

# Knowledge, attitudes and practice among nursing staff concerning pressure ulcer prevention and treatment – a survey in a Swedish healthcare setting

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## Knowledge, attitudes and practice among nursing staff concerning pressure ulcer prevention and treatment – a survey in a Swedish healthcare setting

The aim of this study was to investigate (i) attitudes among Registered Nurses (RNs) and Nursing Assistants (NAs) regarding pressure ulcer prevention, (ii) knowledge among RNs and NAs of pressure ulcer prevention and treatment, (iii) practice of risk assessment and documentation regarding pressure ulcers among RNs and NAs and (iv) to identify perceived possibilities and barriers in pressure ulcer prevention and treatment. In this cross-sectional study, a total of 230 questionnaires were distributed to an equal number of RNs and NAs in both municipality as well as hospital care settings. The response rate was 67% (n = 154). In general, all respondents displayed good knowledge on prevention and treatment of pressure ulcers

and demonstrated a positive attitude towards this area of care. However, answers provided to some questions indicate that recent research findings and guidelines have not succeeded in reaching out to these occupational groups. Furthermore, only 37% (n = 55) of the participants said that they have an agreed strategy for the prevention of pressure ulcers in their unit. These shortcomings may affect the quality of care provided to the patient and lead to pressure ulcers developing as a consequence. Today, evidence-based methods for risk assessment are available but are not adopted and used in practice. The study highlights the need to further reduce the gap between research and practice.

**Keywords:** pressure ulcers, nursing knowledge, attitudes, barriers, pressure ulcer prevention, Sweden, guidelines.

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## Introduction

Pressure ulcer is a significant problem in the Swedish healthcare service (1). For every individual patient, pressure ulcer means suffering, and the presence of the ulcer affects the patient's quality of life in many different ways. The development of pressure ulcers can lead to both prolonged hospital stay and higher costs for the healthcare system (2–4).

A pressure ulcer is defined as an area of skin damage appearing after some prolonged period of insufficient or nonexisting blood flow. The European Pressure Ulcer Advisory Panel (EPUAP) classifies the affliction in stages (I–IV) from nonbleachable erythema to full thickness damage with deep-wound cavity and tissue necrosis (5). The incidence of pressure ulcers varies in American and European

studies lying in the range of 1.17–46% (6). In Swedish studies the incidence varies between 12% and 55% (7–9).

The risks to the patient for developing pressure ulcer can actually be assessed, and measures to prevent the ulcer from occurring and growing can be taken. The guidelines issued by the EUPAP state that pressure ulcer prevention should include:

1. identification of patients at risk. The risk assessment should include the patient's general medical condition, skin assessment, mobility, degree of moistness and incontinence, nutrition and pain. The assessment should be performed on every occasion when care is provided and thereafter continuously, or when the patients' condition changes;
2. maintain and improve the tissue tolerance through daily skin assessment, skin care, nutrition measurements and mobilising;
3. regular and correct positioning both in bed and chair to patients at risk and use of pressure relieving support surfaces;
4. improve the outcome for patients at risk of pressure damage through educational programmes aimed at healthcare providers, patients and family or caregivers.

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National and local guidelines have also been developed. An example of the latter are the local guidelines developed by the healthcare services located in the western part of Sweden, where this study has been carried out (10). The guidelines are publicly accessible on the Internet and comprise all type of wounds, including pressure ulcers, and are based on the best available evidence. A network of wound supervisors [Registered Nurses (RNs) and Nursing Assistants (NAs) in community as well as hospital settings] is still engaged in the implementation of these guidelines.

Designing guidelines is valuable but it often takes a long time before they are actually incorporated into practice (11). Among other things, factors that contribute to successful implementation are the level of support and commitment by the leadership and the quality of planning and education (12–14). MacQuire (15) describes the implementation of new methods and procedures as a process that takes place in a series of stages of which knowledge is the first step. Without knowledge it is difficult for the individual to know that 'this is how it should be' or 'this is what I should do'. These conclusions also depend on the individual's own attitude on the subject area. Based on the knowledge acquired, the individual staff member forms he's/her's attitude and, on the strange of this, can make a decision to adopt or reject the new knowledge and the innovation that follows (16).

Registered Nurses and NAs, within the community as well as in hospital care settings, meet patients with risks of developing pressure ulcers on a daily basis. For the nursing staff, the appearance of pressure ulcer means an increased workload because the wounds require a range of different treatment approaches. At the same time continuous preventive measures are needed to avoid the wound from growing worse or leading to complications. Even if pressure ulcer is a multidisciplinary problem, it is important that these two occupational groups have adequate knowledge and a positive attitude on pressure ulcers and that they take an active part in its prevention (17, 18).

Bearing in mind the above, the aim of the present study was to investigate (i) attitudes among RNs and NAs regarding pressure ulcer prevention, (ii) knowledge among RNs and NAs of pressure ulcer prevention and treatment, (iii) the practice among RNs and NAs in risk assessment and documentation and (iv) to identify perceived possibilities and barriers in pressure ulcer prevention and treatment.

## Method

### *Sample selection*

The study design was descriptive, in the form of a cross-sectional survey, carried out in one medical and healthcare district in the western part of Sweden. A random selection of six hospital clinics and six municipal healthcare centres

was made. Among the hospital clinics, two wards per clinic were then, in a second step, random selected. The head nurses at the study-sites, in the municipality centres as well as in the hospital clinics, made a random selection of RNs and NAs by blindly picking out names from their staff list. Prior to this, the head nurses were given both oral and written instructions on how the selection using this raffle method was to be carried out.

From each of the six hospital clinics and each of the six municipality healthcare centres 20 RNs and 20 NAs respectively participated in the study (making a total of 240 respondents). The selection of the respondents constituted four groups (RNs municipality, RNs hospital, NAs municipality and NAs hospital) with each group consisting of 60 respondents. The criterion for inclusion in the study was permanent employment as nursing staff (RN or NA) with half- or fulltime duty.

### *Questionnaire*

The questionnaire used for gathering data was based mainly on two data collection instruments developed and validated by Moore and Price (17) and Lewin et al. (19). Permission to use these questionnaires was obtained from the respective authors prior to the commencement of the study. These two validated instruments were translated into Swedish by the first-named author of this study, were supplemented with some additional questions to suit the purposes of the current study, and then put together. Also, a small number of questions were excluded as these were judged not to be meaningful to this study. To minimise the risk for linguistic displacement the instrument was translated back into English (20). A researcher with knowledge of both English and Swedish performed this 're-translation'. The layout and content of the questionnaire were approved by a group of 'experts' ( $n = 3$ ) with knowledge in the subject field and/or methodology. The questionnaire was pilot-tested (21) on a small but equal number of nurses, RNs ( $n = 4$ ) and NAs ( $n = 4$ ), representing the municipality healthcare service and the hospital/medical service respectively. Marginal corrections in some of the new questions were made as a result of the pilot-test. The questionnaire finally consisted of 47 questions or statements divided into six sections. In the aim to estimate the nursing staff attitude a five-point Likert scale with 11 statements regarding pressure ulcer prevention was used. The third part in the questionnaire (the knowledge test) comprised open-ended questions where the RNs and NAs were requested to list six intrinsic and four extrinsic factors contributing to pressure ulcer, four pressure ulcer prevention measures and four treatment measures and finally, five areas at risk for pressure ulcer. In the knowledge test the respondents were also requested to identify the four stages of pressure ulcer from a written description. Furthermore, the questionnaire was designed to elicit

**Table 1** Structure and content of the questionnaire

Section	Content	Open-ended questions	Close-ended questions	Reference
Part 1	Background facts	–	7	–
Part 2	Attitudes towards pressure ulcer prevention	–	11	Moore and Price (17)
Part 3	Knowledge about risk factors, preventive and treatment measures, areas at risk and pressure ulcer classification	5	1	Lewin et al. (19) and 2 new
Part 4	Current prevention practice and ratings of their own knowledge	1	16	Lewin et al. (19), Moore and Price (17)
Del 5	Perceived possibilities and impediments towards pressure ulcer prevention	2	–	–
Del 6	Development of competence	–	4	Lewin et al. (19) and 2 new

information about current prevention practice. In this section, the RNs were requested to answer three close-ended questions about documentation. In part five the respondents were asked to mention, in their own words, three perceived possibilities and three barriers towards pressure ulcer prevention. The final part of the questionnaire focused on the upgrading of nursing staff competency. The structure, content and references used in the different parts of the questionnaire are given in Table 1.

#### Data collection

The head nurses at the study-sites were asked for their cooperation in distributing the questionnaires. All head nurses readily accepted to assist. However, one minor clinic requested a reduction in the number of questionnaires to be distributed, from 20 to 10. This request was met. Consequently, 230, instead of the planned 240 questionnaires, were distributed.

Attached to each questionnaire, was an information sheet and a stamped reply envelope. The information sheet contained a short description on the aim of the study as well as instructions on how to fill in the questionnaire. The nurses were asked not to confer with each other and not to consult literature in the specific topic when completing the questionnaire. Nurses who accepted participation were asked to return the questionnaire within a 2-week period. A reminder was sent out to each head nurse.

#### Ethical considerations

Before the study was undertaken, the need to adhere to any ethical requirements was discussed with a member of the Research Ethics Committee at the University of Gothenburg. The outcome was that the study needed no special ethical clearance as it was considered to be a normal quality-enhancement project at one's place of work. Besides, participation of the respondents was entirely voluntary. In the information sheet provided to respondents

there was a guarantee for personal integrity and an assurance that data would be treated confidentially and that it would not be possible to identify any individual answers.

#### Data analyses

Data were coded and entered into the statistical software package SPSS (Chicago, IL, USA), version 13. The open-ended questions in parts three and five were categorised and compiled into frequency tables (20, 21). When comparing results between groups, the *t*-test, the Mann-Whitney test and chi-square tests, were used. The level of significance was set at  $p \leq 0.05$ .

## Results

#### Background facts

A total of 230 questionnaires were distributed and 154 (67%) completed forms were returned. The completed questionnaires received were just as many from each group of RNs municipality, RNs hospital, NAs municipality, NAs hospital. The respondents had been working in their present units for an average period of 10 years (range from 0.5 to 34 years) and the majority worked fulltime (62%). The average time since obtaining their professional examinations was 15 years (range from 2005 to 1965).

#### Attitudes to pressure ulcer prevention

The lowest possible score (negative attitude) was 11 whilst the highest possible score (positive attitude) was 55 ( $md = 43$ , variation 28–53). The nursing staff as a whole (RNs and NAs) demonstrated a positive attitude regarding pressure ulcer prevention, irrespective of profession or study-sites (hospital contra municipality). There were no significant differences between the groups ( $p = 0.078$ ). The majority (95%) of the nursing staff felt that they should

**Table 2** The respondents' attitudes towards pressure ulcer prevention (responses %)

	<i>Strongly agree</i>	<i>Agree</i>	<i>Neither agree nor disagree</i>	<i>Disagree</i>	<i>Strongly disagree</i>
All patients are at potential risk of developing pressure ulcers	50 (32.5)	61 (39.6)	13 (8.4)	19 (12.3)	10 (6.5)
Pressure ulcer prevention is time consuming for me to carry out	11 (7.1)	55 (35.7)	21 (13.6)	53 (34.4)	14 (9.1)
In my opinion patients tend not to get as many pressure ulcers nowadays	34 (22.1)	64 (41.6)	24 (15.6)	19 (12.3)	13 (8.4)
I do not need to concern myself with pressure ulcer prevention in my practice	1 (0.6)	3 (1.9)	3 (1.9)	5 (3.2)	142 (92.2)
Pressure ulcer treatment is a greater priority than pressure ulcer prevention	5 (3.2)	23 (14.9)	23 (14.9)	35 (22.7)	68 (44.2)
Continuous nursing assessment of patients will give an accurate account of their pressure ulcer risk	96 (62.3)	44 (28.6)	11 (7.1)	2 (1.3)	1 (0.6)
Most pressure ulcers can be avoided	76 (49.4)	69 (44.8)	3 (1.9)	5 (3.2)	1 (0.6)
I am less interested in pressure ulcer prevention than other aspects of nursing care	1 (0.6)	16 (10.4)	32 (20.8)	31 (20.1)	74 (48.1)
My clinical judgement is better than any pressure ulcer risk assessment tool available to me	24 (15.8)	39 (25.7)	52 (34.2)	26 (17.1)	11 (7.2)
In comparison with other areas of nursing care, pressure ulcer prevention is a low priority for me	–	8 (5.2)	17 (11.1)	34 (22.2)	94 (61.4)
Pressure ulcer risk assessment should be regularly carried out on all patients during their stay in hospital	93 (60.8)	36 (23.5)	14 (9.2)	9 (5.9)	1 (0.7)

concern themselves with pressure ulcer prevention in their work and just as many (94%) considered that most pressure ulcer could be avoided.

Opinions diverged, however, on how common pressure ulcer is today, and to what extent clinical judgement is better than available risk assessment tools, and if pressure ulcer prevention is time consuming to carry out or not (Table 2).

#### *Knowledge about pressure ulcer prevention and treatment*

The majority of the nursing staff was able to correctly identify areas of risk and suggest appropriate measures for prevention and treatment of pressure ulcer. They were also able to identify intrinsic factors known to be associated with the development of pressure ulcers. However, NAs (mean = 4.0) showed significantly lower results in this area than RNs (mean = 4.6,  $p = 0.05$ ). Few respondents in the occupational groups could correctly list extrinsic factors leading to pressure ulcers (Table 3).

The most frequently mentioned prevention measure was regular repositioning (75%), use of pressure-reducing mattresses (67%), pressure relieving (42%) and nutritional habits (40%).

In addition to this, the great majority mentioned dressings as a treatment measure for pressure ulcers. The most

**Table 3** Nursing staff knowledge on risk factors, pressure ulcer prevention and treatment and areas of risk

<i>Knowledge about</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>SD</i>
Intrinsic factors	152	1	6	4.3	1.27
Extrinsic factors	150	0	4	1.6	0.96
Preventive measures	150	1	4	3.6	0.71
Treatment measures	152	0	4	3.2	0.95
Areas of risk	153	0	5	4.8	0.53

frequently mentioned intrinsic and extrinsic factors are summarised in Table 4.

The percentage of respondents able to correctly identify the four stages of pressure ulcer, described from a written description, is presented in Table 5. Significantly fewer NAs than RNs could correctly identify stages I and II.

Nearly one-third (32%,  $n = 49$ ) of the sample had attended some postbasic education courses on pressure ulcers. This group of the respondents achieved significantly better results in all sections of the knowledge test ( $p \leq 0.05$ ), except on the question of pressure ulcer grading, compared with those respondents who not had attended any postbasic education.

<i>Intrinsic</i>	<i>N</i>	<i>Extrinsic</i>	<i>N</i>
Poor nutritional status (including low BMI, low blood albumin level)	121	Pressure (including hard bed, poor pressure relieving, fold/wrinkle, no repositioning, tight shoes, operation)	138
Immobility (including unconscious, paralysis, contraction)	112	Moisture (including incontinence, deficient skincare)	46
Poor circulation (including low blood pressure)	103	Friction and shearing forces	44
Sickness (inclusive diabetic)	99	Warmth	17
Poor general physical condition (including fever)	76	Time	2
Other (very old, pain, thin and frail skin, overweight, mental condition, oedema, anaemia, dehydration)	134		

BMI, body mass index.

**Table 5** Percentage of RNs and NAs able to correctly identify pressure ulcer stages

<i>Stage</i>	<i>Total</i> <i>N (%)</i>	<i>RN</i> <i>N (%)</i>	<i>NA</i> <i>N (%)</i>
I <sup>a</sup>	144 (83)	78 (91)	66 (74)
II <sup>b</sup>	145 (87)	78 (91)	67 (82)
III	144 (79)	78 (86)	66 (71)
IV	145 (86)	78 (90)	67 (81)

<sup>a</sup>Significant difference between RNs and NAs ( $p = 0.009$ ).

<sup>b</sup>Significant difference between RNs and NAs ( $p = 0.047$ ).

RNs, Registered Nurses; NAs, Nursing Assistants.

Fifty-five per cent of the respondents ( $n = 81$ , of which 63% were RNs) had read a text or journal article specifically related to pressure ulcers. This group had, except regarding areas of risks and grading, significantly more knowledge than the other group ( $p \leq 0.05$ ).

### *Preventive practice*

Thirty-seven per cent ( $n = 55$ ) of the nursing staff stated that there was an agreed routine for pressure ulcer prevention in their unit. There was no significant difference between the municipality group and the hospital group on this topic. Regarding risk assessment, 9% ( $n = 14$ ) used a risk assessment scale when making a judgement on the risk potential in patients, and half of these used the scale just occasionally. Almost 40% ( $n = 95$ ) stated that they made a risk assessment on the day of admitting a patient and/or when the patient's condition had changed.

Concerning documentation, 42% ( $n = 36$ ) of the RNs stated that they always write an individual pressure ulcer prevention care plan for patients at risk and 25% ( $n = 17$ )

**Table 4** Intrinsic and extrinsic factors in order of precedence

**Table 6** Nursing staff perceived possibilities and barriers in pressure ulcer prevention

<i>Possibilities</i>	<i>N (%)</i>	<i>Barriers</i>	<i>N (%)</i>
Access to pressure relieving facilities	79 (61)	Lack of time	61 (53)
Knowledge	74 (57)	The patient not co-operative/too ill	60 (52)
Prevention routines	46 (35)	Lack of resources or lack of equipment	49 (42)
Good teamwork	43 (33)	Lack of knowledge	35 (30)
Enough number of staff	23 (18)	Insufficient organisation or routines	32 (28)
Dressing	21 (16)	Short staffed or insufficient continuity	21 (18)
Good documentation	19 (15)	There are no barriers	3 (3)
Time	18 (14)		
Nutrition measures	11 (8)		
Delegated staff	5 (5)		
Total respondents	130 (84)	Total respondents	116 (75)

reported that they updated the patients' care plan daily. About 35% ( $n = 26$ ) did use the EPUAP classification system in their documentation when a pressure ulcer had occurred.

### *Possibilities and barriers in pressure ulcer prevention*

The respondents were requested to mention three potential factors that both created possibilities and posed barriers in carrying out pressure ulcer prevention or treatment. The most commonly cited possibilities were access to pressure relieving facilities, knowledge, prevention routines and good teamwork. Barriers that were most frequently cited were lack of time, the patients' condition and lack of resources or lack of equipment (Table 6).

## Discussion

Both groups of RNs and NAs, in the municipality as well as in the hospital setting, had generally good knowledge about prevention and treatment of pressure ulcers and demonstrated a positive attitude towards this area of care. Regarding practice itself, the results were poorer. There seems to be an inadequate structure for the prevention and documentation of pressure ulcers. The most frequently cited barriers for not carrying out pressure ulcer prevention was 'lack of time' but the 'patient's condition' was also mentioned by many respondents.

In keeping with some previous studies (22–24), the responding nursing staff displayed generally good knowledge of pressure ulcers. Common for respondents in this study and the study performed by Lewin et al. (19) was that only a few were able to list extrinsic factors contributing to pressure ulcers. The extrinsic factors can be crucial and both RNs and NAs need to have knowledge of them, as some relatively simple measures can be taken to prevent them. Whether this ignorance is in fact reflected in daily practice does not emerge in this study, but the possibility of some degree of correlation existing cannot be ruled out.

Regarding identifying pressure ulcer stages from the written description a cut-off point of 90% was used to identify nursing staff as having sufficient knowledge. At this cut-off point both RNs and NAs achieve notably lower results in this part of the knowledge test. The nursing staff seems not to be familiar with the four-stage classification system (see Table 5) and RNs did not make much use of it in their documentation. However, classification of pressure ulcers is an important tool in the assessment of sores and for deciding the extent of damage. Additionally, classification provides the basis for making choices of preventive and/or treatment options (25). It is also noteworthy that NAs were not able to correctly identify pressure ulcer stages I and II to any higher degree. Today, the NAs often work more closely to the patients than do the RNs, and it is therefore vital that they are able to assess the patient's skin condition and make an early discovery of incipient pressure ulcers. This is an area in need of further improvements.

The results indicate that education and self-acquired knowledge can influence knowledge level. In conformity with Pieper and Mott's (26) study, it appears that nurses who read an article on pressure ulcers during the immediate past year, or had attended a lecture after their graduation, had significantly better results in the knowledge test.

There was however a rather small number of respondents who had attended any postbasic education on pressure ulcer, and the respondents' average time since obtaining their professional examinations were 15 years. This could explain the fact that risk assessment tools were not much used in practice. Identification of patients at risk

of pressure ulcer is the first step in prevention (5) and risk assessment scales have been developed to give a fuller picture of the patient risk factors (27–29). In Sweden, a modified version of the Norton scale (30) has existed since 1982, but national and local guidelines, where the instrument is provided, has been available for some several years now.

Interestingly, the lack of use of risk assessment scales was also reflected in the attitude and knowledge test. In the attitude test, the respondents were not convinced that the use of a pressure ulcer risk assessment tool was better than their own clinical judgement, and the respondents did not mention the use of risk assessment scales at all in the knowledge test as a preventive measure. The poor use of risk assessment scales can be connected with the lack of knowledge and or insecurity on how to use them.

Quite many of the respondents specifically mentioned the aspect of prevention routines as a possibility factor for good pressure ulcer prevention. Despite this, only 37% (n = 55) of the participants said that they had an agreed strategy for the prevention of pressure ulcers in their unit. The huge variation in documentation routines and time-gaps for risk assessment, indicate that common pressure ulcer preventive strategies are lacking in the municipality as well as in the hospital setting. This is serious because in situations where nursing staff do not follow common, accepted strategies for pressure ulcer prevention, there is a risk that patients will be treated differentially allowing pressure ulcers to develop as a consequence (19). Additionally, as the nursing staff commonly mentioned in the study, lack of time and staff shortages is a barrier to carrying out pressure ulcer prevention. From this point of view, accepted evidence-based strategies, incorporated into everyday practice, seem to be even more important in the aim to secure patient safety (31). But is not adequate knowledge among nursing staff and a positive attitude enough to prevent development of pressure ulcer? The incidence or extent of pressure ulcer within the healthcare setting, at the time this study was carried out, is unfortunately not known.

Respondents in this study, in conformity with RNs in other studies (14, 17), stated that pressure ulcer is not so common nowadays. This opinion is not in accordance with the figures reported in Sweden as well as in other countries. Buss et al. (14) suggest that this could depend on the fact that nursing staff only classify stages III and IV as pressure ulcers and that this therefore does not convince them that pressure ulcers are a problem in their unit.

The idea that pressure ulcer is not common can also be associated with an unwillingness to admit the presence of pressure ulcer as it is often equated with lack of care. Furthermore, the problems of pressure ulcers are often transferred to other healthcare givers (14, 32). However, knowing the prevalence rate is an important starting point in planning strategies of pressure ulcer prevention, which in turn can stimulate efforts for quality improvement in

this area (31, 33). A survey of prevalence would have been useful additional baseline data.

Respondents have mentioned the patients' condition/attitude as a barrier in earlier studies (17, 24, 34), and this is the case in our study as well. The explanation given is that the patient is not always willing or able to cooperate. That the patient is attributed to be a problem is something remarkable as it is for the patient's sake that the healthcare provision is available. As the nursing staff often cannot change or influence the patient-related factors they must find strategies for care provision that take into consideration the patient's own limitations to cooperate and be of help (35). In viewing the patient as a barrier, there is a risk that the quality level for prevention is not set high enough. Rather, it can lead to the prevalence of an attitude that encourages an 'allowable acceptance' that pressure ulcer cannot be avoided for all patients.

#### *Method – a discussion*

The present study used a descriptive, cross-sectional survey design to examine RNs and NAs attitudes, knowledge, practice and perceived possibilities and barriers regarding pressure ulcer prevention. We considered that the aim of the study was achieved with this method.

For the purposes of data collection, parts of validated instruments used in two earlier studies were used in our investigation (17, 19). No re-wording of the statements used in our questionnaire was made. There were, nevertheless, some statements in the attitude scale that were difficult to interpret. For example, the statement 'Pressure ulcer prevention is time consuming for me to carry out'. According to Moore and Price (17), the respondents who agree with that statement have a negative attitude. But it is also possible that the respondents may be of the opinion that pressure ulcer prevention is important and therefore feel that prevention should be allowed to be time consuming. The big variation in the answers on that question in both studies could suggest that the respondents had difficulties in deciding whether they should agree or disagree with the statement. If this instrument is to be used in future studies, revision of at least some of the statements need to be considered carefully.

To test people's knowledge by self-administered questionnaires has its limitations. Even if the nursing staff were asked not to confer with each other, or consult literature on the specific topic, there is no guarantee that they did not do so. The fact that the respondents had 14 days to answer the questionnaire increases that possibility. However, if the nursing staff had cheated to any great extent it would have been detectably reflected in the knowledge test regarding extrinsic factors. Furthermore, it is difficult to know whether what they report in the questionnaire really reflects what they actually do in practice. Also, both knowledge and attitude tests can be experienced as

threatening to personal integrity. As persons, we want almost always, consciously or unconsciously, to stand out in our best possible colours. This ambition can result in reluctance to admitting to our own shortcomings. The anonymity and confidentiality that the questionnaire offers does, however, reduce the risk of un-answered or ignored questions, and also helps ensure that answers are not misleading (20).

The response rate of 67% was acceptable (21) and there was no high level of internal dropouts. Only in part five, where the respondents were requested to mention, in their own words, three perceived possibilities and three barriers towards pressure ulcer prevention, was the dropout notably large. These dropouts could be attributed to the rather comprehensive questionnaire and to respondent fatigue in answering open-ended questions at the end of the questionnaire. However, we consider that the answers do give a true picture of the respondents' opinions.

In most cases, knowledge tests included in earlier investigations have been in the form of close-ended questions. Such questions are often easier to answer than open-ended questions as the respondent is provided with alternatives to choose from. But in the real world, nursing staff must have the appropriate knowledge at their finger tips to determine what risk factors they have to look for in a patient. This is especially important if they have to judge the patient's risk for developing pressure ulcer by means of clinical judgement alone. It is with this in mind, that an instrument with both open and close-ended questions was selected.

#### **Conclusions**

This study demonstrates that both RNs and NAs in general have a good knowledge of pressure ulcer prevention and treatment and consider this to be an important area of nursing service. However, our study also showed weaknesses in agreed strategies from an organisational perspective regarding pressure ulcer prevention. These shortcomings may adversely affect the quality of care provided to the patient and lead to pressure ulcer developing as a consequence. Improvements in practice can be made.

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#### **Author contributions**

Both authors have planned the study. The first author has been responsible for the collecting of data, built a database and performed the first analyse. Both authors have then

together performed a further analyse and written the complete manuscript.

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