Master's Thesis

A quality project:

Prevalence - Interventions - Prevalence

of pressure ulcers, eating difficulties and hospital hygiene

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This project is a thesis for the Degree of MSc in Health Sciences at the University of Akureyri

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| Prevalence–Interventions- Prevalence of pressure ulcers, eating difficulties and hospital hygiene | |
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| nis master's thesis is written in memory of Kerstin Ulander with great thanks. |
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Abstract

The subject of this paper can be categorised as a quality project, the aim of which was to improve quality of nursing and increase patient safety in three major fields of nursing; pressure ulcers, nutrition and hospital hygiene. The paper is based on collaboration between Akureyri Hospital and a research group at Kristianstad University College, Sweden. The data analysed consist of the results from six quality evaluations, which were carried out on the basis of previous evaluations which called for improvements. Improvements were implemented through an action plan for a set period of time and then the evaluations were repeated. A comparison was made with results from previous evaluations. The results will form the basis for further development.

The method used consists of frequency measurements (point prevalence studies) on a predetermined day, followed by an agreed intervention, and repeated prevalence measurement approximately one year later (P-I-P method).

The rise in prevalence of pressure ulcers between 2005 (n= 34) and 2007 (n=48) is attributable to the increase in proportion of grade 1 pressure ulcers. Total 98 (2005) patients and 110 (2007) patients were included. Pressure ulcers of grade 1 were 88% (n=30) in 2005 and 96% (n= 46) in 2007. Pressure ulcers of grade 3 or 4 were recorded neither in 2005 nor in 2007. Sacral pressure ulcers decreased from 18% (n=6) 2005 to 6% (n=3) in 2007. The routine use of Modified Norton Scale increased significantly (p < 0.000) from 2005 (0%) to 46% 2007 (n=51). There was a significant improvement in risk assessment and use of turning/moving schedules (p < 0.003).

The results of the malnutrition/eating difficulties study showed a significant increase (p < 0.001) in documenting BMI in the charts, from one patient in 2006 to 28 patients in 2007. In 2006, 85 patients took part and 92 patients in 2007. In total 63% (n= 60) of the patients in 2006 and 58% (n=53) in 2007 had various eating difficulties. Unintentional weight loss was present in 20% (n=19) in 2006 in respectively 13% (n= 12), in 2007 (p <0.041) of the patients in 2007. In total 27% (n= 24) versus 18% (n=16) of the patients showed risk of under nourishment and actions taken to meet the risk of under nourishment had increased from 34% in 2006 to 47% 2007 (ns). Serving of small portion sizes decreased from 35% to 16% in 2007 (p <0.003). Body mass index over \geq 25 was found in 52% (n= 49) 2006 and

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54% (n=50) 2007 of the patients. The largest improvement to increase nutritional actions was to shorten the night fast for all patients in 2007 compared to 2006.

Total number of staff observed in the studies of hospital hygiene and microbiology of wounds was 158 in 2006 and 142 in 2008 and ten wards participated in 2006 and 11 in 2008. The results from the studies showed that substantial improvements were achieved in using short-sleeved scrubs (not significant) and in methodology for the disinfection of hands and forearms before and after wound dressing. There was significant improvement between the years in not wearing rings, jewellery (p < 0.0010), wristwatches and bracelets (p < 0.0001), in hair-hygiene (p < 0.0013) and in the occasional use of gloves (p < 0.0001). No multi resistant Gram-negative bacteria, Meticillin resistant Staphylococcus aureus (MRSA) or Vancomycin Resistant Enterococci (VRE) were identified in 2006 or in 2008. Wounds were colonised with high numbers of micro organisms, a situation which did not change after cleansing.

It seems that the Prevalence-Intervention - Prevalence (PIP) method based on the PDSA-quality circle (Shewhard's cycle) is a optimal model for changes in nursing and optimisation of quality of care and patient safety including the role of leadership in nursing. This model can be denominated the P-I-P-Le method, where "Le" stands for leadership.

Key words: Prevalence, pressure ulcers, nutrition, hospital hygiene, quality in care, patient safety, leadership in nursing.

Útdráttur

Efni þessarar ritgerðar er hægt að skilgreina sem gæðaverkefni, en tilgangur þess var að auka gæði hjúkrunar og öryggi sjúklinga á þremur sviðum hjúkrunar; sviði þrýstingssára, sviði næringar og á sviði smitgátar á Sjúkrahúsinu á Akureyri. Ritgerðin byggir á samstarfi Sjúkrahússins á Akureyri og rannsóknarhóps við Háskólann í Kristianstad í Svíþjóð.

Greining gagna byggir á niðurstöðum úr sex gæðaúttektum að undangengum nauðsynlegum umbótum eftir fyrri gæðaúttektir. Umbæturnar voru innleiddar samkvæmt aðgerðaáætlun og eftir ákveðinn tíma voru gæðaúttektirnar endurteknar. Samanburður var síðan gerður við niðurstöður úr fyrri gæðaúttektum. Á niðurstöðunum verður byggð áframhaldandi þróun. Umbætur voru innleiddar eftir að þær höfðu verið samþykktar og mælingar gerðar um það bil ári seinna (P-I-P- aðferð).

Aukningin sem varð á fjölda þrýstingssára á milli mælinga 2005 (n=34) og 2007 (n=48) skýrist af aukningu á þrýstingssárum af stigi 1 á milli ára. Alls tóku þátt í úttektunum 98 sjúklingar 2005 og 110 sjúklingar 2007. Þrýstingssár af stigi 1 voru 88% (n=30) af þrýstingssárunum 2005 og 96% (n=46) af þrýstingssárum 2007. Þrýstingssár á stigi 3 og 4 greindust hvorki árið 2005 né árið 2007. Flest þrýstingssárin sem greind voru árið 2007 voru á fótunum (n=37) að mestu á tánum. Þrýstingssárum á spjaldhrygg fækkaði úr 18% (n=6) 2005 niður í 6% (n=3) árið 2007. Notkun á aðlöguðum Norton skala jókst marktækt frá engri notkun til 46% (n=51) notkunar árið 2007 (p < 0,000). Marktæk aukning varð á milli ára í gerð áhættumats og notkunar á snúnings- og hreyfiskemum fyrir sjúklinga (p < 0,003).

Niðurstöður rannsóknarinnar á vannæringu/vandamálum við að nærast sýndu marktæka aukningu á skráningu líkamsþyngdarstuðli (LÞS) sjúklinga frá einum sjúklingi árið 2006 í 28 sjúklinga 2007 (p < 0,001). Árið 2006 tóku 85 sjúklingar þátt en 92 árið 2007. Greind voru ýmiss vandamál við að nærast hjá 63% (n=60) þátttakenda í úttektinni 2006 og hjá 58% (n=53) árið 2007. Ómeðvitað þyngdartap greindist hjá 20% (n=19) þátttakenda árið 2006 á móti 13% (n= 12) þáttakenda 2007 (p < 0,041). Tuttugu og fjórir (27%) sjúklinganna á móti sextán 2007 (18%) sýndu einkenni vannæringar og aðgerðum til að reyna að ráða bót á henni fjölgaði úr 34% árið 2006 í 47% árið 2007 (ekki marktækt).

Litlum matarskömmtum fækkaði úr 35% í 16% árið 2007 (p < 0,003). Árið 2006 var 52% (n=50) sjúklinga sem tóku þátt með líkamsþyndarstuðul yfir viðmið og 54% (n=50) sjúklinga sem tóku þátt árið 2007. Mestu umbæturnar á milli úttektanna á næringu og næringarvandamálum voru að stytta næturföstu allra sjúklinga árið 2007 samanborið við árið 2006.

Fjöldi starfsmanna sem skoðaður var í úttektunum á hreinlæti á sjúkrahúsinu og á vexti örvera í sárum voru 158 árið 2006 og 142 árið 2008 og tíu sjúkradeildir tóku þátt 2006 og ellefu árið 2008. Niðurstöður úr rannsóknunum (úttektunum) sýndu haldgóðar umbætur á milli úttekta í notkun á starfsmannafötum með stuttum ermum (ekki marktækar) og smáumbætur í sótthreinsun handa og handleggja fyrir og eftir sáraskiptingar. Það reyndust marktækar umbætur á milli ára í að bera ekki hringi og skartgripi (p < 0,0010), arbandsúr og armbönd við vinnu (p < 0.0001), og hvað varðar að taka saman sítt hár (p < 0,0013). Marktækur munur reyndist líka í tilfallandi notkun handska (p < 0,0001). Engar Gramneikvæðar bakteríur, Meticillin ónæmir Staphylococcus aureus (MÓSA) eða Vancomycin ónæmir Enterococcar (VRE) ræktuðust úr sárum árið 2006 né árið 2008. Í sárum var mikill fjöldi af örverum sem breyttist ekki eftir hreinsun sáranna.

Það virðist sem að aðferðin tíðnimælingar-umbætur-tíðnimælingar framkvæmd samkvæmt PDSA gæðahringnum (Shewhards-hringur) ásamt leiðtogamennsku í hjúkrun nýtist til að bæta gæði í hjúkrun og þá um leið öryggi sjúklinga. Hægt er að kalla aðferðina tíðnimælingar-umbætur-tíðnimælingar-leiðtogamennska: PIP-Le aðferðina þar sem Le stendur fyrir leiðtogamennsku.

Lykilorð: Tíðnimælingar, þrýstingssár, næring/næringarvandamál, smitgát á sjúkrahúsum, gæði í hjúkrun, öryggi sjúklinga, leiðtogamennska í hjúkrun.

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I Introduction

This report towards a master's degree in health sciences at the University of Akureyri is based on the results from six quality evaluations carried out within three of the largest fields of nursing: pressure ulcers, nourishment and hygiene in hospitals. The present thesis is based on research cooperation between Akureyri Hospital (Ólína Torfadóttir) and a research group in Kristianstad, Sweden (Christina Lindholm and Kerstin Ulander). The project has lasted from the end of 2005 to the beginning of 2009. The aim of which was to improve quality of nursing and increase patient safety.

The introductory chapter treats the importance of the subject matter from the perspective of patient safety, quality management and the theoretical aspects which scientists believe to be important in the implementation of all kinds of regulations and standards which are used as intervention tools in health care. The purpose of the quality projects is described, the research questions presented and the practical value of the method explained. The context and limiting factors of the study are also mentioned and the introductory chapter ends with the structure of the research report.

Frame of the study

Complications to care, illness and treatment have long been a major concern for all hospitals. Different models for quality assurance and improvement have been developed. Some methods have been criticised, particularly by physicians, whereas nurses seem to have accepted these methods more easily, and felt that quality assurance has even strengthened their professional role (Erlingsdóttir, 1999). Positive results of measurement of quality indicators has also been believed to be instrumental in the competition for patients (Erlingsdóttir, 1999).

The debate about quality assurance and improvement has gradually been superseded by the phenomenon of patient safety. Patient safety is today regulated by the Health Director of Health in Iceland (Health Director of Health, Act no. 41/2007), and can be defined as "compliance to evidence-based guidelines regarding patient safety issues, measured with valid methodology." Lack of evidence-based guidelines for prevention of sequelae of care, illness and treatment, and difficulties in complying with existing guidelines are an obvious threat to optimal quality of care. The lack of structured methods to evaluate patients' susceptibility to complications as well as quality of care provided has also been an obstacle to demonstrating the level of care quality and patient safety in hospitals.

In Iceland, health care authorities, and in particular health care institutions, have become aware of the importance of improvements of care to guarantee patient safety. One way which has been recommended to decrease complications to care has been the introduction of electronic quality manuals and quality systems which contain clinical instructions and operational procedures for treatment and which allow for active registration of deviations.

The Ministry of Health has run a special quality plan since 1999, and the Ministry has published an official quality policy for the period until 2010. This quality plan deals, among other things, with patient safety as a cornerstone of the quality of the services provided and mentions that the World Health Organisation (WHO) has, in its policy on safety issues in health care, emphasised the importance of hygiene in health care institutions. As part of this emphasis, the Minister for Health signed, at the beginning of 2007, an agreement on Iceland's participation in an international project called *Clean Care is Safe Care*. The project is managed by the World Alliance for Patient Safety, an organisation under the auspices of the World Health Organisation. Of particular interest for the design of the present studies is that this agreement stresses e.g. that "management staff should encourage and support key staff members in leading the way in implementing methods to prevent infections originating in health care services" (Ministry of Health and Social Safety, 2007, Website).

Against the background of the trend towards increasing numbers of lawsuits against hospitals, the identification of risk factors for complications is a major challenge to all hospitals.

As has been mentioned, there is now a focus on quality and patient safety. These concepts are strongly connected and it is the duty of health care staff to provide health care services which meet patients' expectations in terms of quality, and to ensure that the services also meet the safety requirements stipulated by laws pertaining to health care services and patient rights, and by ethical codes of health care professions. It is the role of the Icelandic Directorate of Health to reinforce the quality and the safety of the services provided and to monitor these services. The Directorate meets these requirements e.g. by issuing requests, standards and instructions, and by monitoring quality.

The Directorate is currently working out a quality strategy in cooperation with the Ministry of Health. As regards patient safety the Directorate has established a committee on patient safety, management of data bases and case registration and reactions in health care services. According to

the Health Director of Health Act no. 41/2007, § 9, healthcare facilities and other parties who provide health services shall maintain a register of unforeseen incidents, for the purpose of finding explanations for them and seeking ways of ensuring that they do not recur. (Health Director of Health, 2007). Keeping records of unforeseen incidents as pressure ulcers, nutrition and hospital hygiene is one method of monitoring quality and safety in health services. Such cases call for actions which prevent them from recurring, and thus a certain level of quality and safety should be guaranteed. Monitoring quality in this way is an important part of the management of companies, regardless of whether they are private (health services) companies or public (health services) companies. This kind of quality management can be useful for managers as well as staff as a tool to ensure a certain level of quality and to improve their performance (Gunnarsdóttir and Ingason, 2007).

Context of the study

Akureyri Hospital is affiliated with the University of Akureyri and the University of Iceland. The hospital is the second-largest in Iceland, providing emergency as well as specialised health care for its local community (17,000 inhabitants), extended community (38,000 inhabitants) and, in special circumstances, the entire country (330,000 inhabitants).

The hospital comprises 32 organisational units. Some of these form the operational core, i.e. health treatment and nursing, while others provide support services.

The managerial structure of nursing.

The managerial structure is flat; two lines of management which means that all paths of commands and information are short. The hospital's chief executive, who is responsible directly to the Minister of Health, and three managers form the managerial (direction) board, while the next level consists of heads of departments.

The Director of Nursing is one of the three managers and the head of nursing, and is, together with the managerial board, responsible for running the hospital and adhering to the board's policy and decisions. The Director of Nursing is responsible for the running of nursing services in the hospital and for coordinating the work of executives within the department. He/she is also authorised to carry out operations within the field of nursing. Responsibility for nursing services includes education, research, quality management and development within nursing.

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Heads of nursing in the 12 departments providing nursing care are responsible to the Director of Nursing and they carry professional, managerial and financial responsibility for the nursing provided in each department. Together with head physicians they are, by law, responsible for the running of their departments and their professional emphasis.

Aims

The overall goal of the present series of quality studies was to improve standards of care at Akureyri Hospitalaccording to three identified quality indicators; pressure ulcers, malnutrition/eating difficulties, and hygienic standards and wound microbiology. These factors are closely interrelated and may indicate one level of care quality at the hospital. The quality evaluations were also carried out to examine the usefulness of repeated quality evaluation as a means of development within certain fields of nursing and to determine quality standards for these fields. (Prevalence-Intervention- Prevalence: PIP method). Furthermore the evaluations were used as a tool to reflect on the potential influence of leadership in nursing, responsibility and authorisation at the hospital management level on the method. Therefore this method can be abbreviated to PIPLE (Prevalence-Intervention-Prevalence-Leadership).

The **Aims** of the present quality projects were to compare prevalence before and after interventions at the Akureyri Hospital in the following five areas:

- Prevalence of pressure ulcers, severity and locations, risk assessment and prevention of pressure ulcers
- ii) Prevalence of malnutrition and eating difficulties
- iii) Availability of, and staff compliance with, general basic hygiene principles
- iv) Compliance with hygiene principles at wound dressing changes
- v) Microflora in wounds with a focus on prevalence of multi-resistant microorganisms and pre- and post-cleansing microflora

Rationale for the present studies

Figures on frequency of pressure ulcers were not available at Akureyri Hospital at the start of the study or risk assessment according to as modified Norton Scale. Since most pressure ulcers can be prevented if patients at risk are detected and adequate prevention is instituted, the rationale for the study also aimed at scrutinising whether structured risk assessment was performed, risk status of all patients documented, and preventive actions taken in cases of high pressure-ulcer risk.

Neither were figures on prevalence of malnutrition and eating difficulties available at Akureyri Hospital before the start of the study. It could be hypothesised that stringent documentation of individuals at potential risk for malnourishment and implementation of appropriate interventions could minimise risks of hospital-related malnutrition. No recent Icelandic data were found in the field of nutrition/prevalence of undernourishment, related to prevalence of undernourishment risk, or overweight and nutritional care intervention actions in hospitals.

The degree of compliance with guidelines for available basic hygiene guidelines at Akureyri Hospital was not fully known at the start of the study. No Icelandic data in these fields were found or available.

The hygienic standard of a hospital is one of the most important factors contributing to limiting the threat of infections as a complication to care. Guidelines and recommendations are available on national basis. However, it is well known that compliance with these recommendations varies from ward to ward (Ransjö, Edstedt and Greitz, 2006). Nor was the potential prevalence of resistant bacteria in wounds known at Akureyri Hospital. Neither was the care of these wounds, and the hygienic routines associated with dressing changes, fully known.

Research questions

Pressure ulcers.

How prevalent are pressure ulcers at Akureyri Hospital, and into what grades can they be classified?

Where are pressure ulcers located?

How commonly are risk assessments being performed and documented at Akureyri Hospital?

What proportion of patients have Norton scores ≤ 20 ?

Do patients with pressure ulcers have Norton score ≥ 21 ?

What is the mean Norton score for patients with pressure ulcers?

How frequently are prevention actions introduced and documented in bed, in chair/wheelchair at Akureyri Hospital?

Nutrition.

What was the point prevalence of under and over BMI among patients at the hospital?

Was BMI measured and documented in the patient's charts?

What was the point prevalence of unintended weight loss and of eating difficulties?

What proportion of patients showed a risk of undernourishment?

How frequent were the preventive actions taken at Akureyri Hospital, in total and in relation to patients with risk of undernourishment?

What were the differences in actions taken between the years studied?

Hygiene.

Are hygiene guidelines available at the ward at Akureyri Hospital?

How is compliance to these guidelines a) in general b) at wound dressing changes?

How prevalent are leg/foot and pressure ulcers and other wounds, and how are these wounds treated?

Can multi-resistant Gram-negative bacteria, methicillin resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci, (VRE) and other potentially pathogenic bacteria be identified in these wounds?

Is there a difference in microbiological quantity and quality before and after wound cleansing?

Limiting factors

The research methodology used can be regarded as limited, as it measures the frequency of pressure, malnutrition/eating difficulties, and hygienic standards and wound microbiology at a certain point before and after the implementation of intervention, but does not indicate the frequency over a longer period or explain the reason behind the incidence. Also can three fields of nursing; pressure ulcers, nutrition and hygiene in same master 's thesis have limiting influence on the thesis contents as the theoretical frame and discussion.

The time span of the study, which lasted five years, can also be regarded as a limiting factor, with regard to the practical value of the results.

Structure of the research report

Chapter I starts with a presentation of the project's importance from the perspective of patient safety. The context of the study is presented, and the managerial structure of nursing. Limiting factors are also mentioned and the introductory chapter ends with the report's structure. Chapter II deals with a theoretical review of the literature within the field, quality management and the importance of leadership and culture in the implementation of intervention. Definitions and previous research on pressure ulcers, nourishment-related problems and hygiene in hospitals are discussed, as well as the importance of these fields. The chapter ends with a summary. In chapter III the methodology used for collecting data in the prevalence studies is described. The validity and reliability of the registration protocols is also discussed. Interventions (quality standards) implemented between the quality assessments are presented. Last is a summary of the chapter.

Results from the six studies are presented in chapter IV, by using frequency tables and graphs which compare the situation before and after implementation of the respective interventions. In Chapter V the results, the methodology and the study's relevance for various parties concerned, and potential clinical implications and the potential role of transformational leadership are discussed. Chapter VI is a summary of the main results from the quality project, interventions implemented and the potential impact of this project for nursing practice at Akureyri Hospital as well as generally.

II Theoretical background

In this chapter the subject matter, importance of quality management, leadership and culture in implementation of interventions and guiedlines is discussed. Quality indicators are defined, together with a theoretical review of the literature within the field. In general, this means that previous research on pressure ulcers, nourishment-related problems and hygiene in hospitals is discussed, and the importance of these fields in relation to quality, safety, risk factors, mortality, quality of life, rationale for the studies and the financial costs of health institutions is examined. Last is a summary of the chapter.

The search for sources began in the end of 2005, i.e. when the quality assessments started, and lasted until the beginning of 2010. The following databases were searched: Medline (Ovid, PubMed), Cinahl (Ebsco), Scopus and MD Consult. Full-text articles in accessible journals were also found in e.g. Science Direct and Proquest. Other sources include books on quality and quality management, books on management and leadership as and other additional material from Kristianstad University. The library at Akureyri Hospital provided support in searching for sources and ordered necessary materials from other libraries within Iceland as well as abroad.

Quality management

Quality management can, as a scientific field, be traced back to the beginning of the 20th century, at the start of the industrial era. At that time Walter Sheward and his associates laid the statistically-based scientific foundations for quality management which made Sheward the father of this field. He developed a number of ideas for which W. Edwards Deming became known, including the quality cycle the "Sheward cycle" (Stauffer, 2003).

The eight main rules of quality management are: focus on the customer, leading the field, staff participation, process and system based approach, continuous improvement, fact-based decisions and the mutual benefit of all those involved (Gunnarsdóttir and Ingason, 2007).

According to Gunnarsdóttir and Ingason, (2007) several quality management systems have been designed initially for industry, including TQM (Total Quality Management), the EFQM (European Foundation Quality Management) model and ISO (International Standards Organisation) 9001:2000 which defines quality in the following way: "the extent to which a

set of characteristics meets demands". The use of quality management systems is to be recommended as they are an important tool in the management of a profit company, and a non-profit in terms of quality and safety.

The quality policy of Icelandic health authorities for the year 2010 emphasises Juran's and Gryna's quality trilogy, which refers to three key processes in quality management, i.e. planning for quality, managing quality and quality intervention (Juran and Gryna, 1993). One of the conditions for managing quality and quality intervention in health services is choosing quality indicators and criteria which meet scientific demands. Health authorities in Iceland as well as abroad have dealt with this task in the last few years (Ministry of Health: Stefnumörkun heilbrigðisyfirvalda í gæðamálum til ársins 2010).

The Icelandic Health Service Act (no. 40/2007) includes only a ministerial permission, rather than a requirement, to apply the means necessary to enforce the policy regarding the quality of the services provided. On the other hand, a requirement to provide high quality health services, on the basis of quality intervention and ensuring quality, was included in Swedish health legislation as long ago as 1997 (Erlingsdóttir, 1999).

Importance of leadership in implementation of interventions

According to Deming (1999), quality is determined by, and the responsibility of, company executives and cannot be transferred to others. In his book *Out of the Crisis*, Deming introduced 14 points of quality management; the fourteenth of these deals with how executives need to commit to intervention and its implementation. Support is not enough; action is needed. Such a transformation requires a certain managerial style and a visionary manager who understands the importance of the transformation for the company and its affiliates. He has to regard the transformation as his duty on both a personal and a professional level (Deming, 1999).

A distinction is made between, on the one hand, traditional management, which deals with planning, organisation, recruiting staff and supervision and, on the other, leadership. In recent years leadership has been defined in a number of ways. However, a common factor in the definitions is that leadership is a process which changes and affects a group of people so that they can reach a specific target. James MacGregor Burns (1978) presented a distinction between two types of leadership: transactional and transformational. According to Burns the

main characteristics of a transactional leadership style are conditional reward and corrections by the leader if he is not satisfied with his interaction with his employees. Transformational leadership, on the other hand, is characterised by a communicative process which includes transformation and is based on the leader's charisma and encouragement. The main characteristics of transformational leadership are: being a role-model for the staff, encouragement of a vision for the future, mental encouragement of creativity, personal support and counselling. On this basis the leader leads his team to an excellent performance with long-term goals in mind (Bass, 1995; Northouse, 2007).

Managers within nursing who intend to introduce changes that are meant to improve the quality and safety of the services provided need to pay special attention to the environment in which the nursing takes place. According to Marchionni and Ritchie (2008) two factors need to be kept specifically in mind when nursing intervention is implemented. On the one hand, the value of knowledge development needs to be a part of the departmental culture and, on the other, the management of the department needs to be characterised at least in part by transformational leadership. Some scientists who deal with the implementation of clinical guidelines and other intervention in nursing also believe that the characteristics of transformational leadership are an important, or even crucial, part of such changes and that they are suitable for nursing (Storey, Linden and Fisher, 2008; Wolf, Bouland and Aukerman, 1994).

It can be assumed that transformational leadership creates a certain corporate culture on the basis of the leader's personal characteristics; being a role model, shaping a future vision, showing respect, and being constructive and supportive. Research on leadership within companies and those companies' success has revealed a positive relationship between transformational leadership and the success of the organisational unit and a significant positive relationship between the leader's charisma and the relevant company's success. (Xenikou and Simosi, 2006). The underlying reason is the effect of leadership on the followers' success which in turn affects the entire unit, especially through the behaviour of the followers. (Walumbwa, Wang, Lawler and Shi, 2004).

Importance of culture in implementation of interventions

The concept of departmental/company culture is borrowed from anthropology and sociology and has become generally accepted as a means of examining human systems (Symphony Orechestra Institute). According to Schein (1997), who is among the leading ideologists, company culture is defined as a system of common beliefs among the personnel, which is based on the values and characteristics shared by this group. Company culture has also been defined as a type of behaviour which is valued and encouraged within the organisational unit (Ke and Wei, 2008).

The value of knowledge as a part of the culture of an organisational unit is, according to Marchionni and Ritchie (2008), important in the process of implementing change which leads to intervention. Wolf et al. (1994) believe that the ideal organisational unit in this context is a learning organisation; according to Senge (1996, page 36) this is an organisational unit "... that has an enhanced capacity to learn, adapt, and change. It's an organization in which learning processes are analyzed, monitored, developed, managed, and aligned with improvement and innovation goals ". Johnson (1993) agrees with this and proposes that the creation of knowledge consists of three different actions, thought, communication and cooperation, and that our learning capacity increases as we increase our skills in the above actions.

Departmental or company culture which includes the value of knowledge is certainly an important factor in all intervention and change, but how well such change is prepared and how well implementation and its follow-up is managed is no less important.

As regards the implementation of standards or clinical guidelines for patient treatment which are intended to enhance the quality and safety of the treatment, Grol (2001) and Grimshaw and Grol (2003) suggest that the implementation should be well prepared on the basis of a well-designed plan, which has preferably been pretested. The suggested change also needs to be realistic and interesting in relation to financial as well as other relevant premises. The authors furthermore stress the importance of defining indicators so that success can be measured and the progress of change can be controlled.

Again the implementation of guidelines is not always sufficient, as what suits one department may not suit another. The attitude towards change is a controlling factor, as is the level of success in changing staff behaviour towards, and way of thinking of, the changes in

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question. Furthermore the consent of the organisational unit needs to be obtained (Wallin, 2005).

Quality indicators

Pressure ulcers are one indicator of quality of care malnourishment and suboptimal hygienic routines are others.

Interrelated quality indicators in hospital care in the present study were decided to be:

- i) **Pressure ulcers**: prevalence, risk assessment and prevention
- ii) Eating difficulties and malnutrition among hospitalised patients
- iii) Prevalence of wounds, wound infections, resistant bacteria, management of wounds
- iv) General hygiene performance of the staff in the hospital and specific hygiene routines for changing wound dressings.

Pressure ulcers.

Definition: Pressure ulcers: A pressure ulcer is an area of localised damage to the skin and underlying tissue caused by pressure, shear, friction, and or a combination of these. (Working definition, European Pressure Ulcer Advisory Panel, (EPUAP) n.d-a). Classification of pressure ulcers:

- "Grade 1; non-blanchable erythema of intact skin. Discoloration of the skin, warmth oedema, induration or hardness may also be used as indicators, particularly on individuals with darker skin.
- Grade 2; partial thickness skin loss involving epidermis, dermis or both. The ulcer is superficial and presents clinically as an abrasion or blister.
- Grade 3: full thickness skin loss involving damage to, or necrosis of, subcutaneous tissue that may extend down to, but not through, underlying fascia.

Grade 4: extensive destruction, tissue necrosis, or damage to muscle, bone or structures with or without full thickness skin loss ".

(EPUAP, n.d.-a)

Frequency of pressure ulcers

The frequency of pressure ulcers can be measured as prevalence (number of pressure ulcers at a given point of time) or incidence (number of pressure ulcers which develop during a defined period of time) (Defloor et al. 2005a). In a Swedish prevalence study performed in one university hospital, one regional hospital and one nursing home, the prevalence of pressure ulcers was 23.9 %, 13% and 20% respectively (Gunningberg, 2004).

In a pan-European study carried out by the European Pressure Ulcer Advisory Panel (EPUAP) in 2001-2002 in five European countries – Belgium, Italy, Portugal, the United Kingdom, and Sweden – the prevalence of pressure ulcers varied between 8.3% (Italy) and 22.9% in Sweden (highest). It was also shown that 18.1% had grade 2 to 4 pressure ulcers, and if grade 1 ulcers were excluded the prevalence was 10.5%. Fewer than 10% of patients in need were considered to receive "fully adequate preventive care" in United Kingdom (Clark, Bours and de Fleur, 2002, page 56). Pressure ulcers are found to be more common among the elderly (Young, Nikolette, Mc Caul, Twigg and Morey, 2002), but are also present to a large extent among e.g. patients with spinal injury (Byrne and Salzberg, 1996) and in connection to surgery (Shoonhoven, Defloor, van der Tewel, Buskens and Grypdonck, 2002).

The prevalence of pressure ulcers has been reported to be greatest in hospitals (university and general hospitals) or 36.5%, institutions for the physically handicapped 34.8%, and nursing homes 22.4% (Bours, Halfens, Abuu-Saad and Grol, 2002). Prevalence in Iceland has been reported by Thoroddsen (1999) in her research on the prevalence of pressure ulcers in Icelandic hospitals (22 hospitals). The results showed that 57 patients were diagnosed with a total of 100 pressure ulcers which makes for a rate of 8.9%; 9% in hospitals with an intensive care unit and 8.8% in other hospitals. Pressure ulcers of grade 1 and 2 made up for 82% (82) of all pressure ulcers, while 17% were of grade 3 or 4. Eighty-five percent of the pressure ulcers were located below the waist.

In an unpublished Master's thesis (Sigurjónsdóttir, 2009) which dealt with the prevalence of pressure ulcers at the Landspítali (University Hospital in Reykjavík) and included 219 patients, the rate of pressure ulcers was 21.5% (n= 47). Thirty three (70%) of

the patients with pressure ulcers had ulcers of grade 1 and 2 while 30% (n=14) had ulcers of grade 3 or 4. The majority of the ulcers (n=66) were found on the sacrum, heels, tuberositas ischii and on elbows.

Risk factors

Main risk factors for development of pressure ulcers are: Poor mobility, limited sensory perception, factors that prevent individuals responding to the discomfort of prolonged pressure on the skin and soft tissues, poor nutrition, high age and incontinence. (EPUAP, n.d.-b; Gallagher et al. 2008; Lindholm, et al. 2008a).

Extrinsic and intrinsic factors affect the ability of skin and soft tissue to withstand pressure (Lindholm, et al. 2008a). The elderly (Barczak, Barnett, Childs and Bosley, 1997; Lindholm, Bergsten and Berglund, 1999; Lindholm et al., 2008a), people with spinal-cord injury (Byrne and Salzberg, 1996) and patients undergoing long surgical procedures (Schoonhoven et al. 2002) are at risk for developing pressure ulcers. Other risk factors such as dehydration (Lindholm et al., 2008a) and moist skin, in combination with pressure, shear and friction (Defloor et al., 2005a), are also reported to act as mediators for the development of such wounds.

Locations

Pressure ulcers are traditionally reported to occur most frequently in the sacral area and on the heels for bed-bound patients (Vanderwee, Clark, Dealey, Gunningberg and Defloor, 2007) and over the sitting bones in spinal-cord-injured and other wheelchair-bound patients. These locations as well as trochanters and malleoli have been reported to account for 95% of all pressure ulcers (Dealey, 1994).

Costs of care

A full-thickness peripheral tissue injury is a disaster, and a justifiable cause of litigation (Bliss and Simini, 1999), and is increasingly leading to lawsuits against the institutions where they have developed. Pressure ulcers are one of the top four expensive diseases, along with cancer and cardiovascular diseases and AIDS. Care of patients with pressure ulcers is high and has been reported to be the third largest expense for the health care system in the Netherlands after cardiovascular disease and cancer (Haalboom, 1998). Some studies estimate that the cost of treatment per ulcer ranges between \$20,000 and \$70,000 per wound (Ducker, 2002). In the UK, the cost of pressure ulcer care has been estimated to be 4% of total health care

expenditure in the 1999/2000 financial year; 90% of the cost is the cost in nurse time (Bennett, Dealey and Postnett, 2004). In the Netherlands the total cost of pressure ulcers has been estimated to be 1% of the health care budget (Severens, Habraken, Duivenvoorden and Fredriks, 2002).

In a Spanish study the cost of healing a pressure ulcer was reported to vary from 24 Euros (\$32.16, grade 1) to 6,802 Euros (\$9,115, grade 4) in hospitals. The total cost of pressure ulcer treatment is estimated to be 461 million Euros (\$618 million), 5% of annual health care costs in Spain. The highest cost of wound care is the nurses' time (89%), whereas equipment accounts for only 0.6% and dressings 1% (Soldeville, Torra, Posnett, Soriano, San Miguel and Santos, 2007).

It has also been demonstrated that the cost of care of 10 skin ulcers is equivalent to 9 pacemakers, 6 hip replacements, 5 knee replacements or 5 coronary bypass operations (MacLeod, A., 2007, October). Prevention is usually considered the most efficient method to tackle the problem (Bergström, 1997; Land, 1995; European Pressure Ulcer Advisory Panel n.d-b) and quality of nursing care is considered the key factor in dealing with prevention of pressure ulcers.

Risk assessment

The purpose of risk assessment is to identify those patients that require prevention and their specific risk factors. One recommendation for clinical practice is to perform a systematic risk assessment by means of a validated scale, such as the Braden scale (Bergström, Braden, Laguzza and Holman, 1987) or the Modified Norton Scale (Ek and Bjurulf, 1987). The Modified Norton Scale has been validated by Ek and Bjurluf (1987) in an ongoing projekt in long term care clinic and the purpose of the investigation was to analyse the interrater varibility in the scale and it has also been used in numerous studies in Sweden (Gunningberg, 2004; Lindholm et al., 2007a; Lindholm, Olsson, Ulander and Persson, 2003-2004; Lindholm, Westergren, Axelsson and Ulander 2007c). The Modified Norton Scale is easy to use, and the assessment takes a minimum of time to perform, but gives relevant information regarding the patient's risk for development of pressure ulcers. The cut-off score has been set to 20, which has been validated in several studies (Lindgren, Unosson, Krantz and Ek, 2002). In one systematic review done of Pancorbo-Hidalgo, Garcia Fernandez, Lopez-Medina and Alverz-Nieto, (2006) of risk assessment scales the Norton Scale has proved to have high specificity (61.8%) and

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sensitivity (46.8 %) but there was not evidence enough to conclude that risk assessment per se decreases prevalence of pressure ulcers.

However, it was shown that the Norton and Braden scales were more accurate than nurses' clinical judgement in predicting pressure ulcer risk. It has also been shown to be a tool for observation and to facilitate documentation, and the use of such scales is instrumental in raising the standard of care, since it can assist in optimisation of the prevention strategies for each individual patient (Pancorbo-Hidalgo et al., 2006).

Quality of life in patients with pressure ulcers "unheard-of suffering"

The concept of *quality* has been developed over time and several dictionary definitions are available. The definition: "Quality is customer satisfaction" has become widely recognised and "fitness for use" is another short definition (Juran and Gryna, 1993). The same can be said about the definition of the concept of "quality of life" (QOL); generally QOL is the end result of the individual's capacity to take part in and enjoy life. The concept "health related quality of life" (HRQOL) is a standard against which the success of health treatment can be measured. Most definitions of HRQOL are based on a definition presented by the WHO, according to which health is physical, mental and social well-being, rather than being entirely free of illnesses and infirmity (Bergland and Narum, 2007).

Infections, sepsis, pain (Reddy, Keast, Fowler and Sibbald, 2003) and decreased quality of life have been reported to complicate diagnosis of pressure ulcers (Franks, Winterberg and Moffat, 2002).

The human suffering arising from pressure ulcers is described as "unbearable", and includes pain, infection, malodour, and restrictions in life (Hopkins, Dealey, Bale, Defloor and Worboys, 2006, page 348). In their study, utilising qualitative methodology and analysis according to phenomenological/hermeneutical analysis, three main themes were identified:

- i) Pressure ulcers give endless pain.
- ii) Pressure ulcers give limitations in life.
- iii) Strategies had to be developed to cope with the pressure ulcer and to accept it.

The pain was reported to be constantly present, and caused "a grown man cry". The pain also prevented the patients from moving: "I don't dare move because everything then gets worse"

Mortality

Pressure ulcers are reported as a comorbidity in numerous cases of deaths, and bedbound patients with pressure ulcers are more likely (almost twice as likely) to die than those without pressure ulcers (Brem and Lyder, 2004). Pressure ulcers are associated with high risks of mortality, and in one study 35% of the patients with identified pressure ulcers were dead within 3 months (Lindholm et al., 1999; Lindholm et al., 2007a). The most common cause of death related to pressure ulcers is probably sepsis (Lindholm et al., 2007a).

Effects of interventions

The effects of interventions such as care programmes for pressure ulcer prevention show variable results. In a three-year follow up study from Canada, the implementation of a care programme was proved efficient in decreasing the incidence of pressure ulcers (Cole and Nesbitt, 2004). Feedback of results from point prevalence studies has also been demonstrated to reduce the prevalence of pressure ulcers (Lindholm et al., 2003-2004) in hospitals where strong central leadership was present. In that study a simple intervention of an afternoon education activity and distribution of "pressure ulcer cards" resulted in a significant decrease in prevalence of pressure ulcers (Lindholm et al., 2007a). In the hospital studied, regular measurements of pressure ulcers and improvements were rewarded by the management of the hospital. In another study, repeated education resulted in a decrease in incidence of pressure ulcers of 10-20% (Robinsson, Cloecker, Bush, Copas, Kearns, Kipp et al., 2003). In yet another paper (Thomas, 2003, page 545) however, the effect of such interventions was questioned, and the authors concluded that "no intervention strategy has hitherto been reported to lead to a reproducible reduction of pressure ulcer to zero".

Malnutrition/eating difficulties.

Definitions: If two or more of following criteria are present:

Unintentional weight loss (regardless of time and amount)

Eating difficulties (appetite, swallowing, lack of energy, motor disturbances)

Low Body Mass Index (BMI) with a risk if BMI < $20 \text{ kg/m}^2 \text{ </=}69 \text{ years or younger or } < 22 \text{ kg/m}^2 \text{ >/=}70 \text{ years or older}).$

(Samarbetsgruppen för nutritationens utveckling i Sverige, SNUS, 2004)

Balance in nutritional status is important for health and well-being. Aging may entail difficulties in eating, especially when a person falls ill (Tierney, 1996). Eating difficulties are common in hospitals; 80% of patients have one or more such difficulty (Westergren, Karlsson, Andersson, Ohlsson and Hallberg, 2001a). In a previous study, these difficulties have through factor analysis (FA) been shown to belong to three dimensions of eating (ingestion, deglutition and energy), comprising three items each (Westergren, Unosson, Ohlsson, Lorefält, and Hallberg, 2002a; Westergren, Lindholm, Mattsson and Ulander, 2009). The dimensions and items have been shown to predict outcome and interventions among patients with stroke (Westergren, Ohlsson and Hallberg, 2001b; Westergren et al., 2002a) and among patients within different rehabilitation settings (Westergren, Ohlsson and Hallberg, 2002b; Westergren, Lindholm, Axelsson and Ulander 2008).

It is important both to observe persons who receive feeding assistance and those who do not, since more than 75% of those not receiving assistance have one or more eating difficulties (Westergren et al., 2002a). Persons with eating difficulties tend not to actively attract the attention of staff to seek help, and some even try to conceal their difficulties, due to shame and a striving to maintain independence (Sidenvall, 1995; Jacobsson, 2000). This implies that structured observations are needed in order to detect eating difficulties.

In 520 rehabilitation patients with stroke, orthopaedic, heart and lung problems, as well as general geriatric rehabilitation, 82% had one or more eating difficulty and 36% needed assistance to eat. Forty-six percent were at risk for, or had already developed, undernourishment (Westergren et al., 2002a). Among stroke survivors (89), difficulties with deglutition were experienced by 35%, ingestion by 30% and with energy to eat by 17% half a year after discharge from hospital (Pajalic, Karlsson and Westergren, 2006). Thus eating difficulties are common within both acute and rehabilitation settings, as well as after discharge from hospital. Difficulties in eating often lead to a decrease in food intake and eventually to undernourishment (Westergren et al., 2002a; Westergren et al. 2008). Undernourishment increases the risk for complications such as infections, pressure ulcers and delayed wound healing, prolonged hospital stay and readmittance to hospital (Ek, Unosson, Larsson, Von Schenck and Bjurulf, 1991). However, too high an intake of food and energy leads to excess weight, especially in combination with a sedentary life-style. Being overweight may also lead to an increase in illness (Cornoni-Huntley et al., 1991). The consequences for the individual with an unbalanced nutritional status are often more suffering

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and higher costs of care. To identify eating problems and risk for malnutrition (undernourishment as well as excess weight) is therefore important for all staff (Ulander, 1997). In Swedish hospitals the mean prevalence of undernourishment was found to be around 31%, and in sheltered housing the mean prevalence of undernourishment is found to be around 32% (Elmståhl, 2001).

According to an Icelandic study by Thorsdóttir, Eriksen and Eysteinsdóttir (1991) using a nine-question screening process, 21% of 82 patients were at risk of undernourishment, and 30% had BMI below 20 kg/ m². Eighteen percent had unintentional weight loss of more than 5% of normal weights.

Eating difficulties are common in hospitals: 80% of patients have one or more. Eating difficulties are a predictor for undernourishment, need for assistance when eating, length of hospital stay and level of care after hospital stay as well as development of pressure ulcers (Ek et al.,1991; Tierney,1996: Westergren et al., 2001a) and susceptibility to infections (Ek, et al., 1991).

Compliance to hygienic guidelines, wound microbiology and potential presence of Methicillin- resistant Staphylococcus aureus (MRSA), Vancomycin-resistant enterococci VRE and Gram-negative bacteria in wounds.

Definitions: Basic hygiene standards include: Hand disinfection, hair, hand and nail hygiene, absence of rings and wrist-watches, short-sleeved scrubs, changed daily, and use of plastic aprons when working at the bedside for certain nursing actions.

Hospital hygiene/staff compliance with hygiene guidelines, presence of MRSA, VRE and multi-resistant Gram negative bacteria in wounds are important quality indicators.

The present situation of Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Europe is now such that e.g. 10-25 % of patients in Spain, and 25-50 % in the UK and most other European countries, are carrying the bakteria (Lindholm, 2007d). Iceland is, together with Sweden, Norway, the Netherlands and Denmark, at present in a more favourable position (<1% of *Staphylococcus aureus* strains are resistant to Methicillin), even if the threat is urgent (Smittskyddsinstitutet, Sweden, Website). Patients with chronic wounds, such as leg/foot ulcers and pressure ulcers, are often repeatedly treated with antibiotics and there is a

risk that some of these wounds may host bacteria that have developed antibiotic resistance (Wiström, Lindholm, Melhus, Lundgren and Hansson, 1999).

In a study from Uppsala (Tammelin, Lindholm and Hambreus, 1998), it has been reported that 60% of patients with chronic wounds had repeated treatments with antibiotics during the last six months. In a point-prevalence study at the Karolinska University Hospital (Lindholm, Andersson, Fossum and Jörbeck, 2005) two undiagnosed cases of MRSA in wounds were identified.

Strict compliance with hygienic rules and basic principles by staff is of the utmost importance to hinder the spread of MRSA and other resistant bacteria.

Lack of routines for optimal hygiene performance among staff can lead to spread of infection and cause major costs to the hospital as well as suffering, and sometimes even death, of patients (Lundholm, 2006). Care-related procedures require meticulous compliance with existing guidelines by staff. Costs of hospital-acquired infection (HAIs) are a problem in a number of countries as they significantly prolong the stay in hospital and increase costs of care (Esatoglu, Agirbas, Onder and Celik, 2006), and even risk of death (Lundholm, 2006).

Guidelines for hand hygiene are not available under national recommendations in Iceland, but the Directorate of Health has, on the other hand, issued guidelines regarding infection prevention measures. The routines followed in an information campaign in relation to the first examination were routines for hand hygiene and other basic infection preventive measures used at the Landspítali (University Hospital in Reykjavík). At present Akureyri Hospital follows routines regarding basic infection preventive measures and these routines can be found in the Hospital's on-line quality manual (www.fsa.is).

The present study was designed to measure availability of hygienic guidelines, compliance with these guidelines in general, and particularly in association with changing wound dressings, as well as microbiology and care of wounds, with a special focus on resistant microorganisms.

Summary

The chapter starts with the importance of quality management, leadership and culture in implementation of changes, interventions and guidelines as in the areas of pressure ulcers, malnutritation and hygiene. The frequency of pressure ulcers varies. Thus their frequency has been found to be 8.3% in Italy, while the corresponding figure in Sweden is 22.9%. It has been estimated that less than 10% of patients who need preventive treatment receive it, but pressure ulcers are most common in university and general hospitals. According to research, the main risk factors are decreased mobility and perception, malnutrition and incontinence. Ulcers located on the sacrum and heels are most common among patients confined to bed. It is important to identify patients who are likely to develop ulcers; research shows that such wounds diminish patients' quality of life and can even cause death. Pressure ulcers are costly, not only for patients but also for the health sector as a whole, and they have been identified as one the four most costly diseases within the health sector in the western world.

Patients' difficulties with feeding (nearly 80% of patients have been diagnosed in this way in previous research) can be an indicator of risk of malnutrition, development of pressure ulcers and receptiveness to infection. Therefore identifying malnutrition and difficulties with feeding amongst patients in health institutions is a preventive factor which can keep unnecessary side-effects of hospitalisation from occurring.

A detailed follow-up on regulations concerning prevention of infection hinders the spread of e.g. MRSA (Methicillin-Resistant *Staphylococcus Aures*); at present a large proportion of patients (10-50%) in several European countries carry this bacterium. By following basic rules of hygiene while treating patients, health professionals can prevent the spread of hospital acquired infections (HAIs) and thereby prevent patients from suffering or even dying. At the same time considerable amounts of money are saved.

III Methods and materials

The methodological chapter discusses the design of the assessments and why it was chosen. The assessment process is described and a graph, the progress of the six assessments and the implementation of intervention, is presented. The chapter also deals with the gathering of data, and a description is given of the subjects in the study as well as of those who carried it out. The measuring tool used is presented and it discussed. Interventions (quality standards) implemented between the quality assessments. The informative duties of those responsible for the research are also mentioned, together with the subjects' informed consent and the permission granted for the use of the results from the quality assessments. Finally, a summary of the chapter is given.

Study design and process

The studies design was quantitative, point-prevalence methodology with pre-test/ post-test design (or before-after design) and involves observations at two points, before and after implementation an intervention. The point-prevalence methodologi gives a picture of number of patients at a given point of time (prevalence) divided by total number of patients in the unit (Polit and Beck, 2006). Point-prevalence methodology was chosen, largely due to resources available and due to the attractive instruments available for such studies. The studies were three quality evaluations. Depending on the results of the primary study (baseline), an intervention was agreed and implemented, and the study was repeated approximately one year later:

- Study I, prevalence and prevention of pressure ulcers at Akureyri Hospital 2005 and 2007.
- Study II, prevalence and prevention of malnutrition/eating difficulties at Akureyri Hospital 2006 and 2007.
- iii. Study III, prevalence of hospital hygiene and microbiology of wounds in Akureyri Hospital 2006 and 2008.

The process of the projects follows and is based on "Shewhard's cycle" that emanated from Walter A. Sheward and W. Edwards Deming is considered by many to be the father of modern quality control (Stauffer, 2003). Deming modified the PDSA – quality circle to "The

The first of the f

Plan, Do, Study and Act Model. **Step 1: Plan** a change or a <u>test</u>, aimed at or <u>test</u> improvement. **Step 2: Do** – carry out the change <u>or the test</u>. <u>Obtain a baseline</u>. **Step 3: Study** the results. What did we learn? What went wrong? <u>Do we need improvements</u>? **Step 4: Act** – Adopt the change or <u>improvements</u> or abandon it or run through the cycle again.

The Sheward Cycle for Learning and Improvement

The P D S A Cycle

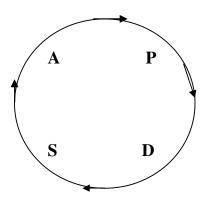


Figure 1. The process of the research projects.

A flow diagram for learning and for improvement of a product or process (From The New Economics, Deming, 1999).

Study I: Prevalence and prevention of pressure ulcers.

The studies were carried out on 19 October 2005 and 20 April 2007 between 07.00 and 21.00 at the Akureyri Hospital.

Participants

All inpatients aged ≥18 years on the wards (n=9) in surgery and orthopaedics, general medicin 1 general medicin 2, intensive care, rehabilitation younger, rehabilitation older departments and nursing home (Sel) participated. Obstetric and psychiatric wards were not included in the study. Eight patients did not participate in year 1 (2005) and eight in 2007. Total 98 patients participate 2005 and 110 in 2007.

Ethics

Current research regulations were observed. The study was supported of the management of the hospital. The Director of Medicine gave his permission for the use of the results from quality studies in a master's thesis and in scientific articles (Appendix 13). The ethical committee of Akureyri Hospital gave its permission for the same use (case 142/2009, Appendix 14) and this use of the results was notified to the Data Protection Authority, where it was accepted without comment (case S4643/2010, Appendix 15).

Four weeks before the studies, information was given to the management, and written information to the ethical committee, Director of Medicine and chief nurses and chief doctors of all departments of Akureyri Hospital. The patients were informed about the assessments and told that the results would be published in scientific journals and used as input in work on creating working instructions at the Akureyri Hospital.

Patient information was developed and given both verbally and in writing to patients, well before the actual study (Appendix 16). The patients were asked to give their verbal consent and guaranteed anonymity. No personal identification number or names were collected. The patients who gave their informed consent were included in the study.

Instruments

The instrument (Appendix 1) for the prevalence recordings has been developed and tested by a group of researchers in the European Pressure Ulcer Advisory Panel (EPUAP) (European Pressure Ulcer Prevalence Survey 2001-2002) and has been used extensively in studies throughout Europe. The technique with repeated point-prevalence studies with an intervention in between (Prevalence-Intervention-Prevalence (P-I-P) has also been used in Skåne (Lindholm et al. 2007a; Lindholm et al. 2007b) and Stockholm (Ebbeskog, Lindholm and Ohman 1996; Ebbeskog, Lindholm, Grauers and Ohman 1999).

The instruments for data collection was translated into Icelandic and back-translated into Swedish: A questionnaire for the registration of prevalence, risk assessment of patients and what prevention is in use. The first part of the protocol includes background data about the patients, age and sex, hight and weight. The second part includes risk assessment according to the Modified Northon Scale (Ek et al., 1989) (Appendix 2). The questionnaire was used in conjunction with the "pressure ulcer card" (Appendix 3) developed by Lindholm,

1996 and contribute to standardised registration and classification of pressure ulcers. On the reverse of the card the Modified Norton Scale is shown. It comprises:

Mental condition

Physical activity

Mobility

Intake of food

Intake of fluids

Incontinence

General condition.

Each of the seven variables has a rating of between 1 that indicates lack of function and 4 that indicates indicates full or almost full function. Every item is classified into 4 scores. A total sum of 28 means that the person can move about normally or has minor limitations and risk for pressure ulcers. A low total sum of the scores indicate risk for pressure ulcer development. It has been decided that

≤20 indicates risk of pressure ulcer development. (Ek and Bjurluf, 1987; Ek and al., 1989).

The third part of the instrument includes data classification of pressure ulcers. Pressure ulcers was according to European standards categorised into four grades:

- Grade 1: Non-blanchable erythema of intact skin. Discoloration of the skin, warmth, oedema, induration or hardness may also be used as indicators, particularly on individuals with darker skin.
- Grade 2: Partial thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion or blister.
- Grade 3: Full thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through underlying fascia.
- Grade 4: Extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures with or without full thickness skin loss.

(EPUAP, n.d.a).

Location of pressure ulcers was marked on front and back views on a body chart, part of the form (Appendix 1).

The fourth part of the instrument contains information about preventive actions recorded in four categories on the protocol;

- i) Pressure-relieving equipment in bed
- ii) Pressure-relieving equipment in chair
- iii) Repositioning scheme in bed
- iv) Repositioning scheme in chair

Prevalence was at last recorded as a percentage of patients in relation to the total number of patients at the ward/hospital.

Data collection

In the present study, prevalence of pressure ulcers was measured on 19 October 2005 and 20 April 2007 (after implementation of a 5-point programme, education of the staff and provision of pressure ulcer cards).

Two trained nurses per ward were allocated to perform the data collection during one pre-set study day each year. These nurses were carefully instructed, and forms were test-filled and questions answered by representatives from Kristianstad University and from the researchers Akureyri Hospital.

The patients were assessed according to the question form and the body was inspected for pressure ulcers, which, if observed were classified according to the European classification:

The skin of each patient was inspected according to a chart, illustrated by front and back views of a human figure in the form (Appendix 1). If a pressure ulcer was detected, it was classified according to the colour photos on the pressure ulcer card (Appendix 3). All patients were assessed for risk of developing pressure ulcers according to the Modified Norton Scale (Appendix 2). The total score was recorded. Preventive actions in bed and chair/wheelchair were recorded on the form.

During the day of the study, the researchers were available at the hospital for solving potential problems.

Data and statistical analysis

The data entry and analysis was conducted using a Statistical Product and Service Solutions Software for Windows version 15.0. The significance level was set to 5%. The prevalence was calculated as percentage of patients with pressure ulcers out of the total number of in- patients at the hospital on the same wards participating both years on study-days. Comparisons between implementation of the programme only included wards which participated in both years (2005 and 2007).

Study II, prevalence and prevention of malnutrition/eating difficulties:

The aim of this quality project was to study the point prevalence of eating difficulties for malnutrition as well as preventive actions taken for patients at risk of undernourishment at Akureyri Hospital. The frequency of risk of malnutrition can be measured either as prevalence (the number of patients at risk at a given time) or as incidence (the number of patients developing a risk of malnutrition during at defined period). In this study the point prevalence metod was used at given point in time.

Participants

All inpatients aged ≥18 years on the wards (n=7)on 14 March 2006 and 23 April 2007 between 07.00 and 21.00 at the Akureyri Hospital, in surgery and orthopaedics, general medicin 1, general medicin 2, rehabilitation younger, rehabilitation older departments and nursing home (Sel) participated. Obstetric, psychiatric and intensive care wards were not included in the study. In total 107 patients (2006) and 104 patients (2007) respectively were asked to participante and 95 and 92 patient took part (89% in 2006 and 88% in 2007). Twelve patients did not participate in year 1 (2006), and in year 2 (2007) 12 patients.

Ethics

Current research regulations were observed. The study was supported of the management of the hospital. The Director of Medicine gave his permission for the use of the results from quality studies in a master's thesis and in scientific articles (Appendix 13). The ethical committee of Akureyri Hospitalgave its permission for the same use (case 142/2009, Appendix 14) and this use of the results was notified to the Data Protection Authority, where it was accepted without comment (case S4643/2010, Appendix 15).

Four weeks before the studies, information was given to the management, and written information to the ethical committee, Director of Medicine and chief nurses and chief doctors of all departments of Akureyri Hospital. The patients were informed about the assessments and told that the results would be published in scientific journals and used as input in work on creating working instructions at the Akureyri Hospital.

Patient information was developed and given both verbally and in writing to patients, well before the actual study (Appendix 16). The patients were asked to give their verbal consent and guaranteed anonymity. No personal identification number or names were collected. The patients who gave their informed consent were included in the study.

Instrument

The instrument used for assessments of eating difficulties was: Minimal Eating Observation Form, version 1 (MEOF-I), it was initially developed in 1996 by Karin Axelsson, Department of Health Sciences, Luleå University of Technology. The observations form has further described and refined by Westergren et al. (2002a) and in Westergren, Lindholm, Mattsson and Ulander (2009) study of MEOF reliability. The researchers conclusion was that MEOF has satisfying validity and reliability and the erlier modell MEOF-I was slightly adjusted to MEOF-II. The instrument form contains three parts; first background data about the patient, age, sex and diagnos, second data about height and weight, intentional weight loss, nutrition and eating difficulties and the third part contains information about type and consistency of food and nutritional interventions and support.

The three components of eating in MEOF-I are: "Ingestion", which includes manipulation of food on the plate, transportation of food to the mouth and sitting position; "Deglutition", which includes opening and/or closing the mouth, manipulating food in the mouth (leakage, hoarding), and swallowing; "Energy", which includes the amount of food eaten, alertness and eating speed. A rate of *zero* indicates normal eating and *one* indicates eating difficulty (Westergren et al., 2002a; Westergren et al., 2009). Another two items graded on five-point

Trevarence of pressure areas, eating afficients and hospital hygiene

scales are included, appetite and chewing ability. Appetite is dichotomised as *zero* (strongly increased, increased, normal) or *one* (reduced, strongly reduced). Chewing ability is dichotomised as *zero* (having problems seldom or never) and *one* (having problems very often, quite often, now and then, occasionally). Nutritional interventions are registered, and coded as *zero*, not having such intervention or *one* having such interventions. (Appendix 4). The instrument for data collection was translated into Icelandic and back-translated into Swedish. Two items were added – *not allowed to eat* and *nauseated*.

Height and weight are measured using the standard equipment available to identify patient at risk. Moderate/high undernutrition risk is defined as the occurrence of at least two of the following:

Unintentional weight loss (regardless of time and amount of veight loss)

Eating difficulties (appetite, swallowing, loss of energy, moving disturbances etc)

Low Body Mass Index (BMI) below <20 kg/ m² if </=69 years or younger, <22 kg/ m² if >/=70 years or older) according to Swedish recommendations (SNUS; 2004).

Definitions of high BMI:

Overweight: 25-29 BMI if </=69 years or younger, 27-31 BMI if >/=70 years or older Obesity: 30-39 BMI if </=69 years or younger, 32-41 BMI if >/=70 years or older Severe obesity: BMI >40 if </=69 years or younger BMI >42 if >/=70 years or olde © Westergren, Lindholm, Axelsson, Ulander, 2008.

Prevalence is recorded as a percentage of patients in relation to the total number of patients at the ward/hospital.

Data collection

The nurses were carefully instructed, and forms were test-filled and questions were answered by representatives from Kristianstad University and by the researcher at Akureyri Hospital.

One registered nurse per ward was allocated to perform the data collection during one set day.

The studies was carried out on 14 March 2006 and 23 April 2007 after implementation of a 5-point programme (Appendix 5), education of the staff and BMI assessment tool. All inpatients on the wards between 07.00 and 21.00 at the Akureyri Hospital who had given consent were assessed according to Minimal Eating Observation Form version 1 (MEOF-I), for eating difficulties and risk for malnutrition. Their weight and height was measured. The patients were observed while eating and asked about different types of eating difficulties and unintentional weight loss. BMI recorded in the patients' charts was noted. Preventive nutritional actions were recorded. Internal loss of data was low

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) version 15.0 was used to analyse data. A Chi-Square test was used when data was at nominal-scale level to analyse statistical significant differences between the years studied. The significance level was set to 5%.

Study III, prevalence of hospital hygiene and microbiology of wounds:

The study was designed as a point-prevalence study and took place on one predetermined day, 1 November 2006, and was repeated on 7 April 2008 after implementation of interventions.

Participants

Staff were told that there would be a study regarding wounds and also general hygiene, without any details being mentioned. In 2006 a total of 158 staff were observed, and 142 in 2008. Ten wards participated in 2006 and eleven in 2008. Data on compliance can be obscured by staff efforts to comply, if they know that a study will take place on a particular day. For this reason the present study disguised the staff observations as part of the wound study, and staff information prior to the study focussed mostly on that part of the study.

Eleven patients with 20 wounds participated in 2006 and ten with 16 wounds in 2008.

Ethics

Current research regulations were observed. The study was supported of the management of the hospital. The Director of Medicine gave his permission for the use of the results from quality studies in a master's thesis and in scientific articles (Appendix 13). The ethical committee of Akureyri Hospital gave its permission for the same use (case 142/2009,

Appendix 14) and this use of the results was notified to the Data Protection Authority, where it was accepted without comment (case S4643/2010, Appendix 15).

Four weeks before the studies, information was given to the management, and written information to the ethical committee, Director of Medicine and chief nurses and chief doctors of all departments of Akureyri Hospital. The patients were informed about the assessments and told that the results would be published in scientific journals and used as input in work on creating working instructions at the Akureyri Hospital.

Patient information was developed and given both verbally and in writing to patients, well before the actual study (Appendix 16). The patients were asked to give their verbal consent and guaranteed anonymity. No personal identification number or names were collected. The patients who gave their informed consent were included in the study.

Instrument

An instrument for these studies, a series of forms (A-F) was developed and pretested in a major study in Sweden and proved sufficeently valid, even though a formal validation test was not undertaken. The forms, however, strictly adhered to the national Swedish guidelines for hygiene which have been developed by a national group of specialists/researchers and which are revised and updated when new literature is available (Ransjö et al., 2006). The forms were translated from Swedish into Icelandic and back- translated into Swedish. The forms are labelled A-F (Appendices 6-11)

- A- general hygiene routines of the ward
- B- observational scheme, general hygiene routines of staff
- C- observational scheme focused on hygiene routines at wound dressing change procedures
- D- Wound registration chart, pressure ulcers
- E- Wound registration chart, leg ulcers
- F- Wound registration chart, other wounds.

Forms D-F was previously used in three major population-based studies in Sweden (Lindholm et al., 1999; Lindholm et al., 2005; Lindholm, Westergren, Holmström, Axelsson and

Ulander, 2008b). They include information about patient's age, sex, type of wound(s), wound duration, size and location, pain, use of analgesics, wound dressings and use of antibiotics.

Wounds in the study were defined as; pressure ulcers grade 2-4 and leg/ foot ulcers, post-surgical wounds, abdominal wounds, traumatic wounds, burns and other wounds. All wounds which were present on the study day were included. Forms E-F was designed to record data on diagnosis and care of leg/foot ulcers, pressure ulcers and other wounds. All wounds were swabbed for bacterial growth before and after cleansing. The methodology for collecting data and swabs from wounds has previously been practised by Lindholm the first author in Uppsala University Hospital (Lindholm et al., 1999) and in Karolinska University Hospital, Solna (Lindholm et al., 2005).

Swabs for microbiological analysis were performed at the Akureyri Hospital microbiology laboratory, according to certified methodology.

Prevalence is recorded as a percentage of personal/patients in relation to the total number of personal/patients at the ward/hospital.

Data collection

The study took place 1 November 2006, and was repeated on 7 April 2008. The methodology needs careful information, preparation and education of the nurses collecting the data. One nurse per ward had responsibility for data collection. The nurses responsible for the data collection were carefully instructed, and forms were test-filled and questions answered by researchers from Kristianstad University and by the researchers at Akureyri Hospital. During the days of the studies, the representatives from Kristianstad and researcher were available for solving potential problems.

Data analysis

The data was organised by using Microsoft Office Excel 2007 and a t- test was used when analysing statistically significant differences between the years studied. The significance level was set to 5%.

Quality assurance series 2005 – 2008

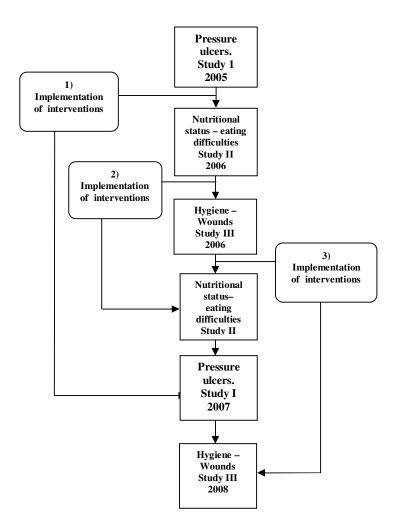


Figure 2. Flowchart; quality assurance series 2005 – 2008

- 1) 5-point prevention programme, Modified Norton Scale, risk assessment tool, education of staff, clinical guidelines.
- 2) 5- point programme for nutrition and eating, education of staff
- 3) 5- point programme poster signed by chief nurses and doctors: education of staff, clinical guidelines

Interventions between the quality assessments

Results from the first mesasurements were analysed, and thereafter presented for management of departments and staff. Every ward was given its own results, for reflection and discussions. Prevention actions were also discussed. In between the respective studies structured interventions was designed and agreed by the nurse managers, nurse specialist team and researchers. The project nurses; wound management nurse, nutrition nurse and hygiene nurse took care of eduction of the staff in assessments, prevention and 5-point programme in the fields of pressure ulcers, nutrition and hospital hygiene.

The researcher made the practical arrangements for, all interventions, such as translating and printing protocols, the pressure ulcer cards, and the risk assessment instrument.

Pressure ulcers.

Pressure ulcer cards for classification of pressure ulcers and Modified Norton Scale (risk assessment instrument) in Icelandic were provided to all staff (Appendix 3), developed by Lindholm (1996). Four colour photos of pressure ulcers, as well as anatomical illustrations of their depth and verbal descriptions of their severity, were displayed on one side of the card. Five-point quality improvement programme was introduced alongside with an education event. A mattress replacement programme was also implemented.

A wound management nurse was appointed, who received her wound education in Denmark, and her clinic was equipped with resources appropriate for modern wound management.

A 5-point programme for pressure ulcers

The programme (as follows) was printed and distributed to all wards: According to Christina Lindholm, 2006:

- All patients restricted to bed or wheelchair and patients aged 70 or above shall be assessed according to the Modified Norton Scale. Results to be documented.
- ii) Patient's skin should be examined and pressure ulcer evaluation made of all inpatients on the ward who are restricted to bed or a wheelchair. Results to be documented

Transfer interventions Trevalence of pressure areas, eating anneating and nospital hygiene

- iii) If patients are at risk of developing pressure ulcers pressure-relieving or -distributing mattresses/cushions should be used for chairs and beds, along with schemes for position changes, if the patients are at risk of developing pressure ulcers.
- iv) "Floating" heels. To be documented.
- v) One nurse in each department is responsible for ulcers and ulcer treatment.

.© Christna Linholm, 2006

Intervention eating difficulties/malnutrition.

Implemention of 5- point programme for eating and nutrition in wards and eduction of staff and training in assessing risk of malnutrition and eating difficulties was done between. The roll of nutrition nurse was clarified at the hospital.

In the Department of Medicine/Oncology, special cooperation with the kitchen was established: patients with poor appetite were to have access to small portions of what they liked to eat.

The 5-point programme for nutrition and eating

1) Make a basic assessment of

Unintentional weight loss (regardless of time and amount)

Eating difficulties (appetite, swallowing, lack of energy, motor disturbances)

Underweight (BMI <20 kg/ m² if </=69 years or BMI <22 kg/ m² if >/=70 years)

Overweight (BMI >25 kg/ m^2 if </=69 years or >27kg/ m^2 if >/=70 years)

2) Risk for undernourishment

Order energy- and protein-enriched food, oral supplements

Reduce night fast to a maximum of 11 hours

Increase in between meals (to 45% of daily needs)

3) Risk for overweight

Order energy contents in food according to patient's needs (approximately 25 kcal/kg body weight and 24 hours) and stimulate physical activity

4) Eating difficulties

Measures depending on the problem

5) Document and evaluate status, given treatment and results

Upon admission the patient's BMI is calculated.

© Westergren, Ulander and Lindholm, 2006.

Hospital hygiene.

A poster **directed at patients** was printed (Appendix 12) and distributed to all wards after the initial study. This poster was approved by the director of nurses, the director of medicine, the hygiene control nurse and one of the researchers after the analysis of the results of the primary study, and stressed behavioural risk factors for nurses identified in this study as:

- i) Disinfection of hands and forearms
- ii) Short nails, hair worn up if long
- iii) Gloves, protective aprons at wound dressing procedures
- iv) Short-sleeved scrubs, changed daily if possible
- v) Bracelets, rings, wrist-watches removed

The poster was addressed to patients and relatives and included a recommendation to remind staff if they observed deviations from the proposed routines. Training equipment for hand hygiene ("Glitterbugs") was acquired and the hygiene nurse was encouraged to perform regular training sessions with all staff.

A proposal for an incentive strategy was presented for certification of the wards, if statistically significant improvement or 80% compliance was achieved during the period November 2007 to April 2009.

Summary

This chapter discusses the methodology, point-prevalence methodology with pretest – posttest design (or before-after design) and involves observations at two points before and after implementations. The project follows, and is based on, Deming's modified PDSA – quality circle. The subjects in the research were in-patients, 18 years and older, and members of staff on pre-set study days. Obstetric and psychiatric wards were not included. The examinations were carried out both before and after the implementation of intervention. The instruments used is presented. Point-prevalence methodology was used for data collection; this methodology is also useful for measuring the potential improvements from the interventions.

Data collection was carried out by experienced nurses who underwent training prior to all the studies. During the entire study period of four years, management of the hospital were informed about all steps in the studies as well as about the interventions implemented. The intervention poster after the first hygiene study was signed by chief doctor and head nurse of each ward. The studies were performed in close cooperation between external researchers and nursing management at the hospital.

Trevarence of pressure areas, eating afficients and hospital hygiene

IV Results

The results chapter consists of three parts, in each of which results from the quality assessments are presented; first in relation to pressure ulcers, then in relation to nourishment, and finally in relation to hygiene. Each part has its own research questions and also the results; in text, tables and graphs showing %, proportions and the significance of the results, where applicable.

Study I: Prevalence and prevention of pressure ulcers in Akureyri Hospital

The aims of stydy I was o compare prevalence, location and severity of pressure ulcers, prevalence of risk assessment, risk status and prevention before and after interventions and answer the following questions:

How prevalent are pressure ulcers and into what grades are they classified?

Where are the pressure ulcers located?

How commonly are risk assessments being performed and documented?

What proportion of the patients have Norton scores \leq 20 (high risk of developing pressure ulcers) and do patients with pressure ulcers have Norton score \geq 21?

How frequently are prevention actions introduced and documented?

- A. In bed
- B. In chair/wheelchair

In year 1 (2005) a total of 119 patients were included, and in year 2 (2007) a total of 118. When correcting number of patients for participation in both years, the number were in year one 106 patients and year two 118 patients. One ward did not participate in the study in 2007, and the results are excluded in the comparison study. Out of these patients, 98 (year 1) and 110 (year 2) participated in the study, which gives an external loss of 8% (year 1) and 7% (year 2).

Number of patients per ward and participation in the study is shown in table 1. These descriptive statistics show the wards/units that participated in the study in both years (2005 and 2007).

Table 1. Number of patients per ward 2005 (N=106) and 2007 (N=118)

| Year of study | Ward/Speciality | Number of in- patients at the unit/ward | Not participating | Total |
|------------------|--|---|-------------------|-------|
| | | participating in the | | |
| 2005 | II and II also in a second | study | 2 | 22 |
| 2005 | Handlækninga og bæklunardeildir (surgery & orthopaedics) | 20 | 2 | 22 |
| | Lyflækningadeild1 (medicine) | 13 | | 13 |
| | Lyflækningadeild 2 (medicine) | 8 | | 8 |
| | Gjörgæsla (intensive care) | 1 | 3 | 4 |
| | Endurhæfingadeild (Rehabilitation younger) | 12 | 3 | 15 |
| | Öldrunarlækningadeild (Rehabilitation older) | 19 | | 19 |
| | SEL- hjúkrunarheimili (nursing home) | 25 | | 25 |
| 2005 Total | | 98 | 8 | 106 |
| 2007 | Handlækninga- og bæklunardeildir (surgery & orthopaedic) | 21 | 2 | 23 |
| | Lyflækningadeild 1 (medicine) | 23 | 1 | 24 |
| | Lyflækningadeild 2 (medicine) | 7 | 1 | 8 |
| | Gjörgæsla (intensive care) | 3 | | 3 |
| | Endurhæfingadeild (Rehabilitation younger) | 19 | 4 | 23 |
| | Öldrunarlækningadeild (Rehabilitation older) | 18 | | 18 |
| | SEL- hjúkrunarhei mili (nursing home) | 19 | | 19 |
| 2007 Total | | 110 | 8 | 118 |
| Total 2005 + 200 | 07 | 208 | 16 | 224 |

Gender and Age.

The criteria for participating in the studies were all adult inpatients, 18 years or older, on the wards, between 07.00 and 21:00 on the predetermined days. With regard to gender of participants 51 (total 95) were female in 2005, and 64 (total 106) in 2007. Women were 115 of the participants in the both studies and 72% of them were 65 years or older. Male participants numbered 44 in 2005 and 42 in 2007. Men were 86 of the participants in 2005 and 2007, and 60% of them were 65 years and older (table 2).

Table 2. Participants by gender and age groups according to study year

| Gender | Female | Female | Male | Male |
|-------------|--------|--------|------|------|
| | 2005 | 2007 | 2005 | 2007 |
| Age | | | | |
| 21-64 years | 14 | 25 | 13 | 21 |
| 65-79 years | 15 | 22 | 16 | 8 |
| >=80 years | 22 | 17 | 15 | 13 |
| Total* | 51 | 64 | 44 | 42 |

^{*} Internal loss age and gender 3 patients 2005 and 4 patients 2007

Prevalence of pressure ulcers.

Number of patients with pressure ulcers were 16 (17%) in 2005 and 22 (20%) in 2007 (non significant). Number of pressure ulcers was 34 in 2005 and 48 in 2007 (ns). Table 3 shows number of patients with pressure ulcers were 16 (17%) in 2005 and 22 (20%) in 2007 (non significant). Number of pressure ulcers was 34 in 2005 and 48 in 2007 (ns), table 3 shows.

Table 3. Percentage of patients with pressure ulcers compared to total number of patients per ward and year

| Ward/Speciality | 2005 (N=98 pat) | 2007 (N=110 pat) |
|---|-----------------|------------------|
| Handlækninga- og bæklunardeildir (surgery & orthopaedics) | 5% (20) | 5% (21) |
| Lyflækningadeild1 (medicine) | 23% (13) | 22%(23) |
| Lyflækningadeild 2(medicine) | 13% (8) | 14% (7) |
| Gjörgæsla (intensive care) | 0% (1) | 0% (3) |
| Endurhæfingadeild (rehabilitation younger) | 17% (12) | 16% (19) |
| Öldrunarlækningadeild (rehabilitation older) | 26% (19) | 44% (18) |
| SEL- hjúkrunarheimili (nursing home) | 16% (25) | 21% (19) |
| Total | *17% (98 pat) | 20% (110 pat) |

^{*}Internal loss 1%

Severity of pressure ulcers.

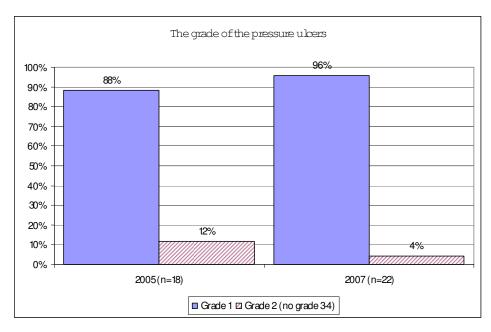


Figure 3. Pressure ulcer grades 2005 and 2007 as percentage of all pressure ulcers identified

In 2005, 88% (n=30) of the pressure ulcers were graded as grade 1 and 96% (n=46) in 2007 (ns).

In 2005, 4 or 12% of the pressure ulcers were grade 2, and 2 or 4% in 2007 .

No pressure ulcers of grade 3 or 4 were identified in 2005 or in 2007 (figure 3).

Prevention.

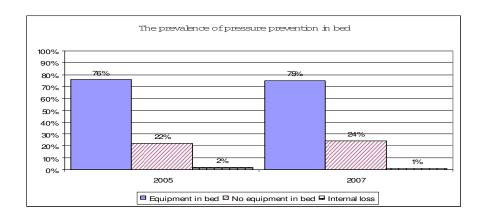


Figure 4. Prevalence of pressure prevention (equipment) in bed

Percentage of patients with pressure prevention in bed was 76% (74) in 2005 and 75% (83) in 2007 (ns). A total of 84% (175) of the participants in the both studies had prevention equipment in bed. In 2005, 7% (7) of patients had turning/moving schedules in bed, and 5% (6) in 2007, while in 2005, 89% (87) of patients had irregular position changes in bed, and 53% (58) 2007 (figure 4 and table 4).

Table 4 shows that 89% (n=87) of the patients had irregular position change in bed in 2005 but 53% (n=58) in 2007.

Table 4. Position changes used in bed

| | 2005 | |
|-----------------------------------|---------|----------|
| | | 2007 |
| | 7%(7) | 5%(6) |
| Turning/moving schedule in bed | | |
| Irregular position change in bed | 89%(87) | 53%(58) |
| No turning/moving schedule in bed | 4% (4) | 42% (46) |
| Total | 98 | 110 |

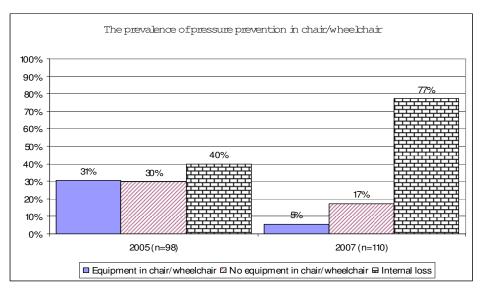


Figure 5. Prevention (equipment) in chair/wheelchair

Percentage of patients with pressure preventions used in the chair/wheelchair decreased significantly (p-value 0.023) from 31% in 2005 (30) to 5% (6) in 2007 (Figure 5).

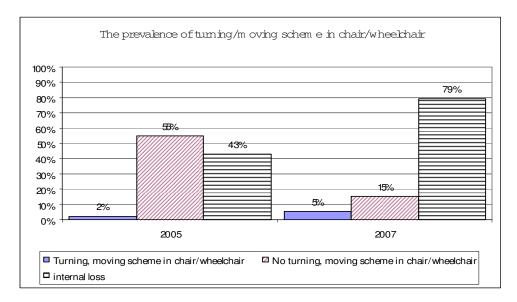


Figure 6. Prevalence of position changes in chair/wheelchair

Figure 6 shows that 2% (n=2) of the patient had turning, moving schema in chair/wheelchair in 2005 and 5% (n=5) in 2007.

Assessment of patients at risk for development of pressure ulcers according to the Modified Norton Scale.

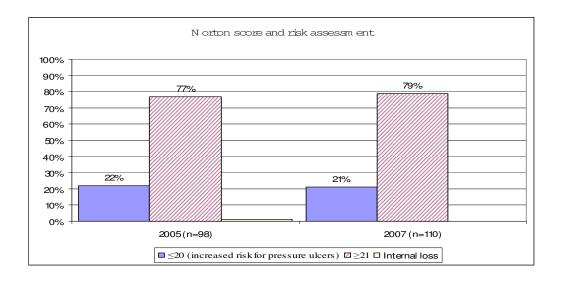


Figure 7. Percentage of patients with Norton score <20 and \ge 21 (Norton score < 20 have an increased risk of developing pressure ulcers)

Figure 7 shows use and documentation of a risk assessment tool (the Modified Norton Scale)

7,6

increased significantly (p-value 0.000) from 0% 2005 to 46% in 2007 (51 patients).

The mean Norton score was 22.2 in 2005 and 21.1 in 2007 for patients with pressure ulcers. Patients with Norton scores <= 20 were 22 in 2005 and 26, in 2007 and with pressures ulcers were 5 (23%) patients, in 2005 and 7 (30%), in 2007 (not significant). Patients with Norton scores over 20 were 74 in 2005 and 87, in 2007 and with pressures ulcers were 10 patients (14%), in 2005 and 15 (17%), in 2007 (not significant). Patient Mean Modified Norton Scores for patients with and without pressure ulcers are shown in Table 5.

Table 5. Mean Modified Norton Scale Score total and with pressure ulcers and without.

| Mean score Norton scale | 2005 | 2007 |
|-------------------------|------|------|
| Total | 23.9 | 23.7 |
| With Pressure Ulcers | 22.2 | 21.1 |
| Without Pressure Ulcers | 24.3 | 24.4 |

Table 6 shows that ninety-five percent (21) of the patients in 2005 and 83% (19) in 2007 with Norton score \leq 20 had some prevention (not significant).

Table 06. Prevention in patients with Norton score ≤20

| Patients with a Norton score ≤20 | 2005 | 2007 |
|--|----------|----------|
| Any prevention | 21 | 19 |
| No prevention recorded | 1 | 4 |
| % with prevention and a Norton score ≤20 | 95% (21) | 83% (19) |

Location of the pressure ulcers.

In 2005, 41% (14) of the pressure ulcers were located on the feet and 77% (37) in 2007. The sacral location decreased from 18% in 2005 to 6% in 2007, see table 7.

Table 07. Locations of pressure ulcers in 2005 and 2007

| | 2005 | 2007 | |
|---------------|------|------|--|
| Location/year | | | |
| | | | |

| Feet | 41% (14) | 77% (37) | |
|----------------|----------|----------|--|
| Sacrum | 18% (6) | 6% (3) | |
| Other location | 41% (14) | 17% (8) | |
| n= | 34 | 48 | |

Details on pressure ulcer locations are shown in Figures 8 and 9. Notably there were no pressure ulcers in the scapulae in 2007, and pressure ulcers in the tuberositas ischii were 6.3 % compared to 10.8 % in 2005.

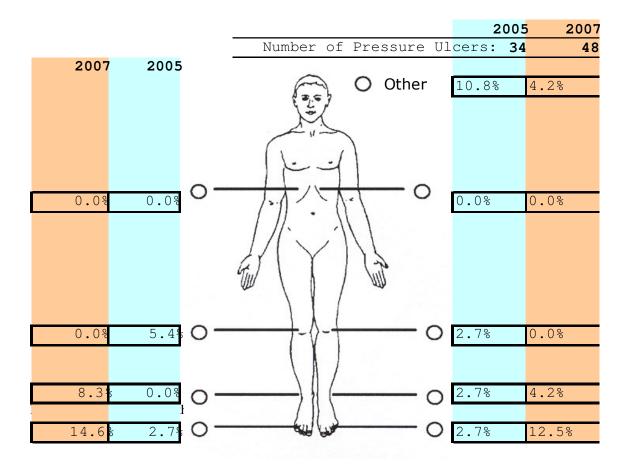


Figure 8. Location of pressures ulcers in detail (front)

2005 2007 2007 2005 0.0% 0.0% 0.0% 2.7% 2,7% 0,0% 2.7% 18.0% 4.2% 2.7% 6.0% 0.0% 0.0% 0.0% 0.0% 2.1% 5.4% 5.4% 4.2% 16.2% 18.8% 18.8% 18.9%

Figure 9. The locations of pressure ulcers in detail (back)

Study II: Malnutrition/eating difficulties – Prevalence and prevention

revalence interventions revalence of pressure areas, eating afficiences and hospital hygiene

The aim was to study the point prevalence of eating difficulties and risk of malnutrition as well as preventive actions taken for patients at risk for undernourishment and answer following questions:

- What was the point prevalence of low and high BMI among patients at the hospital?
- Was BMI measured and documented in the patient's charts?
- What was the point prevalence of unintended weight loss and of eating difficulties?
- What proportion of patients showed risk of undernourishment?
- How frequent were the preventive actions taken, in total and in relation to patients with risk of undernourishment?
- What were the differences in actions taken between the years studied?

Internal dropout of questions in the studies, see table 8.

Table 8. Percentage unanswered questions, internal dropout

| Item | Percent internal loss 2006 (n=95) | Percent internal loss 2007 (n=92) |
|-------------------------|--------------------------------------|-----------------------------------|
| Gender | 0 | 0 |
| Year of birth | 0 | 1 |
| Weight | 0 | 0 |
| Length | 1 | 0 |
| BMI | 1 | 0 |
| Unintended weight loss | 0 | 1 |
| Eating difficulties | 1 | 2 |
| Difficulties swallowing | 4 | 1 |
| Eating assistance | 2 | 1 |
| Type of food | 2 | 1 |
| Consistency of food | 3 | 2 |
| Consistency of drink | 1 | 4 |
| Size of portion | 1 | 6 |

revalence interventions revalence of pressure areas, eating afficiences and hospital hygiene

Participants.

In 2006, 107 patients were asked to participate and 95 patients (89%) chose to do so. In 2007, 104 patients were asked, and 92 patients (88%) participated in the study. Females participating in the study comprised 64% in 2006 and 60% in 2007. The mean age of the participating patients in 2006 was found to be 71.4 years (SD 17.8), whereas in 2007 their mean age was 70 years (SD17.7). See table 9 for specified data from the different wards.

Table 9. Number and percentage of patients within each speciality

| | 2006 n | | | |
|---|--------|----------|--------|----------|
| Ward/Speciality | | 2006 (%) | 2007 n | 2007 (%) |
| Handlækningadeild (surgery) | 8 | 57% | 7 | 88% |
| Lyflækningadeild 1 (medicine) | 15 | 83% | 16 | 80% |
| Lyflækningadeild II (medicine) | 7 | 100% | 6 | 100% |
| Öldrunarlækningadeild (Rehabilitation older) | 19 | 100% | 15 | 100% |
| Bæklunardeild (orthopaedic) | 11 | 85% | 14 | 88% |
| Endurhæfingadeild (Rehabilitation/younger) | 12 | 92% | 15 | 75% |
| Sel-hjúkrunarheimili (nursing home) | 23 | 100% | 19 | 100% |
| Total | 95 | 89% | 92 | 88% |

Prevalence of low and high body mass index.

Table 10 shows the mean BMI of the participating patients by gender and different wards.

Table 10. Gender and mean BMI on different wards according to years

| | | Female | Male | Total |
|---|------|----------|----------|----------|
| | Year | Mean BMI | Mean BMI | Mean BMI |
| Ward/Speciality | | | | |
| Handlækningadeild (surgery) | 2006 | 24 | 25 | 25 |
| | 2007 | 35 | 29 | 31 |
| Bæklunardeild (orthopaedics) | 2006 | 27 | 31 | 28 |
| | 2007 | 25 | 28 | 26 |
| Lyflækningadeild1 (medicine) | 2006 | 29 | 27 | 28 |
| | 2007 | 28 | 26 | 27 |
| Lyflækningadeild 2 (medicine) | 2006 | 27 | 31 | 28 |
| | 2007 | 31 | 23 | 29 |
| Endurhæfingadeild (rehabilitation/younger) | 2006 | 26 | 28 | 26 |
| | 2007 | 33 | 29 | 31 |
| Öldrunarlækningadeild (rehabilitation/older) | 2006 | 28 | 23 | 26 |
| | 2007 | 26 | 26 | 26 |
| Sel –hjúkrunarheimili (nursing home) | 2006 | 26 | 24 | 26 |
| , | 2007 | 26 | 26 | 26 |
| Total | 2006 | 27 | 26 | 27 |
| | 2007 | 28 | 27 | 28 |

In Table 11, the classification of BMI for all participants are presented. No significant differences between the years in classification of BMI were found.

Table 11. Classification of BMI of all participating patients

| Classification of BMI | 2006 | 2007 |
|-----------------------------|-----------|-----------|
| Underweight (<20 – 22 BMI) | 17% (16) | 14% (13) |
| Normal weight (>22- 25 BMI) | 31% (30) | 32% (29) |
| Overweight (>25- 29 BMI) | 52% (49) | 54% (50) |
| Total | 100% (95) | 100% (92) |

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Underweight patients were likely to be older than overweight patients (see Table 12). However no significant differences between the years were found in age and BMI.

Table 12. Mean and median age and classification of BMI

| Classification BMI | Year of study | | | | | | |
|--------------------|---------------|--------|------|--------|--|--|--|
| | 2006 | | 2007 | | | | |
| _ | Age | | Age | _ | | | |
| _ | Mean | Median | Mean | Median | | | |
| Normal weight | 70 | 74 | 73 | 77 | | | |
| Underweight | 78 | 82 | 80 | 83 | | | |
| Overweight | 72 | 73 | 67 | 73 | | | |
| Obesity | 65 | 65 | 65 | 70 | | | |
| Severe obesity | | | 49 | 53 | | | |

Body mass index documentation.

Statistically significant improvements were found in the documentation of BMI in the patients' charts, as shown in Table 13.

Table 13. BMI documented in the patients' charts by each ward according to years

| BMI is do | BMI is documented in char | | | |
|-----------|--|--|--|--|
| 2006 | 2007 | P-value | | |
| n (%) | n (%) | | | |
| 0(0) | 0(0) | | | |
| | | | | |
| 0(0) | 7(44) | .004* | | |
| | | | | |
| 1(14) | 0(0) | 0.335 | | |
| | | | | |
| 0(0) | 13(87) | .000* | | |
| | | | | |
| 0(0) | 0(0) | | | |
| | | | | |
| 0(0) | 8(53) | .003* | | |
| | | | | |
| 0(0) | 0(0) | | | |
| | | | | |
| 1(1) | 28(30) | *000 | | |
| ` , | ` ´ | | | |
| | 2006 n (%) 0(0) 0(0) 1(14) 0(0) 0(0) 0(0) 0(0) | 2006 2007 n (%) n (%) 0(0) 0(0) 0(0) 7(44) 1(14) 0(0) 0(0) 13(87) 0(0) 0(0) 0(0) 8(53) 0(0) 0(0) | | |

^{*} Statistically significant (p-value <0.05)

Prevalence of unintended weight loss and of eating difficulties.

Significantly fewer patients reported unintentional weight loss in 2007 than in 2006 (p < 0.041).

Table 14. Unintended weight loss for participating patients according to wards and years 2006 and 2007

| Ward/Speciality | | Unintended | Unintended |
|---------------------------------------|---------|---------------|---------------|
| | | weight loss n | Weight loss % |
| Handlækningadeild | 2006 | 5 | 63% |
| (surgical) | 2007 | 1 | 14% |
| | P-value | 0.057 | |
| Bæklunardeild (orthopaedic) | 2006 | 5 | 45% |
| | 2007 | 1 | 7% |
| | P-value | .026* | |
| Lyflækningadeild 1 (medicine) | 2006 | 4 | 27% |
| | 2007 | 6 | 27% 38% |
| | P-value | 0.519 | |
| Lyflækningadeild 2 (medicine) | 2006 | 2 | 29% |
| | 2007 | 2 | 33% |
| | P-value | 0.489 | |
| Endurhæfingadeild (rehab. younger) | 2006 | 0 | 0% |
| , , , , , , , , , , , , , , , , , , , | 2007 | 0 | 0% |
| | P-value | | |
| Öldrunarlækningadeild (rehab. older) | 2006 | 3 | 16% |
| | 2007 | 1 | 7% |
| | P-value | 0.412 | |
| Sel-hjúkrunardeild (nursing home) | 2006 | 0 | 0% |
| | 2007 | 1 | 5% |
| | P-value | .023* | |
| Total | 2006 | 19 | 20% |
| | 2007 | 12 | 13% |
| | P-value | 0.041* | |

^{*} Statistically significant (p-value <0.05)

In the follow-up study in 2007, fewer patients were recorded having difficulties handling the food, particularly in the SEL nursing home. This affected the overall result of eating difficulties for the participating patients in the hospital, but with no statistically significant differences. Each patient can have more than one symptom, see Table 15.

Table 15. Number (n) of patient with eating difficulties for all participating patients according to year.

| Eating difficulties of all patients (%) | 2006 n=95 | 2007 n=92 |
|--|-----------|-----------|
| Difficulties in opening/closing mouth | 3 | 1 |
| Difficulties in swallowing | 14 | 12 |
| Difficulties in handling food in the mouth | 9 | 2 |
| Difficulties in transporting food to the mouth | 22 | 14 |
| Difficulties in handling food on the plate | 26 | 13 |
| Difficulties in chewing | 5 | 17 |
| Not enough strength to eat | 11 | 2 |
| Fast/slow eating time | 11 | 7 |
| Difficulties in sitting and eating | 9 | 2 |
| Eat less than 3/4 of food served | 7 | 11 |
| Does not want to eat | 1 | 2 |
| Nausea | 16 | 7 |
| Poor appetite | 28 | 33 |

Proportion of patients at risk of undernourishment.

According to the classification of patients at risk of undernourishment, there were no statistical significant differences in patients at risk for undernourishment between the years studied, see Table 16.

Table 16. Patients at risk of undernourishment, number (n) and percentage (%) according to year

| | 2006 | 2007 |
|--------------------------|---------|---------|
| Risk of undernourishment | n (%) | n (%) |
| No risk | 23(26) | 33(38) |
| Low risk | 42(47) | 39(44) |
| Moderate risk | 21(24) | 12(14) |
| High risk | 3(3) | 4(5) |
| Moderate or high risk | 24 (27) | 16 (18) |

Frequency of preventive action and nutritional actions.

Nutritional actions were taken for an increased number of patients in the study of 2007, although the difference was not statistically significant, see table 17. The actions registered and presented in table 17 were one or more of the following; assistance with eating, protein-and energy-enriched food, food supplementation and an extra evening meal.

Table 17. Nutritional actions taken for all participating patients, number (n) and percentage (%) according to ward/speciality

| Ward/Speciality | 2006 | 2007 |
|-------------------------------------|--------|--------|
| | n(%) | n(%) |
| Handlækningadeild (surgery) | 1(13) | 4(57) |
| (2006 n=8, 2007 n=7) | | |
| Lyflækningadeild1(medicine) | 3(20) | 7(44) |
| (2006 n=15, 2007 n=16) | | |
| Lyflækningadeild II (medicine) | 1(14) | 1(17) |
| (2006 n=7, 2007 n=6) | | |
| Öldrunarlækningadeild (rehab/older) | 7(37) | 5(33) |
| (2006 n=19, 2007 n=15) | | |
| Bæklunardeild (orthopaedics) | 1(9) | 2(14) |
| (2006 n=11, 2007 n=14) | | |
| Endurhæfingadeild (rehab/young) | 1(8) | 7(47) |
| (2006 n=12, 2007 n=15) | | |
| Sel-hjúkrunardeild (nursing home) | 18(78) | 17(89) |
| (2006 n=23, 2007 n=19) | | |
| Total | 32(34) | 43(47) |
| (2006 n=95, 2007 n=92) | | |

One of seven units did not serve food supplementation to any patient at the time of the point-prevalence studies. In total seven patients in 2006 and 13 patients in 2007 received food with less of certain substances such as salt, wheat, fat or milk. In table 18 the different nutritional actions taken are presented. There was a statistical difference in ordering small portions in between the years studied. In 2006, 39% of the patients were served with a small portion, whereas in 2007 the amount decreased to 16% (p < 0.007).

Table 18. Nutritional actions taken in detail

| (%) | 2006 n=95 | 2007 n=92 |
|---|-----------|-----------|
| Actions taken | 34% | 47% |
| Needs assistance to eat | 38% | 29% |
| Protein- and/or energy-enriched food | 1% | 3% |
| Change of consistency of food | 21% | 26% |
| Artificial nutrition | 0% | 0% |
| Served a small portion (approx 200kcal) | 39% | 16% |
| Served an enlarged portion (approx 600kcal) | 5% | 5% |
| Food supplementation | 9% | 38% |

The nutritional actions registered in relation to the risk of undernourishment (moderate/high) identified for the participating patients are presented in Table 19. The percentage of nutritional actions taken for all participating patients had increased from 34% (2006) to 47% (2007). No change was statistically significant.

Table 19. Patients at risk of undernourishment and nutritional actions taken or not taken for them, and nutritional actions taken for participating patients without classified risk of undernourishment

| Ward/Speciality (No. of answers) | Patients at Risk combined (n) with actions (n) | | Risk but no actions (n) | | No risk but actions (n) | | | |
|--|--|------|-------------------------------|------|-------------------------------|------|------|------|
| | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 |
| Handlækningadeild (surgery) (2006 n=8, 2007 n=7) | 5 | 1 | 1 | 1 | 4 | 0 | 0 | 3 |
| Lyflækningadeild I (medicine) (2006 n=15, 2007 n=16) | 2 | 4 | 1 | 1 | 1 | 3 | 2 | 5 |
| Lyflækningadeild II (medicine) (2006 n=7, 2007 n=6) | 2 | 2 | 0 | 0 | 2 | 2 | 1 | 1 |
| Öldrunarlækningadeild (rehab/older) (2006 n=19, 2007 n=15) | 6 | 3 | 5 | 3 | 1 | 0 | 2 | 2 |
| Bæklunardeild (orthopaedics) (2006 n=11, 2007 n=14) | 2 | 2 | 0 | 0 | 2 | 2 | 1 | 2 |
| Endurhæfingadeild (rehab/young) (2006 n=12, 2007 n=15) | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 7 |
| Sel-hjúkrunarheimili (nursing home) (2006 n=23, 2007 n=19) | 6 | 4 | 6 | 4 | 0 | 0 | 12 | 12 |
| Total (2006 n=95, 2007 n=92) | 24 | 16 | 14 | 9 | 10 | 7 | 18 | 32 |

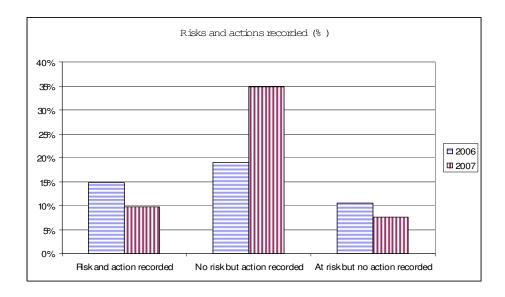


Figure 10. Patients at risk of undernourishment, or without risk of undernourishment, with or without nutritional actions recorded, on all wards.

Fourteen patients were in risk of undernurishment in 2006 and nine patients in 2007 witht nutrition recorded but ten patients at risk in 2006 and seven patients in 2007 without nutritional actions recorded, see figure 10.

Differences of action between the studies.

Table 20 shows the different types of food supplements and evening meals that were recorded on the different wards.

Table 20. Type of food supplements and evening meals recorded on the different wards according to year.

| Ward (No. of answers) | Type of food | 2006 | 2007 |
|--|--|---------|---------|
| | supplement | n (%) | n (%) |
| Handlækningadeild (surgery) (2006 n=8, 2007 n=7) | Energy drink | 1 (13) | 3 (43) |
| | None | 7 (88) | 4 (57) |
| Lyflækningadeild I (medicine) (2006 n=15, 2007 n=16) | Energy drink | 2 (13) | 3 (19) |
| | Toast and juice | 0 | 1 (6) |
| | Bread + Fruit | 0 | 1 (6) |
| | None | 13 (87) | 11 (69) |
| Lyflækningadeild II (medicine) (2006 n=7, 2007 n=6) | None | 7 (100) | 6(100) |
| Öldrunarlækningadeild (rehab/older) (2006 n=19, 2007 n=15) | Energy drink | 1 (5) | 0 |
| | None | 18 (95) | 15(100) |
| Bæklunardeild (orthopaedics) (2006 n=11, 2007 n=14) | Energy drink | | 1 (7) |
| , | None | 10 (91) | 13 (93) |
| Endurhæfingadeild (rehab/young) (2006 n=12, 2007 n=15) | Energy drink | 1 (8) | 0 |
| | Energy drink 2 (13) Toast and juice 0 Bread + Fruit 0 None 13 (87) None 7 (100) Energy drink 1 (5) None 18 (95) 1 Energy drink 1 (9) None 10 (91) Energy drink 1 (8) Fruit 0 Chocolate energy bar + dried fruit None 11 (92) Be) Enteral nutrition, 1200 kcal/24 Energy drink 3 (13) Extra meal (evening) 0 Energy drink + extra 0 | 6 (40) | |
| | | 0 | 1 (7) |
| | None | 11 (92) | 8 (53) |
| Sel-hjúkrunarheimili (nursing home) (2006 n=23, 2007 n=19) | | 0 | 1 (5) |
| | Energy drink | 3 (13) | 0 |
| | Extra meal (evening) | 0 | 14 (74) |
| | Energy drink + extra meal (evening) | 0 | 2 (11) |
| | Beer (evening) | 0 | 1 (5) |
| | None | 20 (87) | 1 (5) |

revalence interventions revalence of pressure dieers, eating difficulties and hospital hygiene

Study III: Hospital hygiene and microbiology of wounds – Prevalence

- -The aims were to investigate availability of and compliance with hygiene recommendations i) in general ii) in all staff iii) at wound dressing changes
- To investigate the frequency of wounds of different etiologies, wound treatment routines for these wounds and the prevalence of multi resistant Gram-negative bacteria, Methicillin resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci, (VRE) and other potentially pathogenic wound bacteria.
- To investigate bacterial growth before and after wound cleansing. The intention was to answer following questions:
 - Are hygiene guidelines available on the ward?
 - How is compliance to these guidelines a) in general b) at wound dressing changes?
 - -How prevalent are leg/foot and pressure ulcers and other wounds and how are these wounds treated?
 - Can multi resistant Gram-negative bacteria, methicillin resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci, (VRE) and other potentially pathogenic bacteria be identified in these wounds?
 - Is there a difference in microbiological quantity and quality before and after wound cleansing?

A total of 158 staff from ten wards participated in the study predetermined day, 1. November in 2006 and 142 from 11 wards on 7 April 2008. Eleven patients with 20 wounds participated in 2006 and ten with 16 wounds in 2008.

General questions about the ward (questionnaire A).

Table 21. Wards participating in 2006 (N=10) and 2008 (N=11), number of patients and staff and number of staff per patient

| | Number patients war | on the | | ber of aytime | - 10 | ber of evening | staf | ber of f per ient |
|--|---------------------------|--------|------|------------------|------|-------------------|------|-------------------------|
| Ward/Speciality | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | 10 | 7 | 10 | 6 | 2 | 2 | 1.2 | 1.1 |
| Bæklunardeild (orthopaedics) | 10 | 9 | 11 | 8 | 5 | 6 | 1.6 | 1.4 |
| Endurhæfingadeild (rehab/younger) | 19 | | 6 | 8 | 3 | 3 | 0.5 | |
| Gjörgæsla (intensive care) | 5 | 12 | 12 | 9 | 4 | 3 | 3.2 | 1.0 |
| Handlækningadeild (surgery) | 11 | 15 | 18 | 10 | 3 | 5 | 1.9 | 0.9 |
| Kvennadeild (gynaecology) | 11 | 7 | 12 | 6 | 4 | 5 | 1.5 | 1.3 |
| Lyflækningadeild 1 (medicine) | 24 | 27 | 22 | 21 | 9 | 7 | 1.3 | 1.0 |
| Lyflækningadeild 2 (medicine) | 9 | 4 | 6 | 6 | 1 | 0 | 0.8 | 0.8 |
| SEL-hjúkrunarheimili (nursing home) | 21 | 14 | 15 | 9 | 6 | 5 | 1.0 | 1.0 |
| Slysadeild (emergency) | | 37 | | 6 | | 2 | | 0.2 |
| Öldrunarlækningadeild (rehab/older) | 19 | 19 | 6 | 12 | 3 | 3 | 0.5 | 0.8 |
| | 12.0 | | | | | | | |
| Mean | 13.9 | 14 | 12 | 8 | 3.9 | 3.1 | 1.1 | 0.8 |
| Total | 139 | 151 | 119 | 101 | 39 | 41 | | |

Number of disinfectant dispensers had increased from 1.1 per staff member in 2006 to 6.1 in 2008. The number of automatic dispensers increased from none (2006) to 56 (2008). Detailed availability of dispensers is shown in table 22.

Table 22. Number of disinfection automats/automatic dispensers with hand-disinfection on the wards, according to year

| Ward/Speciality | Number disinfect automate the wa | ction ts on | Number of automatic dispensers on the wards | | Number of dispensers on the wards per personnel | | Number of dispensers on the wards per patient | |
|--|----------------------------------|----------------|--|------|--|------|--|------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | 23 | 23 | | 6 | 1.9 | 3.6 | 1.2 | 1.1 |
| Bæklunardeild (orthopaedics) | 14 | 11 | | 3 | 0.9 | 2.0 | 1.6 | 1.4 |
| Endurhæfinga deild (rehab/younger) | 16 | | | | 1.8 | | 0.5 | |
| Gjörgæsla (intensive care) | 20 | 9 | | 11 | 1.3 | 1.7 | 3.2 | 1.0 |
| Handlækninga deild (surgery) | 15 | 13 | | 1 | 0.7 | 1.3 | 1.9 | 0.9 |
| Kvennadeild (gynaecology) | 22 | 15 | | 3 | 1.4 | 2.0 | 1.5 | 1.3 |
| Lyflækningadeild 1 (medicine) | 22 | 24 | | 2 | 0.7 | 1.3 | 1.3 | 1.0 |
| Lyflækningadeild 2 (medicine) | 9 | 3 | | 11 | 1.1 | 4.7 | 0.8 | 0.8 |
| SEL – nursing home | 27 | 25 | | 8 | 1.3 | 2.4 | 1.0 | 1.0 |
| Slysadeild (emergency) | | 3 | | 9 | | 1.5 | | 0.2 |
| Öldrunarlækning adeild (rehab/older) | 13 | 14 | | 2 | 1.3 | 1.1 | 0.5 | 0.8 |
| Mean | 18.1 | 14.0 | | 56.0 | 1.1 | 6.1 | 1.1 | 0.8 |

Hygiene guidelines were available in 10 of 11 wards in 2006 and in all wards in 2008. Instruction about general hygiene routines for new employees was available in four wards in 2006 and in one ward 2008, see table 23. Plastic aprons were not available in 2006 but were in use in 9 of 11 wards in 2008.

Table 23. Instructions available for general hygiene routines, according to wards and years

| Ward/Speciality | Instru availak general l routi | ole for hygiene | Electronic or in As a poster In program a file for new employee | | • | | ew | |
|--|---|--------------------|---|------|------|------|------|------|
| Year | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | 1 | 1 | | 1 | 1 | 1 | 1 | |
| Bæklunardeild (orthopaedics) | 1 | 1 | 1 | 1 | | 1 | | |
| Endurhæfinga deild (rehab/younger) | 1 | | | | 1 | | 1 | |
| Gjörgæsla (intensive) | 1 | 1 | | 1 | 1 | 1 | | |
| Handlækningadei ld (surgery) | | 1 | | 1 | | 1 | | |
| Kvennadeild (gynaecology) | 1 | 1 | | 1 | 1 | 1 | | |
| Lyflækningadeild 1 (medicine) | 1 | 1 | | 1 | 1 | 1 | 1 | |
| Lyflækningadeild 2 (medicine) | 1 | 1 | | | 1 | | | 1 |
| SEL (nursing home) | | 1 | 1 | 1 | | 1 | | |
| Slysadeild (emergency) | | 1 | | 1 | | | | |
| Öldrunarlækning adeild (rehab/older) | 1 | 1 | | 1 | 1 | 1 | 1 | |
| Total | 8 | 10 | 2 | 9 | 7 | 8 | 4 | 1 |

Individual observations of hygiene for each staff (questionnaire B).

In 2006, N=158 day and evening staff were observed . The corresponding figure for 2008 was N=142, se Table 24.

Table 24. Total number of staff observed in 2006 and 2008, according to ward and year

| Ward/Speciality | 2006 | 2008 |
|-------------------------------------|------|------|
| Barnadeild (paediatrics) | 12 | 8 |
| Bæklunardeild (orthopaedics) | 16 | 14 |
| Endurhæfingadeild (rehab/younger) | 9 | 11 |
| Gjörgæsla (intensive) | 16 | 12 |
| Handlækningadeild (surgery) | 21 | 15 |
| Kvennadeild (gynaecology) | 16 | 11 |
| Lyflækningadeild 1 (medicine) | 31 | 28 |
| Lyflækningadeild 2 (medicine) | 7 | 6 |
| SEL (nursing home) | 21 | 14 |
| Slysadeild (emergency) | 0 | 8 |
| Öldrunarlækningadeild (rehab/older) | 9 | 15 |
| Total | 158 | 142 |

Table 25 shows proportion of nurses to other staff, nurses comprised 34% of staff 2006 and 39% in 2008.

Table 25. Professional background, according to ward and year

| Ward/Speciality | Number o nurses on wards | - | Number of non- graduate nurses | | Number o staff | % of nurses on the wards | | |
|---|--------------------------------|------|-----------------------------------|------|-------------------|-----------------------------|------|------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | 6 | 5 | 4 | | 2 | 3 | 50% | 63% |
| Bæklunardeild (orthopaedics) | 5 | 5 | 3 | 2 | 8 | | 31% | 71% |
| Endurhæfingadeild (rehab/younger) | 4 | | 2 | | 3 | | 44% | |
| Gjörgæsla (intensive) | 9 | 8 | 2 | 3 | 5 | 1 | 56% | 67% |
| Handlækningadeild (surgery) | 6 | 4 | 2 | | 13 | 7 | 29% | 36% |
| Kvennadeild (gynaecology) | 7 | 6 | 2 | | 7 | 3 | 44% | 67% |
| Lyflækningadeild I (medicine) | 9 | 7 | 9 | 5 | 14 | 8 | 28% | 35% |
| Lyflækningadeild II (medicine) | 5 | 3 | | 0 | 3 | 0 | 63% | 100% |
| SEL (nursing home) | 3 | 2 | 10 | | 8 | 12 | 14% | 14% |
| Slysadeild (emergency) | | 5 | | | | 3 | | 63% |
| Öldrunarlækninga deild (rehab/older) | 3 | 2 | 4 | | 3 | 13 | 30% | 13% |
| Mean | 5.7 | 4.5 | 4.2 | 2.0 | 6.6 | 5.0 | 34% | 39% |

In table 26, working experience of staff is shown and the median time of working in health care was on average 18.6 years in 2006 and 13.8 in 2008.

Table 26. Working experience, number of years in health care, according to wards and year

| Unit/Ward | years in care | Mean number of years in care | | nswers | % internal l | OSS |
|---|--------------------|------------------------------|------|--------|--------------|------|
| | profession 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatric) | 15.3 | 15.9 | 12 | 8 | 0% | 13% |
| Bæklunardeild (orthopaedics) | 18.2 | 14.3 | 16 | 14 | 25% | 0% |
| Endurhæfingadeild (rehab/younger) | 23.7 | 11.2 | 9 | 11 | 0% | 9% |
| Gjörgæsla (intensive care) | | 13.6 | 16 | 12 | 100% | 0% |
| Handlækningadeild (surgery) | 14.7 | 12.9 | 20 | 15 | 15% | 20% |
| Kvennadeild (gynaecology) | 17.3 | 15.9 | 16 | 11 | 0% | 9% |
| Lyflækningadeild 1 (medicine) | 12.7 | 6.9 | 32 | 28 | 66% | 0% |
| Lyflækningadeild 2 (medicine) | | 24.2 | 7 | 6 | 100% | 0% |
| SEL (nursing home) | 22.2 | 18.2 | 21 | 14 | 0% | 0% |
| Slysadeild (emergency) | | 13.8 | | 8 | 0% | 0% |
| Öldrunarlækninga deild (rehab/older) | 25.9 | 18.5 | 10 | 15 | 0% | 0% |
| Mean number | 18.6 | 13.8 | 159 | 142 | 32% | 4% |

The majority of staff wore scrubs both in 2006, 98% (156) but 94% (133) of staff in 2008, (p < 0.0001). Use of short-sleeved scrubs increased from 77% (122) in 2006 to 82% (116) in 2008. Detailed information about scrubs is shown in table 27.

Table 27. Hospital-issue clothing (scrubs), percentage

| Ward/Speciality | Scru | bs | Sh | ort | Long | | Own | |
|--|--------|-------|------|-------|-------|------|-------|------|
| | | | slee | eves | slee | _ | clot | thes |
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild | 92% | 100% | 67% | 75% | 25% | 25% | 67% | 38% |
| (paediatrics) Bæklunardeild | 100% | 93% | 63% | 86% | 38% | 7% | 56% | 7% |
| (orthopaedics) | 100 /6 | 75 10 | 0370 | 30 70 | 30 70 | 1 70 | 30 70 | 1 70 |
| Endurhæfingadeild (rehab/younger) | 89% | 64% | 89% | 64% | 0% | 9% | 22% | 27% |
| Gjörgæsla (intensive care) | 100% | 100% | 88% | 92% | 13% | 0% | 13% | 33% |
| Handlækningadeild (surgery) | 100% | 93% | 70% | 73% | 25% | 13% | 30% | 13% |
| Kvennadeild (gynaecology) | 94% | 100% | 81% | 100% | 13% | 0% | 25% | 64% |
| Lyflækningadeild I (medicine) | 100% | 100% | 75% | 79% | 25% | 21% | 34% | 18% |
| Lyflækningadeild II (medicine) | 100% | 100% | 100% | 100% | 0% | 0% | 0% | 0% |
| SEL (nursing home) | 100% | 100% | 71% | 93% | 29% | 7% | 24% | 7% |
| Slysadeild (emergency) | | 100% | | 50% | | 38% | | 50% |
| Öldrunarlækningadeild (rehab/older) | 100% | 80% | 90% | 87% | 10% | 7% | 20% | 13% |
| Total | 98% | 94% | 77% | 82% | 21% | 12% | 31% | 23% |

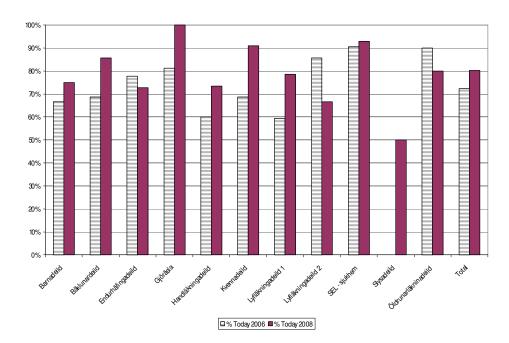


Figure 11. Scrubs changed today (red bars) 2006 and 2008

Scrubs were changed daily by 72% (115) in 2006 and 80% (114) in 2008. Fifteen (9%) of staff had changed clothes the previous day in 2006 and seven (5%) in 2008. Eleven percent (18) had changed the present scrubs > 2 days ago in 2006. In 2008, 9% (12) had not changed their scrubs for > 2 days. Detailed data on changes of scrubs are shown in Figure 11.

Table 28 shows how common long hair was among the participating staff. In 2006 34% (47) of the staff had long hair and 25% (36) in year 2008. In 17% (8) of cases it was worn up in 2006 and in 42% (15) of cases in 2008 (P < 0.0013).

Table 28. Number of staff with long hair, and wearing up, according to ward and year

| | Long hair | | Long hair a | | % wearing long hair | it up if |
|--|-----------|------|-------------|------|---------------------|----------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | 7 | 3 | | 2 | 0% | 67% |
| Bæklunardeild (orthopaedics) | 9 | 1 | 4 | | 44% | 0% |
| Endurhæfingadeild (rehab/younger) | 1 | 1 | | | 0% | 0% |
| Gjörgæsla (intensive care) | 2 | 4 | | 2 | 0% | 50% |
| Handlækningadeild (surgery) | 5 | 2 | | | 0% | 0% |
| Kvennadeild (gynaecology) | 3 | 7 | 1 | 2 | 33% | 29% |
| Lyflækningadeild 1(medicine) | 11 | 11 | 2 | 8 | 18% | 73% |
| Lyflækningadeild 2 (medicine) | 2 | | | | 0% | |
| SEL- hjúkrunarheimili (nursing home) | 5 | 1 | 1 | | 20% | 0% |
| Slysadeild (emergency) | | 5 | | 1 | | 20% |
| Öldrunarlækninga Deild (rehab/older) | 2 | 1 | | | 0% | 0% |
| Total | 47 | 36 | 8 | 15 | 17% | 42% |

Wearing of rings and jewellery decreased between 2006 and 2008 from 45% (72) to 32% (26) (p < 0.001), and wearing of bracelets and wristwatches decreased from 30% (48) to 16% (23) (p < 0.0001). The same trend was seen regarding facial piercing (6) in 2006, with none in 2008, se table 30.

Table 29. Rings, jewellery, watches and facial piercing, number and percentage according to year and ward

| Ward/Speciality | g | | Watches or | bracelets | Piercing in the facial region | | |
|---------------------|---------|---------|------------|-----------|-------------------------------|-------|--|
| | n % | n % | n % | n % | n % | n % | |
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | |
| Barnadeild | 9(75%) | 4(50%) | 6(50%) | 2(25%) | | 0% | |
| (paediatrics) | | | | | 0% | | |
| Bæklunardeild | 8(50%) | 2(14%) | 2(13%) | 0% | 3(19%) | 0% | |
| (orthopaedics) | | | | | | | |
| Endurhæfingadeild | 4(44%) | 6(55%) | 1(11%) | 4(36%) | | 0% | |
| (rehab/younger) | | | | | 0% | | |
| Gjörgæsla | 10(63%) | 4(33%) | 4(25%) | 0% | | 0% | |
| (intensive care) | | | | | 0% | | |
| Handlækningadeild | 6(30%) | 2(13%) | 6(30%) | 3(20%) | | 0% | |
| (surgery) | | | | | 0% | | |
| Kvennadeild | 6(38%) | 3(27%) | 5(31%) | 2(18%) | | 0% | |
| (gynaecology) | | | | | 0% | | |
| Lyflækningadeild 1 | 15(47%) | 8(29%) | 9(28%) | 5(18%) | 1(3%) | 0% | |
| (medicine) | | | | | | | |
| Lyflækningadeild 2 | 4(57%) | 3(50%) | 4(57%) | 1(17%) | 0% | 0% | |
| (medicine) | | | | | | | |
| SEL (nursing | 9(43%) | 4(29%) | 7(33%) | 1(7%) | 2(10%) | 0% | |
| home) | | | | | | | |
| *Slysadeild | | 5(63%) | | 4(50%) | | | |
| (emergency) | | | | | | | |
| Öldrunarlækninga | 1(10%) | 5(33%) | 4(40%) | 1(7%) | 0% | 0% | |
| deild (rehab/older) | | | | | | | |
| Total | 72(45%) | 46(32%) | 48(30%) | 23(16%) | 6(4%) | 0(0%) | |

^{*} Not participating 2006

Table 30 shows that 8% (12) of the staff had eczema and nail-bed infections in 2006, and the same proportion in 2008. Seventy-two percent (115) in 2006 and 75% (107) in 2008 had short nails (p-value 0.209). Fifteen people wore nail polish in 2006 and 10 in 2008. Artificial (press-on) nails were 2 in 2006 and 5 in 2008. Detailed data on hand eczema, artificial nails, nail polish and short nails are shown in Table 10.

Table 30. Number of staff with infected nail-beds/eczema, artificial nails, nail polish, short nails according to ward and year

| Ward/Speciality | Infected wounds on nails, hands, eczema | | Artificial nails | | Nail polish | | Short nails | |
|--|--|------|------------------|------|-------------|------|-------------|------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Barnadeild (paediatrics) | | | | | 1 | 1 | 7 | 5 |
| Bæklunardeild (orthopaedics) | 3 | 1 | | | 1 | | 12 | 11 |
| Endurhæfinga deild (rehab/younger) | | | | 1 | | 1 | 8 | 6 |
| Gjörgæsla (intensive care) | 4 | 1 | | | 1 | 2 | 16 | 8 |
| Handlækninga deild (surgery) | 4 | | 2 | 1 | 3 | 1 | 14 | 12 |
| Kvennadeild (gynaecology) | | 2 | | 1 | 3 | 1 | 10 | 8 |
| Lyflækningadeild I (medicine) | | 3 | | | | 1 | 26 | 25 |
| Lyflækningadeild II (medicine) | | | | 2 | 1 | 2 | 6 | 5 |
| SEL (nursing home) | | 4 | | | 3 | | 11 | 11 |
| *Slysadeild (emergency) | | | | | | 1 | | 6 |
| Öldrunarlækninga deild (rehab/older) | 1 | 1 | | | 2 | | 5 | 10 |
| Total | 12 | 12 | 2 | 5 | 15 | 10 | 115 | 107 |

^{*} Not participating 2006

Use of gloves when in contact with body fluids decreased from 78% (124) in 2006 to 25% (35) in 2008 (p < 0.0001), and occasional use of gloves increased from 18% (28) in 2006 to 65% (93) in 2008 (p < 0.0001).

Observation of staff involved in wound dressing changes (questionnaire C).

Thirteen staff were observed changing wound dressings in 2006, and nine in 2008. The mean working experience time of staff involved in wound treatment was 24 years in 2006 and 14 years in 2008. Short nails had 55% of the observed staff in 2006 and 64% in 2008. A total of 11 patients with 20 wounds in 2006 and 10 with 16 wounds in 2008 participated in the study. None of the observed staff (4) with long hair wore it up in 2006, but all (2) did so in 2008. Of the total 22 observations of wound dressing changes during the two years, physicians were present in three cases.

Table 31. Number of observed staff involved in wound dressing changes (22) and professional background, according to ward and year

| Ward/Speciality | Number of ol | bserved | Nurs | es | MDs | |
|---|--------------|---------|------|------|------|------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Bæklunardeild (orthopaedics) | | 3 | | | | |
| Endurhæfingadeild (rehab/younger) | 1 | | 1 | | | |
| Handlækningadeild (surgery) | 1 | 2 | 1 | 8 | | |
| Kvennadeild (gynaecology) | 2 | | 1 | | 1 | |
| Lyflækningadeild 1 (medicine) | 8 | 1 | 6 | 1 | 2 | |
| SEL (nursing home) | 1 | 2 | 1 | | | |
| Öldrunarlækninga deild (rehab/older) | | 1 | | | | |
| Total | 13 | 9 | 10 | 9 | 3 | 0 |

Four of the staff removed jewellery before changing wound dressings in 2006 and one in 2008. One of the staff removed bracelets/ watches before handling the wound in 2006 but none in 2008.

Six staff disinfected their hands before and after wound dressing changes in 2006 and 8 in 2008. The staff applied hand disinfectant, (5) applied on fingertips, (6) between fingers, (5) in between fingers and thumb and (3) on the forearms in 2006. In 2008 all staff applied hand disinfectant on fingertips, between fingers, between fingers and thumb and (5) on

forearms. Gloves were used in 85% (11) cases in 2006 and 78% (7) cases 2008. Plastic apron was not available in 2006 but used in three cases 2008.

Wound characteristics, Pressure ulcers, Leg and Foot ulcers, other type of ulcers/wounds (questionnaire D+E+F).

A total of 11 patients with 20 wounds participated in the study in 2006 and 10 patients with 16 wounds in 2008. In 2006 there was no patient with a pressure ulcer, three with leg and foot ulcers and eight with other ulcers/wounds. In 2008, four patients had pressure ulcers, one had leg and foot ulcers and 5 patients had other ulcers/wounds.

Table 32. Number of patients with wounds, according to ward and year

| Ward/Speciality | Proto Press Ulcer | ure | Protoc. E, Le Foot ulcers | eg and | Protoc. F, Other ulcer/wound | |
|--|-------------------------|------|------------------------------|--------|------------------------------|------|
| | 2006 | 2008 | 2006 | 2008 | 2006 | 2008 |
| Handlækningadeild (surgery) | | 1 | | | 1 | 2 |
| Lyflækningadeild 1 (medicine) | | | 2 | | 4 | 1 |
| Bæklunardeild (orthopaedics) | | | | 1 | | 2 |
| SEL (nursing home) | | 2 | 1 | | 1 | |
| Öldrunarlækningadeild (rehab/older) | | 1 | | | | |
| Endurhæfingadeild (rehab/younger) | | | | | 1 | |
| Kvennadeild (gynaecology) | | | | | 1 | |
| Total no. of patients with wounds | 0 | 4 | 3 | 1 | 8 | 5 |

No pressure ulcers were present in 2006 and six in 2008, there were 10 leg and foot ulcers in 2006 and 2 in 2008. Other ulcers/wounds numbered 10 in 2006 and 8 in 2008.

Table 33. Number of wounds per ward

| Ward/Speciality | Scheme D, Pressure Ulcers | Scheme and Foot | , 0 | Scheme F, Other ulcer/wound | |
|-------------------------------------|---------------------------------|-----------------|------|-----------------------------|------|
| | 2008 | 2006 | 2008 | 2006 | 2008 |
| Handlækningadeild (surgery) | 1 | | | 1 | 5 |
| Lyflækningadeild I (medicine) | | 7 | | 6 | 1 |
| Bæklunardeild (orthopaedics) | | | 2 | | 2 |
| SEL (nursing home) | 4 | 3 | | 1 | |
| Öldrunarlækningadeild (rehab/older) | 1 | | | | |
| Endurhæfingadeild (rehab/younger) | | | | 1 | |
| Kvennadeild (gynaecology) | | | | 1 | |
| Total number of wounds | 6 | 10 | 2 | 10 | 8 |

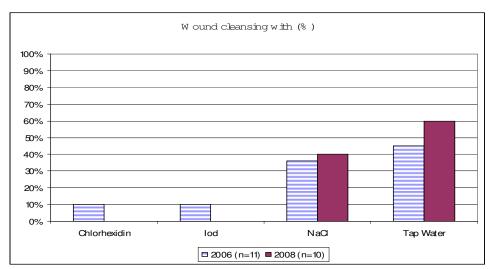


Figure 12. Wound cleansing agents, according to year

Wound dressings were changed between 1 and 7 times per week, and wounds were predominantly cleansed with tap water or saline. Wound cleansing is shown in figure 12.

revalence—interventions—revalence of pressure dieers, eating difficulties and nospital hygiene

Dressing types used at the hospital on the study day are shown in Table 34.

Table 34. Type of dressing, according to ward and year

| Ward/Speciality) | Local dressing in use | 2006 | 2008 |
|--|---|--------|------|
| Endurhæfingadeild (rehab/younger) | Aquacel, Teqaderm | 1 | |
| Handlækningadeild (surgery) | Allevyn | | 1 |
| (111 81 3) | Jelonet/flamazin creme | | 2 |
| | Jelonet + mefix | 1 | |
| Kvennadeild (gynaecology) | Cotton Gauze dressing | 1 | |
| Lyflækningadeild I (medicine II) | No Dressings | 1 | |
| | Allevyn | 1 | |
| | Contreet | 1 | 1 |
| | Cotton Gauze + Absorbent Dressing Pads+ mefix | 1 | |
| | Sorbact | | 1 |
| | Atrauman, Cotton Gauze | 1 | |
| | Mepore | 1 | |
| Bæklunardeild (orthopaedics) | Aquacel | | 1 |
| | Sorbact | | 1 |
| | V.A.C. | | 1 |
| SEL (nursing home) | Allevyn Foam | 1 | |
| | Aquacel | Foam 1 | |
| | Opsite postop | 1 | |
| | Mepore | | 1 |
| Öldrunarlækningadeild (rehab/older) | Allevyn Foam | | 1 |

revalence—interventions—revalence of pressure dieers, eating difficulties and nospital hygiene

Microorganisms isolated from the wounds before and after cleansing of the wounds are shown in Table 35.

Table 35. Wound microbiology before and after cleansing according to year

| Before cleansing | After cleansing | Before cleansing | After cleansing |
|---------------------------|----------------------------|--|--|
| 2006 | 2006 | 2008 | 2008 |
| No growth (3) | Staph. Coag. Neg. | No growth (2) | |
| No cultivation (2) | | No cultivation (2) | |
| Staph. aures +++ | | Klebsiella pneum. (+) Staph. coag. Neg. + | Klebsiella pneum. (+) Staph. coag. Neg. + |
| Strept. hemol. gr. A | | Staph. aures ++ | Staph. aures ++ |
| Non hemol. enterc. | Non hemol. enterc. | Staph. coag. neg (+) | Staph. coag. neg (+) |
| sp +++ | sp (++) | Corynebact. (+) | Corynebact. (+) |
| E. coli +++ | E. coli (++) | Staph. aureus ++ Staph. coag. neg++ | Pseudomonas aeruginosa (+) Staph. aureus ++ |
| Non hemol. enterec. sp ++ | Non hemol. enterec. sp (+) | Staph. coag.neg.+ Acinetobacter baum (+) Strept. hemol. gr. C+ Corynebact + | Staph. coag.neg.+ Acinetobacter baum (+) Strept. hemol. gr. C(+) |
| Staph. coag.neg+ | Staph. coag.neg+ | • | |

V Discussion

The results from the Prevalence-Intervention- Prevalence studies are quite acceptable and the project has created extensive knowledge amongst the hospital staff, while at the same enhancing quality and safety within the field of preventive actions and treatment. Such creation of knowledge should increase the value of knowledge development within the organisational unit.

The study of prevalence of pressure ulcers in 2005 and 2007 was carried out with no major difficulties. Extensive information was given prior to the studies, where the nurses responsible for the data collecting were present. The recording and the grading of the pressure ulcers had one (1%) internal loss 2005, none in 2007. The same internal loss was recorded for the Norton Score. Patient participation was 92% and 93% in 2005 and 2007 respectively. In most cases, the same researchers recorded the data both in 2005 and 2006. The questionnaires were in general very well filled in. In 2005, the study was also carried out in an acute and emergency-ward (13 patients). The 2007 this ward was not included in the data collection, and for this reason the data have been excluded from all calculations and statistics in this report.

The prevalence of pressure ulcers at Akureyri Hospital in 2005 was 17% and in 2007 was the prevalence 20%, which can be compared with the prevalence at the Landspítali (Sigurjónsdóttir, 2009) and at hospitals in Belgium, the UK and Sweden, which (measured with the same method) varied between 21.1% and 22.9%. In Italy and Portugal prevalence have been reported to be 8.3% and 12.5% respectively.

In the present study, 88% (n=46) in 2005 and 96% (n= 46) in 2007 of the pressure ulcers were grade 1 ulcers, and only a few, 12% (2005) and 4% (2007) were grade 2. No pressure ulcers of grade 3 and 4 were detected while 30% (14) had ulcers of grade 3 or 4 at the Landspítali 2009 (Sigurjónsdóttir, 2009). These results could be compared with the study in Uppsala (Gunningberg, 2004), where only 66% of the ulcers were grade 1. In the Skåne studies (Lindholm et al., 2007b; Lindholm et al., 2007c), the percentage of grade 1 ulcers was mean value 63%, of grade 2 ulcers was mean value 20%, of grade 3 ulcers was the mean value 6% and of grade 4 ulcers was the mean value 4%. In one study in the Azores, the prevalence of pressure ulcers was only 14.2 %, but 70% of these pressure ulcers were grade 3-4, indicating a substantial care problem.

The location of the pressure ulcers varied significantly between the years studied, so that the study in 2007 included more pressure ulcers on the feet, particularly on the toes. This might be explained by an even more careful scrutiny of the foot in 2007. A remarkable (p < 0.023) decrease in sacral pressure ulcers was noted between 2005 (18%) and 2007 (6%) This is in most cases attributable to good nursing and high standard of pressure distributing mattresses. The corresponding figures were in the Skåne studies 15% sacral ulcers, and in the South Atlantic study 35.5%.

Many pressure ulcers (37.7%) in the present study were located on the heels. This finding is in accordance with findings in other studies (Gunningberg, 2004; Lindholm et al. 2007b; Lindholm et al., 2007c). Specific action should be directed to protecting the heels, particularly in patients with a peripheral arterial occlusive disease (POAD), which is regarded as becoming increasingly common due to longer life-span and smoking habits in the population. In future studies it is also recommended to focus on the peripheral arterial circulation of the feet, and to record heel prevention measures separately.

The fact that the pressure preventions used in the chair/wheelchair decreased significantly (p < 0.023) from 31% to 5% is surprising. But the question is, were the same number of patients prone to sitting for long periods in both years. If a patient is in bed all day and not able to sit at all, the answer will probably be that no prevention in the chair/wheelchair is in use. It is also possible that more patients were mobile and active in 2007 than in 2005.

Surprisingly, however, the patients with turning/moving scheme used in the chair/wheelchair increased significantly (p < 0.003) from 2% to 5%, even though the numbers are so low that no conclusions can be drawn. The total prevention activities in chair/wheelchair should also be examined more carefully in future studies.

In the hospitals in Skåne (Lindholm et al., 2007b; Linholm et al., 2007c), the mean Norton score for patients with pressure ulcers was 19.7, while at Akureyri Hospitalthe mean score was 22.2 (2005) and 21.1 (2007), which is high. This might indicate a high number of patients with relatively good health status. The pressure ulcers identified at Akureyri Hospital were all superficial, and it is likely that the Norton score had minor relevance for these patients. Although the score was >20 for some patients with pressure ulcers in the present study, 20 has proved to be a safe cut-off point for high risk patients in other studies (Ek and Bjurulf, 1989; Gunningberg, 2004; Lindholm et al., 2007b; Lindholm et al., 2007c).

The lack of correlation between low Norton score and presence of pressure ulcers may also have been balanced by the fact that the mattresses at Akureyri Hospital were of remarkably good quality and thickness compared to mattresses in the Skåne hospitals. These excellent mattresses and a replacement programme may also contribute to the absence of grade 3 and 4 ulcers, and the decrease in sacral ulcers. The mattress replacement policy, introduction of risk assessment and directed preventions according to the risk assessment appear, however, to have altered an already favourable outcome. It is likely that the transformational leadership contributed to the quality improvements.

Another explanation of the absence of severe pressure ulcers might be the high outcome of prevention actions in the present study. In Akureyri Hospital, 95% and 83% of the patients (21 and 19) with Norton score ≤20 (22 and 23) had some prevention (no significant changes) between the years. The results from the 2007 study indicate that the interventions resulted in a higher proportion of grade 1 pressure ulcers, decrease of severity, increase of risk assessment, changed location pattern and better prevention in the hospital. However, a study utilising incidence methodology might have given more reliable answers to the question of improvements. The patient mix on the specific occasion when pressure ulcers are registered can be influenced by random factors.

To perform repeated prevalence studies between which an intervention is implemented, the Prevalence-Intervention-Prevalence (P-I-P) methodology has been valuable. A similar success was recorded in the Stockholm studies (Lindholm et al., 2007a). In these studies, as well as in the Akureyri studies, the researchers had central positions in the management of the hospital and it is likely that the transformational leadership contributed to the quality improvements.

However, in the Skåne studies, the P-I-P method per se did not lead to any improvements (Lindholm et al., 2007b; Lindholm et al., 2007c), since such central leadership was absent in the hospitals studied at the time of that study.

The studies of prevalence of malnutrition/eating difficulties in 2006 and 2007 were also carried out without difficulties. One limitation was that the study was performed during one day (point-prevalence study), but it is not likely that the results would have differed

substantially using another technique as answer when and why the risk was developed. The rate of participation was high, 89% (in 2006) and 88% (in 2007) and the patients participating were similar in age and gender on the two occasions.

The data collection went smoothly since the preparation and information was well performed. This resulted in carefully filled-in forms with few missing data. The nutritional actions showed a difference between the two study dates. The results of this study showed fewer patients who were underweight and had eating difficulties at the follow-up compared to the baseline study. Prevalence of different types of eating difficulties was identified in over half of the participating patients, 63% (n=60) in 2006 and 58% (n=53) in 2007. This is about the same prevalence of eating difficulties that was found in Swedish hospitals (Westergren et al. 2008). The action in the first year (2006) to meet this was to serve small portions of food, while in 2007 more patients received oral supplements but not protein- and energy-enriched food. It is important to change this.

Moderate or high risk of under nourishment had decreased to 18% (n=16) in 2007 compared to 27% (n=24) in 2006 (non significant), and was somewhat lower in 2007 than found in Swedish studies (Elmståhl, 2001; Westergren et al., 2008). The result from 2007 is also lower than in an Icelandic study from 1999, where 21% of the patients in the study were undernourished (Thorsdóttir et al., 1999). One reason may be differences in definitions of under nutrition. Another reason may be differences in age of the patients. The mean age of the patients in the study from 1999 was 56 years, while it was 71 years in 2006 and 70 years in 2007. Unintentional weight loss had statistically significant (p < 0.041) lower prevalence in 2007, in 13% (n=12) of patients, compared with 20% (n=19) in 2006 but was 18% in the Icelandic study from 1999. The 5-point programme for nutrition and eating was implemented in October of 2006, and it may have influenced the point-prevalence of patients at risk of under nourishment. However, most probably the patient mix on the study day explains the figure of patients at risk of under nourishment and unintentional weight loss in 2007.

The prevalence of high BMI 52% (n=49) in 2006 and 54% (n=50) of the patients (2007) was higher than in southern Sweden, 39% using the same criteria (Westergren et al., 2008). This may reflect differences in the patient mix and possibly differences in precision of the scales used for weighing. It is also higher than in the Icelandic study from 1999, where 28% of the patients that were admitted to dietetic services had BMI \geq 25 (Thorsdóttir et al., 1999).

It should be pointed out that the number of overweight people in Iceland has increased during the last ten years (Thorsson, Aspelund, Harris, Launer, and Guðnason, 2009) as in other western countries. But overweight/obesity is a factor to take into account in a public health perspective. Depending on what type of care is given, educational programmes on weight loss and increased physical activity might be appropriate, especially after the patient leaves the hospital.

The largest improvements were made by serving in-between meals, consisting of food supplements or fruit, and by introducing an evening meal at 21.00-22.00, to shorten the night fast. These actions were not specifically for patients classified at risk of under nourishment, but rather for all patients, and in this area we need to see improvements as in Sweeden (Olin, Osterberg, Hadell, Armyr, Jerström and Lungquist, 1996).

The programme implemented had led to significant improvements (p < 0.001) in recording of BMI in the patients' charts, showing an increased awareness among staff concerning nutritional assessment. Also the increase of nutritional actions for all patients in 2007 compared to 2006 showed that the introduction of the 5-point programme had been of value.

It has been reported that the effects of intervention studies on improvement of hygiene routines has not had long-term effects of improving hygiene routines (Pittet, 2001). However, by illuminating the problem and by performance of repeated prevalence studies with an intervention in between (P-I-P), hopefully excellence may be achieved at Akureyri Hospital. One plan might be to certify wards which demonstrate excellence in hospital hygiene standards. The hygiene and wounds microbiology studies in 2006 and 2008 gave important information regarding availability of, and compliance with, hygiene routines. One limitation was that the study was performed during one day (point-prevalence study) like the others. Another limitation was that the hygiene norms were set by Swedish standards, which may differ somewhat from Icelandic guidelines. However, the mother study was designed in Sweden, and the value of the possibility of a comparison between the two countries overshadowed this weakness.

Only on one ward were no recommendations/guidelines available in 2006, while they were available on all participating wards in 2008. However, on a few wards such

recommendations were not present in introduction programmes for new staffnembers, and only on one ward in 2008.

Jewellery was worn in 45% of cases in 2006 and 32% of cases in 2008 (p < 0.0010), and wristwatches were worn by 30% of the staff in 2006, but 16% in 2008 (p < 0.0001) but it is well documented that rings and bracelets/wristwatches harbour billions of micro organisms, and that they should not be worn by staff involved in the care of patients (Gustafsson, Norberg and Struwe, 2000).

Hand disinfection was performed according to different routines on different wards. Methodology for disinfection of hands/forearms improved between 2006 and 2008, but there was a lack of hand disinfection before and after changing wound dressings in almost half the cases in 2006 (54%), but in 11% of cases in 2008 (ns). Forearms were also only rarely disinfected in 2006, but in 56% of cases in 2008. That is important to have in mind when staff is asked about their frequency of hand disinfection, they tend to overestimate their performance (Harris, Samore, Nafziger, Dirosario, Roghmann and Carmeli, 2000). It is therefore recommended that compliance be studied by observation as in this study (O'Boyle, Henly and Larson, 2001). The study in 2006 probably gave a true picture of the situation and provided an excellent baseline for improvements.

There was no single pressure ulcer present in 2006, which might be either a sign of good quality of care or a random coincidence, since some patients are admitted with pressure ulcers and some will inevitably develop due to patients' severe condition (Lindholm, et al. 2008a). In the study there were ten leg and foot ulcers, and ten wounds of other origin. No MRSA, VRE or multi-resistant Gram negative bacteria were identified, but one case of beta-haemolytic streptococcus Group A.

In the study in 2008 there were six pressure ulcers, two leg and foot ulcers, and eight of other origin. No resistant Gram-negative bacteria or MRSA and VRE bacteria were identified, but one case of haemolytic streptococcus Group C. The wounds were cleansed with either tap water, NaCl or Iodine (one case) or Chlorhexidine (one case) in the 2006 study. In the 2008 study wounds were cleansed with tap water in six cases and NaCl in four cases. The dressings were changed between none and seven times a week in the both studies. Seven times is usually too frequent for most non-infected wounds. However, heavy exudation might necessitate this frequency. There was no change in microbial flora pre- and post-cleansing of the wounds. These results are in harmony with the results from the Skåne studies (Lindholm,

et al. 2007b; Lindholm et al. 2007c; Linholm et al., 2008b). It might be tempting to abandon the tradition of wound cleansing in view of these results. However, there are other agents in the wounds which should be removed by proper wound cleansing, such as necroses and senescent cells. Traditional wound cleansing might not influence bio film, which seems to embed micro organisms in a slime (Lindholm, C., April 2009) which can only be broken by surfactant solutions.

Even if the hygienic standard was generally satisfactory, there is potential for improvement in a few areas. Nosocomial infections include both infections which patients acquire at hospital or through care in the community, and infections acquired by staff caused by the working conditions. Nosocomial infections can prolong hospital stay and entail extremely high costs. It has been estimated that all nosocomial infections in Sweden entail a cost of 3.7 billion SEK annually (Lundholm, 2006). Nosocomial infections are also a common cause of mortality (Emori and Gaynes, 1993).

The hands of staff carry numerous micro organisms which, if transmitted to a fragile patient, can cause a life-threatening infection. Barrier care including hand hygiene, hand disinfection and use of gloves can reduce the number of nosocomial infections (Ericsson, Ericsson, and Palmgren, 2002), and should be practised before and after all patient contacts (WHO guidelines, 2006).

Compliance with hygiene guidelines is therefore vital, in order to protect the patients from infections. Reasons for lack of compliance with hygiene guidelines have been reported to be fear of drying out the skin and allergy (Patarakul, Tan-Khum, Kanha, Padungpean and Jaichaiyapum, 2005), but also that the work is stressful and that one forgets to disinfect the hands. According to Gunnarsdóttir and Ingason (2007) it seems that quality management through keeping records of unforeseen incidents using prevalence studies is a useful method of monitoring quality, prevention, and guaranteeing safety in nursing. When intervention was implemented between the examinations, no assessment was made either of departmental culture or of characteristics of transformational leadership, but according to Storey et al. (2008) it is recommended that an assessment of this kind be carried out prior to the implementation of change. However, the examiners were aware that this culture and leadership could vary from one department to the other, which could in turn have affected the results. There was also an awareness that attitudes towards change might differ between departments, and therefore communication and cooperation were emphasised, along with

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teaching and presentation of interventions and results at departmental meetings, in order to diminish potential impediments.

In the present P-I-P- studies, it was demonstrated that central leadership in nursing was vital for some of the interventions, and to propel the project forwards. Acquisition of training equipment for hand hygiene ("Glitterbugs") and the installation of new automatic alcohol dispensers, as well as the printing of a poster directed at patients and next of kin and signed by the chief doctor and chief nurse of the respective ward, were examples. The clarification of the role and mandate of the infection control nurse was another important intervention which may have contributed to the improved results in the follow-up study in 2008.

To perform repeated prevalence studies between which an intervention is implemented (the Prevalence-Intervention-Prevalence (P-I-P) methodology has been valuable. This leads us to believe in an optimal model for change in nursing and optimisation of quality of care and patient safety, built on the PDSA quality circle (Sheward's cycle), including the role of leadership in nursing. That corresponds with Marchionni and Ritchie (2008), who indicate that the heads of nursing departments, co-workers and clinical specialists in the relevant fields that lead the changes in the departments with support from the nursing manager, are probably a crucial factor in implementation of interventions in nursing.

Limitations

As this work is very extensive it was impossible to go in the depth of each project, according to literature review. The used instruments were all translated from Swedish to Icelandic and although their reliability and validity was not proven in the project the instruments are measuring rather concreat issues that are not subjective in translations. Therefore it is assumed that the Icelandic instruments are measuring the same objects as the instrument in other language. However more researchs are needed.

VI Summary

Intervention and safety in nursing at the Akureyri Hospital are at the core of this project. It is based on a quality development plan which was implemented in 2005 and ended in 2009. The plan consisted of six quality investigations; two pressure ulcers, two nutrition and two hospital hygiene and wound microbiology quality investigations, which in turn included the implementation of intervention, teaching and assessment between evaluations.

Between examinations preventive actions (intervention) were implemented, and the project was carried out according to Deming's modified PDSA quality circle: Plan, Do, Study and Act model. Point-prevalence methodology was used for research. This is the first time intervention or clinical guidelines for nursing are implemented and the effects have been evaluated at the Akureyri Hospital with the above mentioned method.

The quality project was supported by the hospital management and approved by its heads of nursing departments. It was carried out in cooperation with the research team "Patient Focused Clinical Research," located at the University of Kristianstad in Sweden. The team carries out research and developmental work within the field of patient safety. Researchers from the team were present throughout all the studies in Akureyri.

The main results from the "Pressure Ulcers - Prevalence and Prevention" quality studies in 2005 and 2007 were that there was an increase of 3 percentage points between examinations in pressure ulcers (17% in 2005; 20% in 2007) and that there was a significant difference in terms of where the ulcers developed. In the 2007 study, pressure ulcers were more frequently located on patients' feet and legs than in 2005. There was a marked decrease in the number of ulcers found on the sacrum in 2007. In 2005, 88% of the pressure ulcers were grade 1 ulcers (persistent erythema), while the corresponding figure in 2007 was 96%. Relatively few grade 2 ulcers were found in the study; 12% in 2005 and 4% in 2007. No pressure ulcers of grade 3 or 4 were found in these examinations. All ulcers were in the surface of the skin.

Results from the Eating and Nutrition quality examinations in 2006 and 2007 were that fewer patients had a low Body Mass Index (BMI) and suffered from malnutrition (14% vs. 17%) in 2007 than in 2006. However, in both years a similar number of patients had a high BMI (52% in 2006; 54% in 2007). In the examinations 16% of the patients in 2006 and 20% in 2007 were categorised as obese. In 2007 three patients showed signs of severe obesity, but none in 2006.

An unintentional weight loss was recorded in 20% (19) of the patients in 2006 as opposed to 13% (12) in 2007. In 2006 63% (60) of the patients experienced difficulties with feeding and the corresponding figure in the 2007 examination was 58% (53). Significant improvements were made between 2006 and 2007 in the registration of BMI and the greatest improvements (ns) were found in the increase of extra nutrition for all patients.

The third quality project which was carried out consisted of examining the basics of infection prevention, compliance with hygiene recommendations and guidelines, and microorganisms in ulcers, in order to enhance safety in patient treatment at the hospital. The main results in the studies 2006 and 2008 were that 98% of the staff wore scrubs in 2006 and 94% in 2008 and in 72% of cases the clothes were changed daily. The staff removed rings and bracelets and wristwatches in significantly more cases in 2008 than in 2006 and there were also significant improvements in hair hygiene between the years. Nails were cut short by 72% in 2006 and 75% in 2008, and nail-bed infections and hand eczema were at almost equal levels in 2006 and 2008.

The most satisfactory point was the increase in number of hand disinfection dispensers from 1.3 per staff member in 2006 to 6.1 per staff member in 2008, and the method of disinfections of hands and forearms, that improved significantly between 2006 and 2008. One aspect of this project was the hiring in 2006 of a nurse specialised in infection, who followed up a 5-point plan on the basics of infection prevention between the examinations.

The importance of patient safety during treatment in health institutions is indisputable. However, this safety can be compromised by a lack of operational guidelines in health institutions or by insufficient follow-up of such guidelines. Icelandic regulations require incidents of this kind to be registered, but as such registration is still in its developmental stages in many health institutions there are examples of it reaching an unsatisfactory level.

One example of possible complications is a patient developing a pressure ulcer during hospitalisation due to insufficient preventive measures, which can in turn often be traced to a lack of risk evaluation regarding pressure ulcers. Another example is a hospital infection that is traceable to staff negligence in terms of basic hygiene principles or the lack of risk evaluation regarding infections. The seriousness of complications of this kind can vary, but it is always the patient who suffers. The above cases can be examined both from the patient's point of view and from a financial viewpoint, as the financial resources available to health services are limited at any given time.

Research has shown that pressure ulcers cause suffering, constant pain and infections, at the same time as they limit patients' mobility and thereby also reduce their independence and restrict their possibilities in terms of social activities. It has also been established that pressure ulcers increase risk of death, and a study shows that 35% of patients diagnosed with pressure ulcers died within three months (Lindholm et al., 1999; Lindholm et al., 2007a). Pressure ulcers are one of the four most expensive diseases, along with cancer, cardiovascular diseases and AIDS (Haalboom, 1998).

Expenses from hospital infections, pressure ulcers and malnutrition mainly stem from a prolonged period of hospitalisation, health expenses and various inconveniences suffered by the patients. It should therefore be obvious that, by increasing patient safety and reducing complications, great suffering and unnecessary expense can be avoided, thereby creating opportunities for other valuable work within health services.

The importance of this project for health science can hardly be doubted, as it is imperative that such projects are successfully implemented, and research shows that as many as 30-40% of patients do not receive treatment based on new scientific findings and that 20-25% of the treatment that they receive is unnecessary and even harmful (Grimshaw and Grol, 2003). It also seems reasonable that health professionals should receive more training in preventive measures regarding pressure ulcers, and that their education should include more emphasis on nutrition, both as a preventive factor and as a part of the treatment. Furthermore, the basics of infection prevention should be addressed more directly, e.g. the follow-up on guidelines in relation to hand-washing. All these factors can reduce unnecessary risks for the patient and thereby also unnecessary pain, at the same time as they cut down the costs for society as a whole.

The quality project ended in 2009 and it illuminated problem in the fields of nursing; pressure ulcers, nutrition and hygiene but also improved the nursing in areas with interventions between the studies. My recommendation for the future researches is to repeat the miniature studies within pressure ulcers, nutrition and hygiene with an intervention between (P-I-P method) and hopefully more excellence in nursing in these areas may be achieved in the future at Akureyri Hospital.

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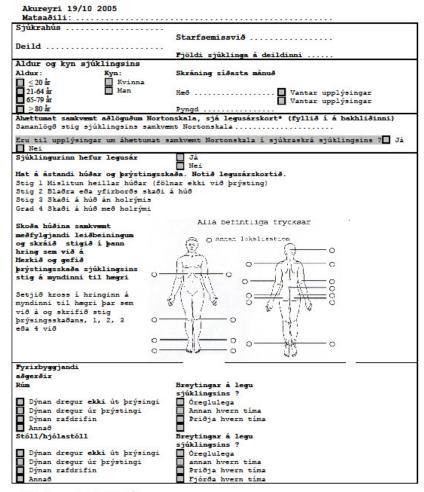
Trevarence of pressure areas, eating afficients and hospital hygiene

Appendices

Appendix 1. Questionnaire for prevalence of pressure ulcers, Icelandic version



Spurningalisti vegna gæðaúttektar á legusárum á Fjórðungssjúkrahúsinu á Akureyri



Pýtt úz sænsku 10.10.05/ÓT

......

revarence interventions revarence of pressure dicers, eating difficulties and nospital hygiene

Appendix 2. Modified Norton Scale Icelandic version

| Aðlad | gaður Nortonskali |
|--|--|
| Andlegt ástand 4 Áttaður á stað og stund 3 Stundum óáttaður 2 Svarar ekki kalli 1 Ekki hægt að ná sambandi við Líkamleg virkni 4 Gengur án eða með hjálpartækjum 3 Gengur með hjálp starfsmanns (hjólastóll við flutning) 2 Bundinn hjólastól (allan daginn) | 1 Stjórnar hvorki hægðum né þvaglátum G Almennt ástand 4 Ágætt (hitalaus, öndun eðlileg; tíðni og taktur Eðlileg hjartsláttartíðni, blóðþrýstingur, verkjalaus,eðlilegur húðlitur, útlit í samræmi við aldur 3 Gott (hitalaus- |
| 1 Rúmliggjandi Hreyfigeta 4 Full 3 Skert að hluta(þarf aðstoð við stöðubreytingu) 2 Mjög skert (þarf alla aðstoð en getur hjálpað til) 1 Hreyfigeta ekki til staðar (getur ekki hjálpað til) | hitaslæðingur, eðlileg öndum, hjartsláttur og blóðþrýstingur, jafnvel hraðurpúls, dulinn þurrkur - ofvökvun, verkjalaus eða litlir verkir,sjúklingur vakandi, fölvi á húð,smá bjúgur) 2 Slæmt (jafnvel hiti, erfiði við öndum, merki um ófullnægjandi blóðrás, hraður púls, bjúgur, |
| Næring 4 Meðal skammtur (eða algjörlega næring í æð) 3 % af meðal skammti (eða mótsvarandi í æð) 2 Hálfur skammtur (eða mótsvarandi í æð) 1 Minna en hálfur skammtur (eða mótsvarandi í æð) Vökvi | purkur eða ofvökvun, verkir, syfjulegur eða vakandi en áhugalaus. Fölvi á húð eða blámi, heit rök eða köld rök húð, eða fylling/teygjanleiki húðar minnkaður eða bjúgur) 1 Mjög slæmt(jafnvel hiti, erfiði við öndun, merki um ófullnægjandi blóðrás jafnvel sjokk, miklir verkir, syfjaður, svarar ekki áreiti, meðvitundarlaus. Fölvi á húð eða blámi, heit rök eða |
| 4 Meira en 1000 ml/dag 3 700 - 1000 ml/dag 2 500 - 700 ml/dag 1 Minna en 500 ml/dag | köld rök húð, eða fylling húðar minnkuð eða bjúgur) Samanlögð stig |
| Stjórnun hægða og þvagláta 4 Já 3 Tilfallandi(stjórnar venjulega) 2 Stjórnar annað hvort ekki hægðum né þvaglátum (þvagleggur) | Ek AC. Unosson M, Bjurulf P. The modified Norton scale and the nutritional intake, (1989) Scand J Caring Sci 3:4;183-187 (pýtt úr sænsku 12.10.05/ÓT) 20 stig eða minna = aukin hætta á legusárum. Mjög virkar legusársvarnir/ bætt hjúkrun! |

Frevalence—interventions- Frevalence of pressure dicers, eating difficulties and nospital hygiene

Appendix 3. Pressure ulcer card, Christina Lindholm ® and Modified Norton Scale, Icelandic version.



Aðlagaður Nortonskali A. Andlegt ástand 4 Áttaður á stað og stund 3 Stundum óáttaður 4 Já 3 Tilfallandi (stjórnar venjulega) 2 Svarar ekki kalli 1 Ekki hægt að ná sambandi við Stjórnar annað hvort ekki hægðum né Stjórnar hvorki hægðum né þvaglátum B. Líkamleg virkni G Allmennt astand Gengur án eða með hjálpartækjum Gengur með hjálp starfsmanns (hjólastóll við flutn 4 Ågætt (hitalaus, öndun eðlileg; tíðni og taktur. Eðlileg hjartsláttartíðni, blóðþrýstingur, verkjalaus, eðlilegur huð-litur, útlit í samræmi við aldur. ing) 2 Bundinn hjólastól (allan daginn) 1 Rúmliggjandi 3 Gott (hitalaus-hitaslæðingur, eðlileg öndun, hjartsláttur og blóð-þrýstingur, jafnvel hraðurpúls, dulin þurrkur - ofvökvun, verkja-laus eða litlir verkir, sjúklingur vakandi, fölvi á húð, smá bjúgur) C. Hreyfigeta 4 Full 3 Skert að hluta (þarf aðstoð við stöðubreytingu) 2 Mjög skert (þarf alla aðstoð en getur hjálpað til) 1 Hreyfigeta ekki til staðar (getur ekki hjálpað til) saus sed nilu verani, sjunningu vakarini, loviv a moi, sina ujugur) Stæmt (jafrivel hiti, erflöt við öndun, merki um ófullnægjandi blóðrás, hraður púls, þjúgur, þurrkur eða ofvökvun, verkir, syfju legur eða vakandi en ahugalaus. Fölvi á húð eða blámi, heit röl eða köld rök húð, eða fylling/teygjanleiki húðar minnkaður eða 4 Meðal skammtur (eða algjörlega næring í æð) 3 % av af meðal skammti (eða mótsvarandi í æð) 2 Hálfur skammtur (eða mótsvarandi í æð) 1 Minna en hálfur skammtur(eða mótsvarandi í æð) 1 Mjög slæmt (jafnvel hiti, erfiði við öndun, merki um ófullnæ-gjandi blóðrás jafnvel sjokk, miklir verkir, syfjaður, svarar ekki áreiti, án meðvitundar. Fölvi á húð eða blámi, heit rök eða köld rök húð, eða fylling húðar minnkuð eða bjögur). E. Vökvi 4 Meira en 1000 ml/dag 3 700 - 1000 ml/dag 2 500 - 700 ml/dag 1 Minna än 500 ml/dag 20 p eða minna = aukin hætta á legusárum g virkar legusársvarnir/bætt hjúkrun! The modified Norton scale and the nutritional intake. (1989) Scand J Caring Sci 3:4;183-187 (þýtt úr sænsku 12.10.05/ÖT)

Appendix 4. The 5-point programme for nutrition and eating

Programme for nutrition and eating

1 Make a basic assessment of

Unintentional weight loss (regardless of time and amount)

Eating difficulties (appetite, swallowing, lack of energy, motor disturbances)

Underweight (BMI <20 kg/ m^2 if \leq 69 years or BMI <22 kg/ m^2 if \geq 70 years)

Overweight (BMI >25kg/ m^2 if \leq 69 years or >27kg/ m^2 if \geq 70 years)

2 Risk for undernourishment

Order energy- and protein-enriched food, oral supplement Reduce night fast to a maximum of 11 hours Increase in between meals (to 45% of daily needs)

3 Risk for overweight

Order energy content of food according to patient's needs (approximately 25 kcal/kg body weight per 24 hours) and stimulate physical activity

4 Eating difficulties

Measures depending on the problem

5 Document and evaluate status, treatment and results!

Upon admission the patient's BMI is calculated.

(Westergren, A., Ulander, K., and Lindholm, C., 2006)

Appendix 5. Minimal Eating Observation Form (MEOF – Version I)

Appendix 4

Næring – tíðni könnun (MEOF I-Minimal Eating Observation Form- Form I) Fjórðungssjúkrahúsið á Akureyri, 15. mars 2006.

| Allir sjúklingar metnir sem dvelja á sjúkrahúsinu og þeir sem eru lagðir inn á deildina tímabilið 07:00 til 21:00, þann dag. | | | | | | | | | | |
|--|---|--------------------------|-----------------|---------|----------------------------|-----------|------|----------|-------|-------------|
| BAKGRUNNUR | | | | | | | | | | |
| Tekur ekki þátt | Einstaklingurinn | vill ek | ki 🗌 getur e | kki te | kið þátt | | | | | |
| 1. Fæddur/fædd (ár) | Ü | | | | • | | | | | |
| 2. Kyn | ☐ Kona ☐ Maður | | | | | | | | | |
| 3. Sjúkdómsgreining* | | | | | | | | | | |
| 5. Sjukdomsgrenning | | | | | | | | | | |
| Ástand | | | | | | | | | | |
| 4. Þvngd (kíló) | □ b | | | | | | | | | |
| 4. Pyriga (Kilo) | | Pyngd í kg: | | | | | | | | |
| | | Ekki hægt að vega vegna: | | | | | | | | |
| 5. Hæð (sentimetrar) | ☐ Hæð í sm: | | | | | | | | | |
| | Ekki hægt að mæ | | | | | | | | | |
| 6. BMI | BMI er skráð á de | eildinn | i. Skráðu það | | | | | | | |
| Ómeðvitað þyngdartap | ☐ Nei | | ☐ Já | | | | |] Óþekkt | | |
| 8. Næringavandamál. Merktu við eina | ☐ Hefur ekki þrek t | il að lji | úka máltíð, ha | ettir v | egna þreytu (e | kki me | tt/u | r) | | |
| eða fleiri staðhæfingar sem eiga við. | ☐ Erfiðleikar við að | opna | og eða loka n | unnin | um | | | | | |
| 5 5 | ☐ Kyningarerfiðleik | ar (t.d | . hósti, reynir | á sig | við að kyngja) | 1 | | | | |
| ☐ Engin vandamál með næringu. | ☐ Erfiðleikar við að | hafa r | natinn í munr | inum | (dreglar/safna | r matnı | um) | | | |
| | Borðar mjög hrat | (<10 | mín) miög ha | gt (>3 | 30 mín) | | | | | |
| | Erfiðleikar við að | | | | <i>*</i> | | | | | |
| | ☐ Erfiðleikar við að | | | | ellir niður. mi | issir) | | | | |
| | ☐ Erfiðleikar með n | | | | | | öri | 1) | | |
| | ☐ Borðar minna en | | | | | | | | | |
| | ☐ Vill ekki borða | 74 (75 | o) ar skommi | uoum | iiiii | | | | | |
| | ☐ Borðar ekki (viðb | nót) | | | | | | | | |
| | ☐ Óglatt, líður ekki | | ðbót) | | | | | | | |
| 9. Matarlyst | Mjög aukin | | Aukin | | Eðlileg | | М | innkuð | | Mjög |
| 9. Watarryst | ivijog aukin | | Aukili | | Lomeg | | 171 | IIIIKUO | _ | minnkuð |
| 10. Eru til staðar erfiðleikar við að | | | | | | | | | | HIHIKUO |
| tyggja matinn vegna munn eða | ☐ Oftast | | Mjög oft | | Einstöku | Ιп | Nic | estum | П | Aldrei |
| tannvandamála, laustennur? | U Ollasi | l | MJog off | | sinnum | | | drei | | Alulei |
| taiiivaildailiara, fausteilifui ? | | | | | SIIIIuIII | | an | 11 61 | | |
| Aðgerðir | | | | | | | | | | |
| 11. Hjálp við að matast | ☐ Matast sjálf/ur | | ☐ Uiáln að | hluto | t.d. smyrja br | ouăcno | iă/ | onno | Пъ | arf að mata |
| 11. Hjarp vio ao matast | iviatast sjani/til | | umbúðir? | muta, | t.u. siliyija bi | auosne | 101 | орна | _ P | arr ao mata |
| | | | umbuon : | | | | | | | |
| 12. Fæðistegund | ☐ Almennt fæði | | ☐ Orkubét | fæði | | | | | | |
| 12. I aoistegund | Sykursýkisfæði | | Önnur (s | | hvoðo). | | | | | |
| 13. Fæðisáferð | ☐ Almennt fæði | | Cilitar (| | unnfliótandi | | | | | |
| 13. Pædisaleid | ☐ Hakkað | | | _ | ondumatur að | bluto | | | | |
| | ☐ Maukfæði | | | | ondumatur ad Sondumatur | muta | | | | |
| | | 14 | | _ = ~ | | 11.7 | × | 8.1.1.7 | | |
| | □ Tært fljótandi(var gelé) □ Næring í innrennsli í æð að hluta □ Þykkfljótandi □ Næring í innrennsli í æð | | | | | | | | | |
| 44 (0. % (1.1) | ☐ Þykkfljótandi | | | | | nnsli i a | | | | |
| 14. Áferð á drykk | Venjuleg | | | | ótandi | | | Hlaup | (1.10 | |
| 15. Skammtastærð við aðalmáltíð (kcal) | Stór (1 ½ skai | nmtur | ca 🔲 | | al (1/1 skamm | ıtur, | | | • | kammtur, ca |
| | 600 Kcal) | | | ca 42 | 20 Kcal) | | | 200 H | (cal) | |
| 16. Fær viðbótarnæringu næringardrykk | Já (hvaða tegund) | : | | | | | | | | |
| eða mótsvarandi | ☐ Nei | | | | | | | | | |
| | ☐ Ekki vitað | | | | | | | | | |
| Dagsetning: | | | | | | | | | | |
| Mat gert af (+ nafn á nemenda): | | | | | | | | | | |

^{*} Skrifað á bakhliðina, ef með þarf

Appendix 6. Questionnaire A:





| <mark>Blað A:</mark> | lmennum grundvallar hre | inlætisreglum- |
|---|-------------------------|----------------|
| DagsetningStaður | | |
| 1.a Deild | ð (t.d handl. deild) | |
| 2.Fjöldi sjúklinga á deildinni eða komur | | |
| 3.a Fjöldi starfsmanna á morgunvakt (08.00 - 16 | .00) | |
| 3.b Fjöldi starfsmanna á kvöldvakt (16.00 – 24. | 00) | |
| 4. ☐ Sveitarfélag ☐ Sjúkrahús | ☐ Heilsugæsla | ☐ Annað |
| Almennar spurningar um deildina: 5.Þennan dag unnu starfsmenn | í | |
| Af þeim voru: Hjúkrunarfræðingar | | |
| Læknar,Sjúkraþj | álfarIðjuþjálfar | |
| Sjúkraliðar | /C] X' | |
| Aðrir s.s. hjúkrunarn | <u> </u> | enn |
| 6.Er notaður vinnufatnaður á deidinni? ☐ Já ☐ | Nei □Stundum | |
| 7.Fjöldi venjulegra skammtara með handspritti á | deildinni? | |
| (Fjöldi snertifría skammtara með handspritti á | deildinni?) | |
| 8. Eru til reglur um grundvallar hreinlæti á dei Veit ekki | ldinni? 🔲 Já | □ Nei □ |
| Ef svarið er já eru reglurnar ? | | |
| ☐ Í möppu eða rafrænt☐ Sem veggspjald☐ Í aðl | ögunaráætlun fyrir nýtt | starfsfólk |
| 9.Eru plastsvuntur notaðir á deildinni? 🗌 Já | Nei 🗌 Veit ekki | |
| Ef já, hve oft er skipt um svuntu? | | |
| ☐ Við hvert tilfelli ☐ Hvern dag | ☐ Stundum ☐ A | Annað |
| 10.Eru notaðir hlífðarsloppar á deildinni? 🗌 J | á□ Nei□ Veit ekki | |
| Ef já, hve oft er skipt um slopp ? hverja stofu □ Veit ekki | ☐ Við hvern sjúkli | ing 🗌 Við |
| 11.Hve oft er skipt um plastsvuntu/slopp ? | | |
| \square Hvern dag \square Við hvert tilfelli \square Stundum . | □ Annað | |
| | | |

Appendix 7. Questionnaire B:





Appendix 6

| Blað B: Úttekt á almennum g | rundvallar hrei Hvern stafsma n | | lum- eitt |
|---|---|-----------------------|-----------------------|
| DagsetningSt | | | - |
| 1.a Deild | .bSérsvið(t.d. ha | ndlæknings | svið) |
| 2.a |] Sjúkraliði] Aðrir skoðaður er Starfsaldur □ Já | □ Nei | . □ .tuttum ermum? |
| 6.Hvenær var skipt um síðast? ☐ Í dag ☐ Í gær meira en tveimur dögum | Fyrir tveimu | _ | öngum ermum? Fyrir |
| 7.Eru notuð eigin föt? Eru þau ? ermum? | ☐ Já ☐ Með stuttum | ☐ Nei ermum? | ☐ Með löngum |
| 8.Eru notuð vinnuföt og eigin fö | it? | ☐ Já | Nei |
| 9.Hafi starfsmaðurinn sítt hár: Er hárið uppsett/ eða í stert? | ☐ Já | ☐ Nei | |
| 10.Hringir og skartgripir a.Er starsmaðurinn með hringi og b.Er starfsmaðurinn með armband, c.Er starfsmaðurinn með göt í ar | /armbandsúr | ☐ Já ☐ Já ☐ Já | Nei Nei Nei |
| 11.Hendur, Neglur a.Eru sýkt sár á höndum/naglabör | ndum eða exsem? | | |
| b.Eru neglur starfsmannsins stut c.Er starfsmaðurinn með gervine d.Er starfsmaðurinn með lakkaðar | plur? | Nei Já Já Já | Nei Nei Nei |
| 12.Handskar Eru notaðir hanskar í snertingu | við líkamsvessa? | ☐ Nei | ☐ Stundum |
| | | | |
| Walinghaife and former and | 5 | | |

University Akureyri

Appendix 8. Questionnaire C





| Blað C: Úttekt á almennum grundvallar | | | | | | | |
|--|-------------------------|---------------------------|--|--|--|--|--|
| hreinlætisreglum- við umbúðaskipti á sárum - eitt | | | | | | | |
| blað fyrir - Hvern stafsmann | | | | | | | |
| Dagsetning Sta8ur | | | | | | | |
| 1.a Deild | (t.d. handlæknim | ngsdeild) | | | | | |
| 2.a Morgunvakt (08.00 - 16.00) 2.b | Kvöldvakt (1 | .6.00 - 24.00) | | | | | |
| Vinnur sem; 3. ☐ Hjfr ☐ Sjúkraliði ☐ Læknir | ☐ Anna∂ | | | | | | |
| 4.Heilbrigðisstarfsmaður sem er skoðaður er? | | | | | | | |
| | ır | | | | | | |
| 5.Fjöldi sjúklinga á deild | | | | | | | |
| 6.Fjöldi sjúklinga með sár sem þarf umhirðu/s | kiptingu | | | | | | |
| Starfsmaður með sítt hár; | | _ | | | | | |
| Er hárið uppsett eða í stert? | Já | Nei | | | | | |
| 8. Br starfsmaðurinn sem skiptir með sýkt sár Sýkt sár/ eða sýking í naglaböndum | ☐ Já | □ Nei | | | | | |
| 9.Grundvallar sýkingavarnir við skiptingu á sá | | | | | | | |
| a.Eru neglur stuttklipptar? b.Er starfsmaðurinn með gervineglur? | Já Já | Nei Nei | | | | | |
| c.Eru neglur lakka8ar? | Já | Nei | | | | | |
| d.Er starfsmæðurinn með hringi og skærtgripi? | ☐ Já | Nei | | | | | |
| e.Er starfsmaðurinn með armband/armbandsúr? | Já | Nei | | | | | |
| 10. Handþvottur Eru hendur þvegnar með sápu og vætni fyrir uml | | Já 🔲 Nei | | | | | |
| 11.Sótthreinsun handa | doaskipti : | oz Linei | | | | | |
| a.Eru hendur sótthreinsaðar med efni sem inni | | | | | | | |
| heldur alkohól fyrir umbúðaskiptingu? | ☐ Já | Nei | | | | | |
| b.Eru hendur sótthreinsaðar med efni sem inni heldur alkohól eftir umbúðaskiptingu? | ☐ Já | □ Nei | | | | | |
| nerdur arkonor ererr umbuoaskiptingu: | L 02 | MET | | | | | |
| 12.Aðgerð við sótthreinsun handa: | | | | | | | |
| ☐ Prýst einu sinni ☐ Prýst tvisvar prisvar eða oftar (☐ Snertifrír skammtari með | | Prýst | | | | | |
| , | , | | | | | | |
| 13.Handsprittinu er núið um allar hendurnar fr | rá fingurgómum | Já Nei | | | | | |
| a.Milli fingranna | □ Ja □ Já | Nei Nei | | | | | |
| b.Í þumalgrópina c.Á framhandlegg | Já | Nei Nei | | | | | |
| 14.Hanskar | - | | | | | | |
| Eru notaðair hanskar við umbúðaskiptin? | | | | | | | |
| 45 77/57 571 | ☐ Já | Nei | | | | | |
| 15.Hlífðarföt a.Er notuð plastsvunta við umbúðaskiptin? | ∏ Já | Nei | | | | | |
| b.Er notadur hlífdarsloppur? | Já | Nei | | | | | |
| c.Ef já, er hlífðarsloppurinn notaður: | Fyrir hvern Fyrir hverj | sjúkling a sjúkrastofu | | | | | |
| | | | | | | | |
| Undirskrift starfsmanns eða nemenda sem fyllir | r út blæðið | | | | | | |
| | | | | | | | |

Appendix 9. Questionnaire D

| HÖG |))((GSKO) STIANS | LAN TAD | | | Аррег | ndim 8 | | | Sjókr | à dieùder | Akureyri |
|---|---------------------------------------|-------------------|-----------------|---------|----------|------------|----------|------------|------------|------------------------|------------------|
| Blað D: Úttekt á legusárum | | | | | | | | | | | |
| Dagsetning | | | | | | | | | | 10 | |
| Üttektin gerð af: Nafn og kennitala | | | | | | | | | | | |
| Deild | | | | | | | | | | | |
| Simi | | | | | | | | | | | |
| | ilsugæs | | Heir | 1000 | | A Commence | | Langleg | | (9-1) | |
| ne: | LISuges | 3000 | | | | | | ld Endur | | | |
| | | | | | | 211042110 | gaucz | Zug Zuguz | | | |
| 2.a F | jöldi s | ára: | 2. | b Sterð | litilla | sára | mm | 2.c Ste | rð stær | ri sára. | ж |
| 3.a V | ið hvað | a adsta | dur ko | m sárið | /sárin? | | | | | | |
| 3.ь н | vener f | annst/f | undust | sári8/ | sárin í | fyrsta | sinn? | | | | |
| 3.c H | vað hef | ur senr | ilega | orsakað | sárið/s | sárin? . | | | | | |
| 3.d H | ve leng | i hefur | sjúkl | ingurin | n haft : | sárið/sá | rin? | | | | |
| 4. Hv | ert er | stig så | rsins/ | sáranna | ?(sjá le | egusárak | ort) (1- | 4) | | | |
| 5. Hv | ener sk | oðaði 1 | æknir | sárið/s | árin síó | Bast? | | | | | |
| Áh | e ttusti | g samkt | emt No | rton ?(| sjá legu | ısárakor | t) | | | | |
| 7.a H | vaða um | búðir e | ru not | aθar ?. | | 7.b Hr | einsun s | ársins/sár | anna me | d? | |
| 8.Hve | oft er | skipt/ Lega sá | viku? rsins/ | sáranna | sýnd me | ð pílu. | Mörg sái | r, númeruð | 1,2,3 | o.s.f. | |
| 9.Ski | ptingin | er ver | julega | gerð a | £ | | | 9 | | | 19 |
| Heilsugæslu hjúkr/hjúkrunarfræðing Sjúkraliða/ ófaglærðum Aðstandanda Sjúklingnum Öðrum, hverjum? 10. Evaða sjúkdóm er sjúklingurinn með? (fyrst aðalsjúkdómstæiningu) 11. Á hvaða lyfjum er sjúklingurinn? Sjá bls 2 | | | | | | | | | | | |
| 12.Kr | 05518 | bar se Lykt | m viö | 2 | | Vess | | 35.54 | Útlit Útli | | |
| nûmer | | | | | | | | | 0.000.0 | | |
| | Sterk | Meðal | Engin | Mikill | Litill | Enginn | Tær | Gröftur | Svart | Gult lagt fibrin | Rautt gróandi |
| | | 9 3 | | 1 | | | | | | | J. |
| | | | | | | | | | | | |
| Já | 14. Tekið fúkalyf síðustu sex mánuði? | | | | | | | | | | |

revalence interventions revalence of pressure areas, eating armeuntes and nospital hygiene

Appendix 10. Questionnaire E





| | | Appendix 9 | | | |
|--|------------------------------|---------------|------------------|-----------------|----------|
| Blað E: Útte | kt á sárum | á fótleg | gjum og fæ | ti | |
| Dagsetning | | | | | |
| Úttekt gerð af | | | | Nafn og kenn | itala |
| Deild | | | | | |
| Simi | | | | | |
| 1.Sjúklingurinn fær | r þjónustu venjul | ega | | | |
| ☐ Heilsugæslu | Heima | Sértæku b | úandi 🗌 Langlegu | deild (sel) | |
| | ■ Bráðasjúkrahús | ☐ Endurhæfi | ngadeild Endur | hæfingadeild a | ıldraðra |
| 2.Fjöldi sára: | Hægri fótleggur/ | fótur fj | Vinstri fótleg | gur/fótur | fj |
| 3.Sennilegasta ásta | eða fyrir sárinu/: | sárunum. | ☐ Ónógt bl | ámðaflæði | |
| Vegna áverka | ☐ Ónógt slagæðaf | læði | ☐ Blandað | venös/arteriel | 11 |
| Sykursýki | ☐ Gigtar sjúkdómur | Hjarta- | og æðasjúkdómur | | |
| □ Illkynjasjúkdómur | Perifer eðasjúkdómur | ☐ Taugaska | ði | | |
| Athugasemdir | | | | | |
| 4.Fær sjúkligurinn | meðferð sem veik | ir ónæmiskerf | ið (t.d steralyf | , frumudrepandi | lyf)? |
| ☐ Já | Nei Nei | | | | |
| 5.Með hverju hefur | ástæðan verið gr | eind(Eitt eða | fleira) 🔲 Gert | Kliniskt mat | |
| ☐ Slagæðarmælingu | (Doppler) | ☐ Blóðflæði | srannsók | | |
| 6.Hve lengi hefur | sjúklingurinn haft Dagar | t þetta/ þess | i sár? | Ár | Mán |
| Merktu með ör hvar | sárið/sárin er/e | ru. Ef mörg | sár, númeraðu 1, | 2, 3 o.s.f. | |
| 7. Umbúðir Prýstingsumbúðir? Tvofaldar umbúðir? Teygjusokkur? Teygjubindi? | | | | | |
| 8.Tegund binda? | | | \ \ \ | \ | . (|
| 9.Hvaða umbúðir eru | a notadar á sárið | ? | 1-1 | - / | - 1 |
| 10.Sárið hreinsað m | neð | | { } | 1 | ì |
| 11.Fjöldi umbúðaski 12.Umbúðaskipti eru | | | 1 11 1 | | |
| Heilsugesluhjúfr Sjúkraliða/ófagl Aðstandanda Sjúklingnum Annar, hver? | r/Hjúkrunarfræðing lærðum | | | 00 | |

Appendix 11. Questionnaire F





Appendix 12. Poster to patients



Siúkrahúsið á Akureyri

Á þessari deild virðum við öryggi sjúklinganna og drögum úr sýkingarhættu m.a. með því að:

Nota vinnuföt með stuttum ermum í ummönnun og við eftirlit með meðferð. Skipta daglega um vinnuföt ef kostur er

Hafa sítt hár uppsett

Hafa neglur stuttar og ólakkaðar, engar gervineglur

Bera ekki armbandsúr, armbönd og hringi

Bera ekki hangandi eyrnalokka né lokka í andliti

Sótthreinsa hendur og framhandleggi milli sjúklinga og fyrir umönnun þeirra

Nota einnota hlífðarsloppa eða plastsvuntur þegar við á Ef við gleymum okkur þá er þér velkomið að minna okkur á!

Deild:

Forstöðulæknir/Yfirlæknir: Hjúkrunardeildarstjóri:

Appendix 13: Permission from the Director of Medicine of Akureyri Hospital.



Ólína Torfadóttir. framkvæmdastjóri hjúkrunar á FSA.

Akureyri 25. nóvember 2009.

Efni: Bréf þitt, dags. 23. nóvember um notkun niðurstaðna úr gæðaúttektum gerðum á FSA í meistararitgerð og greinar.

Í bréfi þínu óskar þú eftir aðgengi að sjúklingagögnum sjúklinga er tóku þátt í gæðaúttektum sem gerðar voru á tímabilinu 2005 - 2009 á FSA. Ætlunin er að nota niðurstöðurnar í meistararitgerð og í greinar í fagtímaritum.

Leyfi var gefið fyrir framkvæmd gæðaúttektanna og upplýsingabréf sent til Siðanefndar og yfirlækna og hjúkrunardeildarstjóra viðkomandi deilda.

Leyfi til aðgengis að sjúklingagögnum þeirra sjúklinga sem tóku þátt í gæðaúttektum á FSA 2005 - 2009 hér hér með veitt að fengnu leyfi Vísindasiðanefndar og Persónuverndar.

Gangi þér vel með verkefnið.

Með kveðju,

Þorvaldur Ingvarsson, framkvæmdastjóri lækninga.

Appendix 14: Permission from the ethical committee of Akureyri Hospital



SIÐANEFND SJÚKRAHÚSSINS Á AKUREYRI

Nefndarmenn:

Kristján Kristjánsson prófessor

Margrét Þorsteinsdóttir hjúkrunardeildarstjóri

Ragnheiður Baldursdóttir kvensjúkdómalæknir

Sigmundur Sigfússon forstöðulæknir

Christina Lindholm Kristianstad University Sverige

Akureyri, 9. desember 2009

142. mál Siðanefndar FSA: Umsókn dags. 25. nóvember 2009 um heimild til að nota í meistararitgerð og í fræðigreinar niðurstöður úr sex gæðaúttektum sem framkvæmdar voru á árunum 2005-2008 á FSA:

- 1. Pressure Ulcers-prevalence and prevention at Akureyri Hospital, Iceland 2005 and 2007
- 2. Eating and Nutrition at Akureyri Hospital, Iceland 2006 and 2007
- 3. Hygiene Standards and Wound microbiologi at Akureyri Hospital, Iceland 2006 and 2008

Ábyrgðarmaður rannsóknarinnar er dr. Christina Lindholm, prófessor í klínískri hjúkrun við háskólann í Kristianstad í Svíþjóð. Meðrannsakendur eru Ólína Torfadóttir framkvæmdastjóri hjúkrunar á Sjúkrahúsinu á Akureyri, dr. Kerstin Ulander (látin í nóvember 2008) lektor í klínískri hjúkrun í háskólanum í Kristianstad í Svíþjóð og dr. Albert Westergren dósent í klínískri hjúkrunar við háskólann í Kristianstad í Svíþjóð.

Þátttakendur í framangreindum gæðaúttektum voru inniliggjandi sjúklingar á sjúkrahúsinu á Akureyri ákveðna daga á tímabilinu kl. 7 að morgni til um 21 að kvöldi. Í fyrstu úttektinni var fjöldi þeirra sem samþykktu þátttöku tóku þátt var 119 árið 2005 og 118 árið 2007. Í annarri gæðaúttektinni samþykktu 95 þátttöku árið 2006 og 92 árið 2007 g þeirri þriðju tóku þátt 159 starfsmenn árið 2006 og 142 starfsmenn árið 2008. Sjúklingar sem samþykktu þátttöku í síðastnefndu gæðaúttektinni voru 11 árið 2006 og 10 árið 2008.

Niðurstöður þessara rannsókna á gæðaúttektum mynda grunn til að ákveða viðmið / gæðastaðla í hjúkrun og til frekari þróunar á þessum sviðum. Um er að ræða innleiðingu á áhættumati og forvörnum gegn þrýstingssárum, næringarvandamálum og sýkingum sem skapað geta öryggi í meðferð hjúkrunar og draga úr líkum á fylgikvillum vegna dvalar á sjúkrahúsi.

Siðanefnd FSA þakkar óvenju vel frágengna umsókn og samþykkir án athugasemda heimild til að niðurstöðurnar úr gæðaúttektunum verði notaðar í meistararitgerð og í fræðigreinar.

Virðingarfyllst,

f.h. Siðanefndar FSA

Sigmundur Sigfússon, formaður

Afrit: Vísindasiðanefnd Vegmúla 3,108 Reykjavík

Appendix 15: Acceptance from the Data Protection Authority

Ólína Torfadóttir Hafnarstræti 100 600 Akureyri Persónuvernd Rauðarárstíg 10 105 Reykjavík sími: 510 9600 bréfasími: 510 9606 netfang: postur@personuvernd.is veffang: personuvernd.is Reykjavík 8. janúar 2010 Tilvísun: S4643/2010/ LSL/--Hér með staðfestist að Persónuvernd hefur móttekið tilkynningu í yðar nafni um vinnslu persónuupplýsinga. Tilkynningin er nr. S4643/2010 og fylgir afrit hennar hjálagt. Allar tilkynningar sem berast Persónuvernd birtast sjálfkrafa á heimasíðu stofnunarinnar. Tekið skal fram að með móttöku og birtingu tilkynninga hefur engin afstaða verið tekin af hálfu Persónuverndar til efnis þeirra. Hjál.: - Tilkynning nr. S4643/2010 um vinnslu persónuupplýsinga.

Appendix 16: Patients information – an example

Upplýsingar til sjúklinga

Fjórðungssjúkrahúsið á Akureyri hefur það sem markmið að veita sem bestu og öruggustu læknis- og hjúkrunarmeðferð. Ákveðið hefur því verið að gera gæðaúttekt á þeim þætti meðferðar sem hefur með sár og sárameðferð að gera. Úttektin fer fram 19. október n.k. á dagvinnutíma.

Gæðaúttektin verður framkvæmt af hjúkrunarfræðingum starfandi á sjúkrahúsinu, ásamt sænskum hjúkrunarfræðingum/rannsakendum sem skoða húð og sár ef þau eru til staðar. Sérstaklega verður skoðuð þrýstingssár eða merki sem staðsett eru á bakhlið líkamans. Tekið verður strok úr sári ef finnst, en það er sársaukalaust.

Þú hefur fullan rétt að neita þátttöku í þessari gæðaúttekt og einnig að hætta þátttöku, ef þú óskar þess.

Algjör nafnleynd er tryggð þar sem hvorki nafn né kennitala er skráð af þeim sem framkvæma úttektina. Niðurstöður gæðaúttektarinnar verða upplýsingagrunnur fyrir verklagsreglur um sár og sárameðferð á FSA og einnig birtar í vísindaritum.

Ábyrgðaraðilar:

Porvaldur Ingvarsson, framk væmdastjóri lækninga, gsm: 8630109 og Ólína Torfadóttir,

framkvæmdastjóri hjúkrunar,

gsm 8630271

Ábyrgir fyrir gæðaúttektinni:

Dr Christina Lindholm Dr Kerstin Ulander

Prófessor, klínískri hjúkrun Klínísk lektor

Högskolan Kristianstad Högskolan Kristianstad

Svíþjóð Svíþjóð