How good is the evidence for using risk assessment to prevent pressure ulcers?

Preventing pressure ulcers is one of the eight high impact actions for nursing and midwifery. This article looks at the role of risk assessment in targeting prevention.

**INTRODUCTION**

It is often assumed that risk assessment leads to better care. However, nurses should question and evaluate the quality of the evidence on which this assumption is based.

Pressure ulcer prevention is one of the eight high impact actions for nursing and midwifery, which has been adopted as one of the eight high impact actions for nursing and midwifery. The issues raised are equally relevant to any clinical area where processes such as risk assessment are used to demonstrate evidence of quality care.

**DO RISK ASSESSMENT TOOLS ACCURATELY PREDICT RISK?**

Risk assessment tools are used to stratify patients likely to develop pressure ulcers into categories reflecting their degrees of risk. First, we must consider whether the tools are accurate. The evidence suggests that none of the popular tools has good evidence for accuracy of their predictions.

Pressure ulcer guidelines suggest that risk assessment tools must be used alongside clinical judgement (Royal College of Nursing, 2005), principally because the tools do not accurately and reliably predict which patients are at risk. Studies on the Braden scale – the best researched tool – show a positive predictive validity of 4.5-100%; the Norton scale varies between 7.1% and 38%, and the widely used but relatively untested Waterlow scale varies from 5.3% to 33% (Pancorbo-Hidalgo et al, 2006). This variability means that as few as 5% of patients identified by the most popular tools as being at risk of having a pressure ulcer go on to develop one (see Box 1).

Although evidence for the performance of the Braden scale is considerably more favourable than that for the Waterlow score (Pancorbo-Hidalgo et al, 2006), the predictive validity of this tool may still be very poor. Predictive validity, however, is determined by incidence so the setting for the study may influence the performance of the tool (rather than the tool itself).

The few studies of clinical judgement alone give positive predictive values ranging from 28.8-38.5%, although figures for sensitivity suggest that clinical judgement alone may miss a higher number of patients at risk than risk assessment tools do (Pancorbo-Hidalgo et al, 2006).

Admittedly, predictive validity may not be the best way to evaluate the effectiveness of risk assessment tools, as patients in validity...
studies are usually subject to pressure prevention strategies so intrinsic risk is not assessed (Defloor and Grypdonck, 2004). Predictive validity cannot be properly determined if using the tool can change the outcome – as it would be expected to if care changed as a result of a risk assessment. This would only be the case if the use of risk assessment tools led to effective preventive actions that reduced pressure ulcer incidence – but is there evidence that this is the case?

DOES USING RISK ASSESSMENT TOOLS PREVENT PRESSURE ULCERS?

Randomised trials of pressure ulcer prevention strategies are the most reliable means of assessing their effectiveness. However, a high quality systematic review found no randomised trials comparing use of a risk assessment tool with no formal risk assessment or comparing the performance of two tools (Moore and Cowman, 2008).

A more recent study provides some evidence which indicates that using risk assessment may not reduce the risk of developing a pressure ulcer. Vanderwee et al. (2005) randomised 1,617 participants in six hospitals in Belgium to one of two conditions:
- A standard prevention strategy – a Braden score <17 or presence of non-blanching erythema (NBE) as indication of risk.
- A strategy of awaiting the presence of NBE to indicate risk.

If patients were assessed as being at risk using either approach, they were assigned (randomly) to one of two types of pressure reduction devices – an alternating pressure mattress or a high specification foam constant pressure mattress – in addition to a standardised pressure management protocol.

The study found no overall significant difference in the incidence of pressure ulcers between groups by risk prediction strategy – 53 participants (6.7%) in the standard strategy group and 56 (6.8%) in the NBE only group developed pressure ulcers (European Pressure Ulcer Advisory Panel grades 2–4).

The investigators did find that the NBE-only approach was associated with significantly greater conversion to the more severe grade 3 or 4 ulcers, which does suggest a possible benefit from the use of risk assessment tools. However, this conclusion was derived from a subgroup analysis. Such analyses can lead to false conclusions because of multiple significance testing (Oxman and Guyatt, 2002).

Vanderwee et al. (2005) reported 18 tests of significance on their dataset. When there is random allocation to groups, there is a 1:20 probability of finding a significant difference by chance alone in each independent statistical test. As the number of tests rises, so does the probability of a “significant result”. Fundamentally, there is no way of properly determining from this study whether the significant result is simply the result of chance, as people are randomly allocated to groups, or because there is a real benefit from using the risk assessment tool. So what we have, at best, is suggestive evidence that is worthy of further investigation in a properly designed trial. Unfortunately, it does not constitute definitive evidence.

Vanderwee et al. (2005) found that twice as many pressure reduction devices were used in the standard approach than in the NBE only strategy (31.9% versus 15.5%). These findings suggest that not only do risk assessment tools overestimate risk but also that they lead to much greater resource use – no doubt at considerable expense, given the substantial potential for overtreatment.

This is confirmed by other research. A large study of five acute hospitals in the UK followed 2,507 patients in general medicine, general surgery, orthopaedics, urology, coronary care, acute care of older people, rehabilitation and gynaecology between 1996 and 1998 (Clark et al, 2002). It found that, overall, 71% of patients were considered to be at some degree of risk when assessed using the Waterlow scale. The scores from this risk assessment tool suggest that nearly three quarters of patients admitted to a general hospital may need pressure ulcer prevention strategies. This would be hugely expensive and there is no clear evidence that such strategies would deliver benefits.

DO ESCALATION STRATEGIES PREVENT PRESSURE DAMAGE?

A more subtle use of risk assessment involves allocating patients to different risk categories. This might provide an answer to concerns about overtreatment. Escalation strategies increase the frequency, intensity or complexity of interventions with increased levels of risk. For example, a clinical guideline might advocate moving “at risk” patients off standard mattresses and putting “very high risk” patients on alternating pressure mattresses (Royal College of Nursing, 2005).

Systematic reviews can provide estimates of the effects of different prevention strategies. Moving patients off standard hospital mattresses onto high specification foam mattresses may reduce their risk of developing a pressure ulcer by about 60%, while moving them from standard mattresses to alternating pressure mattresses may reduce their risk by about 70% (McInnes et al, 2008).

In the light of these small differences in estimates of effect, it is less clear whether alternating pressure mattresses are superior to high specification foam mattresses and studies directly comparing the two approaches are needed.

While there are trials comparing alternating pressure devices to foam overlays, these studies are small and of poor quality and found no significant difference between the two types of device (McInnes et al, 2008). A large trial comparing an alternating pressure mattress with a high specification foam mattress (Vanderwee et al, 2005) found no significant difference in incidence of EPUAP grade 2 or greater pressure ulcers (15.3% versus 15.6%).

Unfortunately, the lack of a standard turning regimen on both mattresses means the effect of each mattress cannot be isolated; the equivalence in incidence rates may be because nurses took a different approach to turning patients on each mattress. The trial may have resembled common clinical practice, which involves maintaining a turning regimen on foam mattresses but not on alternating pressure mattresses. In areas where this difference in regimens has been put into practice, it may not be necessary to use alternating pressure mattresses where turning – high specification foam mattresses can be used.

Healthcare providers could be wasting resources on the more expensive forms of pressure ulcer prevention, especially given that alternating pressure mattresses cost far more than high specification foam mattresses or overlays (Nixon et al, 2006).

However, once again, there is an absence of definitive evidence, and a high quality trial is needed to address this gap in evidence on escalation strategies.

Escalation and risk reduction strategies

An effective and apparently simple alternative escalation strategy is to increase
the frequency of turning, which is effective in reducing pressure ulcer incidence (Defloor et al, 2005). Unfortunately, the resources associated with turning may pose a barrier to its effective use. On a 25 bed general hospital ward, 18 patients would likely be “at risk”, “high risk” or “very high risk” using the Waterlow score (Clark et al, 2002), which would result in 216 turns per day on a two hourly turning regimen. Data is very limited, but, assuming a range of 10-15 minutes per turn (Jaichandar et al, 2007; Hibbert et al, 1999), turning could require 36-54 nursing hours per day per ward if the Waterlow score was used to trigger escalation. The resources required to maintain such regimens may well be beyond the staffing capacity of wards.

The uncertainty of the evidence here is emphasised for two main reasons. First, it is striking that this area of care, which is so strongly “owned” by the nursing profession, urgently needs considerably more research.

Ideally, data from an inception cohort (where patients are followed from admission to the care setting) without risk reduction strategies is required to avoid the effect of such strategies on predictive accuracy. Use of these tools then needs to be evaluated in randomised trials against more declarative strategies, such as awaiting the development of NBE before initiating prevention strategies.

However, it is not ethical to implement “no risk reduction strategies”. The drive for quality measurement may reduce the likelihood that accurate tools can be developed, unless thoughtful research designs that strategically address the broad evidence gaps are funded. For instance, future trials testing existing risk assessment tools against a declarative strategy (waiting for the risk to declare itself by the presence of NBE) could use the declarative arm as a validation cohort to develop better risk assessment tools.

There is a paucity of information on cost effectiveness, which would help determine the best way to use limited financial and human resources to maximum effect. There is an urgent need to address the cost effectiveness of high specification foam mattresses in comparison with alternating pressure mattresses and turning regimens. If the cheaper alternative is found to be as effective, such evidence could deliver welcome cost relief for healthcare providers – but workforce implications need to be considered.

Processes versus outcomes
The second reason for emphasising uncertainty relates to how nurses are to assess and demonstrate quality. Measures of process have significant advantages as measures of quality when the process measured is known to be linked to an improved outcome.

An example might be “door to needle time” for patients with a myocardial infarction, where reducing the time between first presentation and intervention to unblock the coronary arteries reduces tissue damage and leads to improved outcomes.

In the case of pressure ulcer prevention, as with many nursing interventions, it is hard to identify similar evidence based elements of care which, in themselves, are known to lead to improved care. The temptation is to select care processes that are easily measured even when, as in the case of the Waterlow score, there is no real evidence to support their use.

The incidence of pressure ulcers may well be a valid nurse sensitive outcome but preventive care processes are not good quality indicators. There is not enough research to clearly establish the role of any of the existing pressure ulcer risk prediction tools in delivering effective prevention (although there may be sufficient evidence to reject some).

Of course, assessment on its own changes nothing. Evidence that outcomes are improved by using a tool is scant, even when risk as assessed by the tool is linked to an intervention. Given this limitation, it is hard to determine whether further preventive care based on the risk assessment is necessary or wasteful. It is certainly not sufficient just to assume that the presence of a risk assessment represents quality care – unless action is taken. Furthermore, the specific interventions that should result from an assessment of risk (with or without the use of a tool) are unclear.

Ulcer rate reporting
It seems clear that the starting point for judging the quality of pressure ulcer prevention is to measure and report the incidence of ulcers. However, simple reporting of rates will not allow meaningful comparison or benchmarking between wards and hospitals.

Priorities for further research here include the development of a risk adjustment model that will allow the comparison of different provider units with different patient case mixes (Griffiths et al, 2008).

But if we take the view asserted in the report on the high impact actions – that is, that pressure ulcers are “never events” – any ulcers that develop represent a potential deviation from best quality care. The significance of an ulcer is clear, whereas the significance of a completed risk assessment tool is not.

More generally, nurses should carefully consider the evidence for the link between care processes, such as risk assessment tools, and patient outcomes before deciding that a formal risk assessment should be adopted in practice and used as a marker of quality.

CONCLUSION
This brief overview of the evidence base for pressure ulcer prevention makes it clear that nursing quality cannot be easily determined by examining the specific preventive care provided.

That is not to say that there is no information to guide practice in this area. Research and expert opinion do give strong pointers on effective preventive care, which involves clinical assessment (but not necessarily the use of “tools” to do so), moving patients off standard beds onto high specification foam mattresses, overlays or alternating pressure mattresses, and the use of turning regimens in some circumstances.

Although there is probably sufficient evidence to give some confidence that actions and decisions typically within nurses’ responsibility are likely to make a difference, there is not enough to be prescriptive about what precisely should be done under what circumstances.
STAGE ONE OF THE FOUR STAGES OF PRESSURE ULCER DEVELOPMENT

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