesia)

Prevalensi ulkus dekubitus (UD) yang didapat di rumah sakit atau prevalensi nosokomial UD digunakan sebagai salah satu indikator pelayanan keperawatan (*nursing sensitive care*) dan indikator kualitas pelayanan rumah sakit. Untuk itu, diperlukan pengkajian prevalensi nosokomial UD yang baku dengan hasil validitas dan reliabilitas yang baik. Banyak penelitian dari berbagai negara melaporkan angka kejadian UD. Namun angka-angka kejadian tersebut sangat sulit untuk dibandingkan karena adanya perbedaan definisi, metode, kuesioner dan prosedur pengukuran. Studi tentang prevalensi nosokomial UD dan evaluasi kualitas pelayanan kesehatan atau keperawatan terhadap UD di Indonesia belum banyak dilakukan. Tujuan utama disertasi ini adalah mengkaji dan melakukan evaluasi kualitas pelayanan keperawatan terhadap UD, termasuk angka prevalensi nosokomial UD di rumah sakit di Indonesia.

Bab 1 adalah pendahuluan dan latar belakang penulisan disertasi. Bab ini berisi tentang tinjauan pustaka terhadap angka kejadian UD, kerangka teori untuk mengkaji dan mengevaluasi kualitas pelayanan keperawatan terhadap UD, dan informasi tentang rumah sakit di Indonesia. Model Donabedian dipakai sebagai kerangka teori (**Bab 1**). Menurut Donabedian, pelayanan kualitas keperawatan dapat dikaji dan dievaluasi dengan tiga komponen yaitu struktur (indikator kualitas struktural di ruang rawat dan di rumah sakit), proses (intervensi pencegahan dan perawatan UD), dan hasil (prevalensi nosokomial UD). Karena karakteristik pasien sangat berhubungan erat dengan hasil atau angka kejadian UD dan proses intervensi pencegahan dan perawatan UD yang dapat diberikan, kami menambahkan "karakteristik pasien" di dalam model Donabedian. Ekstensi model Donabedian ini diaplikasikan untuk mengkaji dan mengevaluasi kualitas pelayanan terhadap UD di rumah sakit di dalam bab-bab berikutnya.

Bab 2-5 memaparkan tentang pengkajian dan evaluasi kualitas pelayanan keperawatan terhadap UD di beberapa rumah sakit di Indonesia berdasarkan ekstensi model Donabedian. **Bab 6** mendeskripsikan hasil evaluasi terhadap kualitas pelayanan UD di rumah sakit di Belanda yang juga menggunakan ektensi model Donabedian ini. Terakhir, **Bab 7** adalah diskusi umum.

Bab 2 mempunyai dua tujuan umum. Pertama melaporkan hasil penelitian pendahuluan dalam upaya mengkaji kualitas pelayanan keperawatan terhadap UD di salah satu rumah sakit di Indonesia. Penelitian ini merupakan salah satu penelitian ilmiah tentang pengalaman memakai dan membandingkan penggunaan dua kuesioner yang baku (*the European Pressure Ulcer Prevalence Survey Minimum Data Set* dan *the Dutch National Prevalence Measurement of Care Problems, LPZ-International*). Kedua, penelitian ini memberikan gambaran awal tentang kualitas pelayanan keperawatan terhadap UD di satu rumah sakit di Indonesia yang melibatkan 36 pasien stroke. Sepuluh pasien menderita sedikitnya satu luka UD. Tidak ada pasien yang menderita UD kategori IV. Prevalensi nosokomial UD tidak termasuk kategori I adalah tinggi

(11%). Hal ini mungkin karena hampir semua pasien beresiko UD (skore skala Braden ≤ 20). Kebanyakan pasien menerima dukungan nutrisi (91%), direposisi (74%) dan menerima pendidikan kesehatan dari perawat (56%). Intervensi pencegahan yang tidak dianjurkan lagi juga diterapkan seperti pijat (5.8%) dan juga intervensi perawatan luka yang sudah ketinggalan jaman. Kategori III dirawat dengan kasa yang dilembabkan dengan larutan anti mikroba. Sangat sedikit indikator kualitas struktural yang dipenuhi di ruang rawat dan di rumah sakit. Namun, rumah sakit setiap bulannya melakukan pencatatan jumlah pasien yang menderita UD dan adanya diskusi yang melibatkan mono disiplin dan multi disiplin. Tetapi tidak ada tim/komite khusus UD, protokol tentang pencegahan dan perawatan UD, staff yang dihubungi untuk perawatan UD, pelatihan tentang UD untuk para tenaga kesehatan, dan brosur pendidikan kesehatan tentang pencegahan dan perawatan UD untuk pasien dan keluarga pasien.

Hasil penelitian ini **(Bab 2)** tidak bisa digeneralisasikan untuk semua pasien stroke di Indonesia atau untuk semua pasien di rumah sakit di Indonesia karena sedikitnya sampel penelitian. Kami merekomendasikan untuk melakukan penelitian yang lebih besar dengan menggunakan kuesioner LPZ-Internasional yang telah diterjemahkan ke dalam Bahasa Indonesia. Kuesioner ini sangat komprehensif dalam mengukur banyak aspek yang relevan dengan kualitas pelayan terhadap UD.

Bab 3 mendeskripsikan hasil evaluasi psikometrik kuesioner LPZ-Internasional di beberapa rumah sakit di Indonesia. Kuesioner LPZ-Internasional ini diterjemahkan kedalam bahasa Indonesia melalui metode terjemahan *forward* dan *backward.* Kemudian 18 profesional kesehatan di Indonesia mengevaluasi konten validitas kuesioner LPZ-Internasional versi Bahasa Indonesia untuk mengukur kualitas pelayanan keperawatan terhadap UD di berbagai rumah sakit di Indonesia. Sebagian besar pertanyaan kuesioner (77.5%) mempunyai item konten validitas (I-CVI) yang baik. Beberapa item ditambahkan seperti pada karakteristik pasien (alergi kulit, jumlah hari tirah baring atau *bedrest*, dan riwayat UD sebelumnya), intervensi pencegahan UD (minyak untuk melindungi kulit, pijatan, bulatan donut, ring, dan sarung tangan yang diisi air), intervensi perawatan (seperti pembersihan luka, debridemen luka), dan infeksi pada luka. Protokol EPUAP-NPUAP tahun 2009 yang digunakan sebagai sumber referensi untuk menambahkan pertanyaan tentang pencegahan dan perawatan UD di kuesioner. Semua tindakan yang direkomedasikan dan yang tidak direkomendasikan menurut protokol EPUAP-NPUAP dimasukkan ke dalam kuesioner. Pertanyaan tentang 'bantalan di kursi roda sebagai salah satu tindakan pencegahan UD' dihapus karena mempunyai nilai I-CVI yang rendah.

Analisis interrater reliabilitas dilakukan pada kategori UD, Skala Braden dan Skala CDS pada empat rumah sakit dengan melibatkan 72 penilai atau evaluator. Interrater relibilitas pada semua kategori UD adalah sangat bagus ($\kappa = 0.92$). Hasil interrater

reliabilitas ICC (1,1) jumlah total skore pada skala Braden sangat bagus (po = 90.0%). Hasil interrater reliabilitas ICC (1,1) total nilai pada skala CDS juga sangat baik (0.88). Evaluasi psikometrik menunjukkan bahwa kuesioner LPZ dapat dipakai untuk mengukur kualitas pelayanan UD di berbagai rumah sakit di Indonesia.

Penelitian tentang feasibilitas prosedur pengkajian LPZ-Internasional telah dilakukan di empat rumah sakit di Indonesia **(Bab 4).** Dari 15 rumah sakit yang diundang, hanya empat rumah sakit memberi respon positif dalam dua bulan masa pendaftaran. Akan tetapi keberhasilan prosedur pengkajian UD pada semua pasien sangat baik dan dapat diterapkan di rumah sakit dibuktikan dengan tingginya angka respon pasien yang bersedia menjadi partisipan penelitian (95.7%) dan data yang hilang (*missing value*) tidak terlalu banyak.

Bab 4 mendeskripsikan kualitas pelayanan keperawatan tentang UD di empat rumah sakit di Indonesia. Terdapat 1.132 pasien yang berpartisipasi dari 66 unit ruang rawat. Prevalensi nosokomial UD yang tidak termasuk kategori I adalah rendah (3.6%). Rata-rata umur pasien adalah 48,7 tahun. Rata-rata jumlah hari rawat inap adalah 9.5 hari. Sebagian besar pasien merupakan pasien yang berisiko menderita UD dan butuh bantuan dalam pemenuhan perawatan dasar.

Terkait dengan intervensi pencegahan UD, 30% dari 771 pasien yang beresiko UD (berdasarkan skala Braden ≤ 20) mendapat pendidikan kesehatan tentang pencegahan UD. Hampir setengah dari pasien yang tirah baring (46.3%) menerima reposisi dari para perawat dan anggota keluarga. Pelembab kulit dipakai oleh 35.9% pasien yang beresiko mengalami gesekan pada kulit (*friction and shear*). Satu dari empat pasien dengan status nutrisi tidak adekuat atau buruk menerima dukungan nutrisi untuk mencegah UD. Sedikit sekali jumlah pasien yang *bedrest* (11.2%) menggunakan kasur anti UD (*mattress overlay, air fluidised/low air loss, alternating air, visco-elastic foam mattress*). Mengangkat tumit atau memberi bantal di bawah betis (*floating heels*) untuk pasien yang hanya bisa terbaring ditempat tidur jarang dilakukan (16.5%) walaupun intervensi ini sangat mudah dilakukan. Beberapa rumah sakit masih menerapkan intervensi pencegahan UD yang sudah tidak direkomendasikan lagi seperti pijatan, donut, sarung tangan yang diisi air.

Lebih dari setengah ruang rawat yang mempunyai aturan dalam menerima, mengeluarkan dan memindahkan pasien UD (72.7%), melakukan dokumentasi intervensi pencegahan dan perawatan UD di berkas/rekam medik pasien (62.1%) dan melakukan diskusi tentang intervensi perawatan UD antar tenaga perawat. Hampir setengah dari unit ruang rawat mengimplementasikan diskusi multidisiplin tentang intervensi pencegahan dan perawatan UD (48.5%), mempunyai file khusus untuk mengkaji risiko UD (45.5%), dan melakukan pengawasan terhadap implementasi intervensi perawatan

UD yang diberikan (40.9%). Ketersediaan perawat ahli khusus luka atau UD (25.8%) dan alat/kasur anti UD (25.8%) sangat terbatas. Hanya satu ruang rawat yang mempunyai brosur pendidikan kesehatan tentang pencegahan UD. Pada tingkat institusi, jumlah pasien nosokomial UD dilaporkan terpusat di semua rumah sakit. Hanya satu dari empat rumah sakit yang mempunyai protokol pencegahan dan perawatan UD. Rumah sakit ini juga mengadakan pelatihan kepada para perawatnya tentang pencegahan dan perawatan UD.

Karakteristik pasien, struktur dan proses indikator yang berhubungan dengan indikator hasil (angka prevalensi nosokomial UD) adalah melakukan dokumentasi intervensi pencegahan dan perawatan UD di berkas pasien, reposisi, melembabkan kulit, umur, jumlah hari rawat, skore CDS, immobilitas, gangguan persepsi sensori, kelembaban kulit, dan kulit yang rentan tergesek (*friction and shear problem*).

Di bab berikutnya **(Bab 5),** kami mengeksplorasi karakteristik pasien UD, ulkus, dan juga intervensi pencegahan dan perawatan yang diberikan pada pasien UD. Terdapat 91 pasien dengan 142 ulkus. Hampir sebagian pasien (51 pasien) menderita UD selama berada di rumah sakit. Karakteristik pasien yang menderita UD adalah kulit beresiko tinggi untuk tergesek (*friction and shear*), tirah baring, diabetes, dan memiliki masa tirah baring di tempat tidur yang lama. Hampir kebanyakan ulkus (42.3%) adalah kategori III dan IV. Sepertiga dari pasien menderita UD dan *moisture lession* (36.3%). Pasien juga menderita nyeri (45.1%). Intervensi pencegahan yang paling banyak diberikan adalah reposisi (61.5%), pemberian pelembab kulit (47.3%), pendidikan kesehatan pada pasien dan atau keluarga (36.3%), dan pijatan kulit (35.2%). Kebanyakan balutan luka menggunakan kasa basah normal salin atau larutan anti mikroba.

Pada **Bab 6,** ekstensi model Donabedian ini digunakan untuk mengevaluasi kualitas pelayanan keperawatan terhadap UD di rumah sakit umum di Belanda. Pada tahun 2004, inspektorat pelayanan kesehatan Belanda (*the Dutch Health Care Inspectorate*) membuat peraturan agar setiap rumah sakit melaporkan prevalensi UD kepada publik. Prevalensi nosokomial UD menurun tajam mulai dari tahun 2004 sampai tahun 2008. Kami membandingkan karakteristik pasien, indikator proses dan indikator struktural antara dua periode yaitu sebelum angka UD dipublikasikan (2001-2004) dan sesudah dipublikasikan (2005-2008). Hasilnya menunjukkan bahwa ada sedikit perbedaan pada karakteristik pasien dan intervensi pencegahan. Namun ketersediaan indikator struktural atau fasilitas yang berhubungan dengan pelayanan keperawatan UD meningkat tajam setelah tahun 2004.

Bab 7 merupakan diskusi umum tentang hasil-hasil penelitian di dalam disertasi ini. Kuesioner LPZ sudah diterjemahkan dalam Bahasa Indonesia dan psikometrik

kuesioner (konten validitas dan interrater reliabilitas) sudah di evaluasi dengan hasil yang baik. Hasil evaluasi kualitas pelayanan terhadap UD di beberapa rumah sakit di Indonesia menunjukkan bahwa UD merupakan salah satu masalah di rumah sakit di Indonesia yang berpartisipasi dalam penelitian ini namun angkanya lebih rendah dari yang diperkirakan. Indikator kualitas proses dan struktural dapat ditingkatkan dengan:
- Lebih banyak dan lebih berkualitas pendidikan kesehatan pada pasien dan keluarga yang diberikan
- Intervensi pencegahan dan perawatan UD sesuai dengan protokol
- Pelatihan (*tailor made courses*) tentang pencegahan dan perawatan UD pada profesi kesehatan

Penelitian dalam lingkup yang lebih luas direkomendasikan untuk mengidentifikasi pentingnya program peningkatan kualitas pelayanan terhadap UD di level nasional.

Sehubungan dengan kualitas pelayanan keperawatan terhadap UD di rumah sakit di Belanda, walaupun disimpulkan bahwa adanya penurunan angka prevalensi nosokomial UD tidak termasuk kategori I di rumah sakit di Belanda dan terjadinya peningkatan ketersediaan indikator kualitas struktural di ruang rawat dan di level institusi, kualitas pelayanan masih dapat ditingkatkan dengan pada peningkatan kualitas intervensi pencegahan UD seperti reposisi dan pendidikan kesehatan.

Valorization

Introduction

Knowledge valorization refers to the "process of creating value from knowledge, by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes, and entrepreneurial activity" (National Valorization Committee 2011:8). This addendum chapter discusses the value of our study findings for daily practice in hospitals with regard to improving the quality of pressure ulcer (PU) care. The first section presents the relevance of PUs as a health care problem in hospitals and a short overview of our study results, including the innovative aspects of those results. The next section describes the target groups who will use or will be interested in our results. Next, we discuss the activities that have resulted from this study and that may still result from this study. Finally a schedule of implementation activities is proposed.

Relevance

Hospitalized patients, who have a poor general health status and are immobile, have a high risk of developing PUs.[1] Numerous studies have been published to raise awareness about PUs and their consequences. PUs create a high burden for patients and constitute an expensive health care problem. PUs lead to patients experiencing pain, having a low quality of life, requiring wound treatment and extra nursing care time, and needing to prolong their hospital stays. Moreover, PUs increase hospital costs and health care expenditure.[2-5] PU care comprises approximately 1% of the total Dutch health care budget,[6] 2.6% of the total National Health Service budget in the UK,[7] and is the most expensive health care problem in the US.[8]

Over the past three decades, various actions have been undertaken in the Netherlands to increase awareness about PUs, and improve the quality of PU care.[9] The first national guidelines on PU prevention and treatment were published in 1985 and have since regularly been updated. In 1995, a national steering committee on PUs was established to develop a national strategy to improve PU care. Since 1998, the prevalence, prevention, treatment, and structural indicators related to PU care have been measured each year by the Landelijke Prevalentiemeting Zorgproblemen (LPZ, later extended to LPZ-International), executed by Maastricht University. The first national PU measurement showed that the mean PU prevalence within all health care institutions was high (23.1%).[10] The PU prevalence excluding category I in Dutch general hospitals in 1998 was 11.9%. Over the following five years, the trend of PU prevalence remained steady.

Since 2004, the Dutch Health Care Inspectorate has acknowledged PU prevalence as one of the most relevant and important indicators of quality and has obliged health care institutions to publish their data about PU prevalence. The strongest downward PU prevalence trend was seen from 2004 (9.1%) to 2008 (5.5%). Our study **(Chapter 6)** found that structural quality indicators such as the availability of more PU redistributing devices, information leaflets, guidelines, and wound care nurses improved remarkably after 2004. Yet only a slight improvement was found on repositioning and patient education.

Even though hospitals in Indonesia have been recording the number of nosocomial PU patients every month since 2003, only a very few published studies were available about actual PU care. A study in 2003 reported that the incidence of PUs in an intensive care unit was very high (33.3%)[11] and a next study conducted in two intensive care units showed a comparable PU incidence (27% and 31.6%).[12] No other PU studies have been published since then.

A standardized measurement methodology and a validated uniform questionnaire are prerequisites for assessing the quality of PU care in Indonesian hospitals and comparing the results of that measurement with data from other countries **(Chapter 1).** Therefore the LPZ-International questionnaire was translated into the Indonesian language. Indonesian experts evaluated the content of the questionnaire to measure the quality of PU care in Indonesian hospitals. The reliability and validity of the questionnaire was tested with very good results **(Chapter 3).**

Our first actual study in Indonesia showed that the nosocomial PU prevalence excluding category I was high (11%) in stroke patients in one Indonesian specialized hospital **(Chapter 2).** However, in a subsequent study, the nosocomial PU prevalence (excluding category I) in adult patients of medical, surgical, and intensive care wards was low (3.6%) and comparable with the prevalence in Dutch hospitals **(Chapter 4 and 5).** Despite this low rate, PUs are a burden for patients and nurses as well as other caregivers. One third of the PU patients in our studies had both PUs and moisture lesions and half of the PU patients suffered from pain. Half of their ulcers were category III or IV. Almost half of the PUs had developed before the patients were admitted to the hospitals. **(Chapter 5).** This shows that good quality PU care can only be achieved if the care is executed throughout the total health care chain, from community care to hospital care.

Concerning the process and structural indicators of PU care, most Indonesian patients received repositioning, adequate skin moisturizing, and patient/family education. Nevertheless, outdated preventive measures were also still used, such as massage, donuts, and water-filled gloves, as were old-fashioned wound dressings. Very few structural

quality indicators were met for the PU care at ward and hospital level. Almost no PU prevention or treatment guidelines were available. Refresher courses for health caregivers education brochures for patients/family caregivers were seldom applied.

Although PU prevalence was low, our studies show that the quality of the structure and process of PU care was low and can be improved. The first step in this improvement process is raising awareness about this health care problem;[13] the next step is improving the quality of PU care itself. Since only five hospitals participated, a larger national study is recommended to confirm the necessity of a national improvement program for the quality of PU care.

Innovation and target groups

The participating Indonesian hospitals have been recording their numbers of PU patients since 2003, but until now no information was available about the process or structure of the PU care itself. Assessing these aspects of PU care is also important to provide cues for improvement for hospital managers. Furthermore, by using the LPZ measurement methodology, nurses can also get training in several aspects of PU care, such as assessing the PU risk with the Braden scale, applying the Care Dependency Scale, assessing PUs themselves based on the recent official PU categorization, and identifying the difference between PUs and moisture lesions. This is partly why the managers of the participating hospitals, the heads of nurses, and the nurses themselves were very enthusiastic and supported this measurement actively.

Hospital managers used the results of this study to investigate their performance with regard to PU care, and to identify how they can improve it. Furthermore, our studies showed the good validity, reliability, and feasibility of the standardized measurement (LPZ-international) instrument. This finding implicates that this measurement tool can be used to fulfill hospital national/international accreditation reports.

Due to the fact that PUs represent an expensive health care problem, the results of our studies are also interesting for governments, scientists and academic personnel, patients, and payers such as insurance companies. As mentioned before, the results of a uniform (country-wide) assessment of the quality of PU care can target care improvement programs on a local or national level with subsequent direct benefits for the patients.

Activities/products

The three most important results of our studies are 1) raises awareness about PUs; 2) explores and validates a standardized measurement for measuring the quality of PU care regularly, which in addition to prevalence figures also provides cues to improve the quality of PU care in Indonesian hospitals; and 3) offers options for training for data collectors.

In an academic setting, awareness has been and still can be created by publishing the study results in national and international journals and presenting the results at national and international conferences. A number of articles have already been published and we have given some presentations in Indonesia and other international congresses (including the annual European Pressure Ulcer Advisory Panel (EPUAP) conference and the International Society for Quality in Health Care (ISQUa) conference).

We gave a presentation in Indonesia at the national workshop on nursing care management, organized by the Ministry of Health. The aim was to raise awareness of the PU problem among hospital directors and heads of nursing from all Indonesian provinces, to stress the importance of using a standardized measurement for assessing PU prevalence and the quality of PU care, and finally to show how such a measurement can provide cues to improve PU care.[14]

The training of data collectors (a team of nurses) before such a measurement is a prerequisite of the LPZ-International measurement procedure. In this training, we also shared the “worldwide stop pressure ulcer” flyer and video to raise nursing awareness about the PU problem even more.

Furthermore after the actual measurement, the measurement results were reported to the heads of the nursing units and hospital managers. Some hospitals organized a meeting for all data collecting nurses, heads of nursing wards, heads of nursing units, and hospital managers. During this meeting, the researcher presented the measurement results, provided space for discussion, and gave tailored information about evidence-based PU preventive and treatment measures as well as additional suggestions for improving the quality of PU care. After this meeting, the participating hospitals planned their specific actions.

It is clear that this strategy can be used to approach the PU issue by hospitals all over the country and even by hospitals worldwide. Our advice is to take up this challenge in the near future.

Schedule and Implementation

Our studies suggest that the quality of PU care in Indonesia can be improved by providing and implementing an evidence-based national PU prevention/treatment guideline, offering tailor-made courses on PU prevention and treatment for the personnel in hospitals and by providing information brochures about PUs to patients and/or families **(Chapter 7).** Regarding Dutch hospitals, it is recommended to further improve the use of PU preventive measures, especially repositioning and education.

Recently, a widely updated version of the international NPUAP-EPUAP guideline on PU prevention and treatment has become available.[15] This guideline is in English and is freely accessible on the internet. We recommend this guideline is translated and adapted for use in both Indonesian and Dutch hospitals. This guideline should be implemented into daily practice by for instance using PU prevention programs/bundles. A prevention program such as the NO ULCERS bundle[16] (**N**utrition and fluid status, **O**bservation of Skin, **U**p and walking or turn and position, **L**ift (don't drag) skin, **C**lean skin and continence care, **E**levate heels, **R**isk assessment, and **S**upport surfaces for pressure redistribution) may be applied in both Indonesian and Dutch hospitals.

Concerning the LPZ measurement on a national level in Indonesia, we have written a Term of Reference for training and measuring with the title "The LPZ International Prevalence Measurement of Care Problems (LPZ-International) to measure quality of PU care in Indonesian hospitals". For the near future, we recommend inviting a larger number of Indonesian hospitals to participate in this measurement. It is therefore necessary to have the support of the Indonesian Ministry of Health. Finally, we have also written a training proposal with the title "Building an Indonesian Health Care Problem Database to Improve Nursing Quality of Care and Patient Safety Management". This training involves active participation of academicians and clinical practices. It will also enable the maintenance of good international collaboration between Indonesia and the Netherlands. This Tailor-Made Training program proposal will be submitted next year as an application for support of the Netherland Fellowship Programmes, NUFFIC.

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About the author

Yufitriana Amir was born on July 27, 1982 in Padang Panjang, West Sumatra, Indonesia. When she was a teenager, she decided nursing would be an honorable profession. Pursuing her dream, she enrolled as a nursing science bachelor's student at Andalas University from 2000 to 2004. After completing her Bachelor in nursing science, she continued her studies by doing a year of clinical nursing training at Andalas University, Indonesia. During her academic training, she developed her skills as a nursing educator, a nursing researcher, and a clinical nurse.

After graduation, she worked in a nursing academy (Akper Nabila) for six months, and then at a private university (Abdurrab University) for three months. She passed the national examination for Indonesian government employees in 2006 and was then appointed as a lecturer at the nursing institute at Riau University with three main tasks: education, research and community service.

She followed specialized training on neonatology nursing care and was appointed as a scientific member of staff at the child and maternity nursing care department. At that time, she also worked as the head of the nursing skills laboratory. She headed several academic activities and a conference organization committee, and was secretary of nursing organization PPNI Pekanbaru.

In 2008, she decided to develop her research skills abroad and followed a two-year Health Science Research Master program at Maastricht University with a scholarship grant from StuNed NESO Indonesia. She returned to Indonesia on August 2010 and continued her work as a lecturer at Riau University. At the end of 2011, she was appointed as an external PhD student at Maastricht University in the Netherlands with a scholarship grant from the Directorate General of Higher Education, Ministry of National Education, Indonesia. She worked as a PhD student with the LPZ-International research group, Health Services Research (HSR) Department from December 2011 until December 2015.

In addition to conducting her research, she also attended trainings and courses at Maastricht University, and was given the opportunity to do internships at the Institute of Nursing Science at the Medical University of Graz in Austria under the supervision of Professor Christa Lohrman (July – August 2014 and August – September 2015).

While working on her PhD, she became an active member of the European Pressure Ulcer Advisory Panel (EPUAP) and the International Society for Quality and Health Care (ISQUa). She was one of the developers of the "Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline" (Small Working Group of the prevalence and inci-

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She was involved in the conference organization committee for the 14th European Doctoral Conference in Nursing Science in 2014 in Maastricht. She is currently also a reviewer for a number of national Indonesian journals (*Jurnal Keperawatan Profesional Indonesia* since 2011, *Jurnal Makara Seri Kesehatan* since 2014, and Jurnal Luka since January 2015) and a reviewer for the International Journal for Quality in Health Care (since 2014).

Outside her academic life, she was a member of *IntegraCie* team at HSR department in 2013. She has been actively involved in organizing Indonesian festival, charity, and sport competition events within Indonesian student organization and Indonesian Embassy in the Netherlands since 2008.

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