The treatment of pressure sores: a comparison of novice and expert nurses’ knowledge, information use and decision accuracy

Dawn Lamond BSc(Hons) RGN
Lecturer, Department of Nursing and Midwifery, University of Stirling, Falkirk, Scotland

and Sarah Farnell BSc(Hons) RGN
Staff Nurse, St. George’s Hospital, London, England*

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The knowledge experts have and the way it is organized is thought to affect their decision accuracy and the information they use to make decisions. This exploratory study examines the information used by experts, the way they organize their knowledge and their decision accuracy when considering treatments for pressure sores. A convenience sample of 14 subjects (seven experts and seven novices) were given a card sorting task and a decision task. The cards for the sort contained photographs of pressure sores and various dressings, which the subjects had to place into meaningful categories. In the decision task they were given a photograph of a pressure sore, together with various items of information which could be used to make a decision about the appropriate treatment for the pressure sore. The accuracy of the subjects’ decisions were compared to a ‘gold standard’ decision formulated by an expert panel. Results indicated that experts were more accurate in their choice of treatments in the decision task, and also focused on specific items of information to make their decisions. The accuracy of their decisions was not linked to the categorization strategy used in the card sorts. The findings from this study indicate that more research into the way in which such treatment decisions are undertaken needs to be carried out. Specifically, the way in which education into wound care treatments affects decision accuracy needs to be identified, and ways of aiding individuals to focus on relevant information explored.

Keywords: decision making, information use, expertise, decision accuracy, pressure sore treatment

INTRODUCTION
Pressure sores cause extensive human suffering (Hibbs 1988) and place an enormous financial burden on the National Health Service (Livesley 1987). Although it is difficult to determine exactly how much the treatment of pressure sores costs, estimates range from £60 million to £420 million per year (McSweeny 1994). There has been considerable research into the prevention of pressure sores, but less focus on the treatment of pressure sores, once they have developed (Gould 1986). Authors have found that nurses’ knowledge of treatments for pressure sores is often poor, using a variety of products, some of
which may be harmful to healing (David et al. 1983, O’Connor 1993, Sprecht et al. 1995), and that they experience difficulty in accurately choosing dressings (Flanagan 1992). Certainly, clarifying research advice and imparting this knowledge to nurses has led to a reduction in the costs of pressure sore treatment in one USA unit (Sprecht et al. 1995).

It is therefore apparent that the knowledge which nurses have, and how they use it when deciding which dressings to use for treating pressure sores is important. There has, however, been little research which focuses specifically on the knowledge which nurses in the clinical environment have, how this is connected to the treatment decisions they make, and what information is actually useful or necessary for them to be able to make such decisions. In order to try and address these issues, the following exploratory study was conducted. Decisions were defined as choosing between alternatives (Dowie 1993), in this case choosing the appropriate dressing for a pressure sore.

**LITERATURE REVIEW**

Initial studies into the way clinicians made judgements and decisions were attempting to identify a generic reasoning process, which could explain all expert decision makers’ activity, and hopefully be taught to novices in various fields (Parrino & Mitchell 1989). Many studies in the field of judgement and decision making have used comparisons of experts and novices, or focused on expert reasoning, in an attempt to gain insight into how skilled decision making takes place. An expert is often regarded as ‘an individual who possesses a large body of knowledge and procedural skill’ (Green & Gilhooly 1992 p.46) and a novice as ‘a beginner, a person whose performance lacks the speed, accuracy and efficiency of the expert’ (Green & Gilhooly 1992 p.46). These studies revealed that the basis of expert decision making does not appear to lie in the way individuals think or reason, but in the nature of the knowledge which experts have, and the way they organise or structure their knowledge (Grant & Marsden 1988).

One would expect experts in a field to be able to make decisions more accurately, and have more knowledge (both theoretical and experiential) than novices. Experts are more knowledgeable about their domain, and also know how to use that information more effectively (Kolodner 1983). It is the way that their knowledge is used which has been the focus of much study.

Studies examining experts in chess and physics suggest that experts ‘chunk’ or categorize related information together in a sophisticated way (Green & Gilhooly 1992). In physics, experts categorized problems together which were related by ‘deep’ structure (how the problems need to be solved), as opposed to novices who used the ‘surface’ structure of problems (the words used in the problems) (Chi et al. 1981). In medicine, studies into how expert clinicians think about patients have suggested that they categorize patients according to medical conditions (Bordage & Zacks 1984). In nursing it has been suggested that district nurses use the patients’ severity of illness as a way of categorizing information in a meaningful way (Crow & Spicer 1995). In experts it is thought that these categories of knowledge are more developed, containing richer information which link various categories together, with many retrieval pathways (Bordage 1984, Bordage & Zacks 1984). This allows experts to be more effective when making decisions, as the organization of information into these meaningful units allows them to access large amounts of information efficiently and quickly.

It is believed that it takes at least 10 years to gain the experience necessary to become an expert (Benner 1984, Gilhooly 1990). The nature of expert knowledge is also such that it is very specific to the domain in which the expert practises, i.e. it is context or content specific (Norman et al. 1985). As such, if experts are asked to perform outside their specific area of expertise, they will no longer have the experiential knowledge organised in a useful way, and their performance reduces to that of a novice (Kassirer et al. 1982). Therefore, when studying expert knowledge and decision making, one has to ensure that the tasks being given to the expert are those which they would normally encounter.

The way that experts organize their knowledge is also thought to affect the information which they select to process from a situation. Experts appear to have the ability to recognize information which is important for the judgement or decision task, and just using or focusing on that information (Ettenson et al. 1987). Benner & Tanner (1987) call this a sense of salience in their expert nurses. Grant & Marsden (1987) identify this information which experts focus on as the ‘forceful features’ of a situation. They suggest it is the key information which allows efficient access to the experts’ memory/knowledge structures, enabling them to make a decision rapidly. Both the amount of information which experts focus on, and its nature have been examined experimentally, often comparing their information use to that of novices. A common finding is that experts either use the same or less information than novices to make their decisions, but that the information they focus upon is different (Ettenson et al. 1987, Shanteau 1992). It is this ability to focus on important cues which is another factor in determining expertise.

**THE STUDY**

It is clear that knowledge, and the way that this is organized is an important factor in experts’ ability to make decisions. Experts also appear to use different information to novices when making their decisions. The focus of this study was the knowledge that nurses have of pressure sore...
treatments (dressings), how that affects their decisions, and the information they use to do so. It was felt that in order to investigate this fully, individuals who were considered to be experts, and novices in the realm of treatment for pressure sores were compared. Measures of their knowledge organization, decision accuracy and information cues used to make those decisions were taken.

Hypotheses
There were three hypotheses in this study.

1. That experts would make more accurate decisions concerning appropriate treatment for pressure sores than novices.
2. That experts would have a more complex and richer structure of knowledge concerning pressure sores and their treatment than novices.
3. That experts would use fewer informational cues than novices to make their decisions.

METHODS
The study consisted of an audio-taped interview. The subjects were firstly asked to fill out a demographic questionnaire, then complete card sorts, designed to investigate the nature of their knowledge structures. Finally, they were asked to decide what treatment to give three pressure sores shown to them in photographs. They could use a total of six items of information which were available on cards, to aid their decision. The accuracy of their decisions was compared with those of an expert panel.

Subjects
A convenience sample of 14 subjects was recruited to complete the study, from one hospital trust in the South East of England. They worked on a variety of ward specialities including orthopaedic, acute surgery, acute medicine and care of the elderly. The subjects were identified as either experts or novices using peer review and their length of experience, with ward managers identifying individuals who were considered to be ‘expert’ in wound care, and those who were novice. This gave a sample of seven experts and seven novices. All subjects were female, with experts older than the novices (five of the experts in the range 26–50+ years, compared to six of the novices in the range 21–25 years). All the experts had been qualified more than 3 years, with 4 of the sample being qualified for 11 years or more, compared to novices, all of whom had been qualified less than 2 years.

Data collection
Card sorts
Card sorts were used to collect data concerning the way individuals organised their knowledge about pressure sores and dressings. Card sorts examine the conceptual or category systems which individuals possess, with the assumption being that the way individuals categorize or ‘sort’ the cards reflecting their knowledge organization (Shadbolt & Burton 1990). They have been used to investigate the conceptual systems of nurses in other areas, including how community nurses structure medical conditions (Crow & Spicer 1995), patients’ complaints of pain (Broderick & Ammentorp 1979) and patients’ ideas about wellness and illness (Jensen & Allen 1993).

Subjects were given 16 cards (13 cm × 10 cm), on eight there were photographs of pressure sores representative of different grades and positions (e.g. heel, sacrum, etc.). On the other eight cards were the printed names of dressings most frequently used by the hospital, taken from the wound care protocol. Each card was given a number between 1 and 16. The subjects were asked to sort the cards into categories, so that each member of the category had something in common, and was different from other categories. They were then asked to explain their reasons for placing the cards in these particular categories. The whole procedure was audio-taped and subsequently transcribed.

Decision task
Three patient ‘cases’ were constructed for this part of the study, consisting of a photograph of a pressure sore, and cards containing items of information about the patients’ age, mobility, medical diagnosis, nutritional status, continence status and level of exudate (all factors which are thought to affect wound healing). These cases were validated for their content by an expert panel, consisting of two members, both of whom are respected in the field of wound care and have published widely in the area. The expert panel was also asked to decide what the optimum treatment for each sore would be, on the basis of the information provided about the patient. These recommendations became the ‘gold standard’ against which the subjects’ decisions were compared.

The subjects were asked to decide on the treatment they would prescribe for the three pressure sores presented in the photographs, and explain their decision. They could make their decision using information available from information cues written on cards, by turning the appropriate card over. This procedure was also audio-taped and transcribed.

Data analysis
The data from the card sorts was subjected to content analysis (Weber 1990), in order to identify similarities in the card sorting produced by the subjects. This gave common categories used by the subjects for the sorts. These categories were then subjected to a multidimensional scalogram analysis (MSA). The MSA plots each item
The treatment of pressure sores (in this case each subject), as a point in geometric space and aims to divide the items into clear regions on the basis of measures of each variable (the categories used to sort the cards) (Cantor et al. 1985, Wilson 1995, Zvulum 1972). Therefore, the more qualities two items (subjects) have in common, the closer together they are in the plot which is produced. In this case the purpose was to identify if experts and novices in wound care categorised the cards differently (implying they had different knowledge structures). One would therefore expect the experts and novices to be grouped in different regions within the MSA plot.

In the decision task, the number of items of information, and the information used was noted. The subjects’ decision was compared to the gold standard recommended by the expert panel. If the subjects’ treatment decision for the pressure sore matched that of the expert panel, then they were awarded two points. If the subjects suggested treatments that matched some of the recommendations mentioned by the expert panel, but not all, they were awarded one point. If the subjects’ treatment decisions did not match that of the expert panel, they were not awarded points. This gave a scoring system for each subjects’ decision accuracy.

Inter-rater reliabilities for the content analysis for the card sorts and the point scoring system for the decision task were undertaken, giving percentage agreements of 70·6% and 88·1% respectively. It was felt that this gave a reasonable degree of agreement and indicated that the content analysis and point scoring system were reliable.

RESULTS

Thirteen main categories were obtained from analysis of the card sorts (Table 1). The frequency with which the subject groups utilised these categories is also given. This data was used for the MSA (Figure 1), which indicates two clear regions on the plot. These regions were associated with two different strategies of categorizing the cards, which did not appear to be expertise dependent. Some of the subjects categorised the cards by whether they were pressure sores or dressings. Other subjects placed pressure sores together with dressings suitable for dressing them in the same category.

The accuracy scores for the experts and novices can be seen in Table 2. Experts appeared to make significantly more accurate decisions than novices, supported by a Mann-Whitney U-test ($P < 0.05$). There was little difference in the total amount of information the different subject groups used to make their decisions (experts used 58% of the total information, novices 67%). However, experts appeared to focus on certain types of information more often than novices. They predominantly focused on the patients’ mobility, nutritional status and amount of exudate (Figure 2), compared to novices who used non-specific information. These findings indicate that experts made more accurate decisions and also focused on specific items of information, when compared to novices. The accuracy scores were compared to the knowledge organisation strategies identified from the card sorts, with no indication that the organisation strategy was linked to decision accuracy.

From the data collected in the questionnaire, it was also found that on average novices were found to carry out more dressings per week (greater than 7) compared to the experts (4–5 per week). This difference was not significant when analysed using chi-square.

DISCUSSION

Expert nurses in this study certainly made more accurate treatment decisions when compared to those of the expert panel, than novices. This could be attributed to their greater knowledge, as the sample had been qualified longer than the novice sample. However, there was no apparent connection between the categories of knowledge identified in the card sorts and the decision accuracy of either experts or novices. From the demographic data collected it appeared that novices who had been educated to degree level and completed a module in wound care made more accurate decisions than those novices educated by a Project 2000 diploma course. As the sample numbers were small, further analysis could not be undertaken and so no firm conclusions can be made. It does, however, indicate that perhaps specific education in wound care will affect decision accuracy, a finding supported by Sprecht et al. (1995). A lack of education in wound care within nurse training has been highlighted by other authors (O’Connor 1993). This indicates that further exploration of the effects of education on knowledge of treatments for pressure sores could be worthwhile.

Table 1 Categories and frequency used in card sorts

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert</td>
<td>Novice</td>
</tr>
<tr>
<td>Necrotic wound</td>
<td>2</td>
</tr>
<tr>
<td>Superficial wound</td>
<td>4</td>
</tr>
<tr>
<td>Granulating/healthy wound</td>
<td>4</td>
</tr>
<tr>
<td>Cavity wound</td>
<td>1</td>
</tr>
<tr>
<td>Sloughy/infected wound</td>
<td>2</td>
</tr>
<tr>
<td>All dressings</td>
<td>1</td>
</tr>
<tr>
<td>Use Granuflex</td>
<td>1</td>
</tr>
<tr>
<td>Use cavity dressing</td>
<td>5</td>
</tr>
<tr>
<td>Use superficial dressing</td>
<td>4</td>
</tr>
<tr>
<td>Debriding agent</td>
<td>6</td>
</tr>
<tr>
<td>Don’t use/don’t like</td>
<td>5</td>
</tr>
<tr>
<td>Dressings for exuding wounds</td>
<td>3</td>
</tr>
<tr>
<td>Mixture of dressings that go with wounds</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 1 Multi-dimensional scalogram analysis plot: shows grouping of subjects according to their card sorts.

Novices: Subjects 1–7
Experts: Subjects 7–14

Table 2 Accuracy scores on decision task for expert and novice subjects

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Total score</th>
<th>Case no.</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novices</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>N1*</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>N2</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>N3</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>N4</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>N5</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N6</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>N7*</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

* = novice subjects from degree training programmes.
The treatment of pressure sores on the knowledge and decisions of nurses in general hospital wards.

CONCLUSIONS

This study was exploratory in nature, examining how knowledge of the treatment of pressure sores could be linked to individuals decision accuracy and use of information cues. Despite the small sample size, the study has highlighted areas where further research would be useful. This could include a focus on the knowledge experts in wound care have, together with how it appears to be utilised. Studies examining the role of education in aiding treatment decisions would also be advantageous, in order to improve nurses’ decision accuracy. This can only be beneficial to the quality of care which patients receive.

Figure 2 Information cards used by expert and novice subjects.

The findings in this study also support previous research, indicating that part of expertise is the ability to focus on information which is relevant or useful to the decision (Ettensohn et al. 1987). Experts utilized information about the patients’ mobility, nutritional status and amount of wound exudate more frequently to make their decisions than information on other cards (age, medical diagnosis and continence status). The collection of irrelevant data has been shown to influence the ability of individuals to make accurate judgements (Cianfrani 1984). In the study perhaps novices were collecting ‘irrelevant’ data, although again because of the limited sample size it is difficult to draw conclusions. It is necessary to identify exactly what information cues are necessary to make accurate decisions about the appropriate treatment for pressure sores. This could then ensure that data collection tools encourage the integration of relevant data (rather than all data, some of which may be irrelevant) leading to more accurate decisions. This is of vital importance, as from the demographic data it was apparent that the novice subjects carried out more dressings in clinical situations than experts, but in the study made significantly less accurate decisions.

Card sorts have been shown to be a useful technique for studying knowledge structure in other studies (Broderick & Ammentorp 1979, Crow & Spicer 1995). However, in this study the results from the card sort did not have any relationship with the accuracy of the subjects’ decisions. Further studies using card sorts could perhaps include case studies of patients as the elements on the cards, to investigate whether this affects how individuals think about treatment decisions. It would also be beneficial to investigate the effect that having a ward-based specialist nurse, who advices on treatment for pressure sores, has on the knowledge and decisions of nurses in general hospital wards.

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References


