



# Diagnostic and treatment decision making in community nurses faced with a patient with possible venous leg ulceration: A signal detection analysis



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## ABSTRACT

**Background:** Judgements and decisions about venous leg ulcer management are characterised by uncertainty. Good judgements and reduced variations in practice require nurses to identify relevant “signals” in clinical encounters. Nurses, even experienced ones, vary in their ability to separate these signals from surrounding noise.

**Objectives:** Examine specialist and generalist nurses’ discrimination of clinical signals and noise when (i) diagnosing venous versus other causes leg ulceration, and (ii) starting multilayer compression therapy.

**Design:** A signal detection analysis within a cross sectional survey.

**Settings:** Four English NHS districts.

**Participants:** Tissue viability specialist ( $n = 18$ ) and generalist (district and practice nurses,  $n = 18$ ) sampled from networks of nurses caring for people with leg ulcers. Mean age was 46 years, 78% had more than 10 years nursing experience. They worked on average 32.5 h per week, of which 10 h were spent caring for people with leg ulcers.

**Methods:** 110 clinical scenarios based on anonymous patient data from a large clinical trial of compression therapy for leg ulceration. The scenarios were classed as either signal (venous leg ulcer present and/or compression therapy warranted,  $n = 57$ ) or no signal cases (other kind of ulcer and/or compression therapy contraindicated,  $n = 53$ ) by four experts. Nurses made diagnostic and treatment judgements for each scenario. A signal detection analysis was undertaken for each nurse. Measures of signal detection ( $d'$  prime or  $d'$ ) and judgement tendency or bias ( $C$ ) were computed. Differences between specialist and generalist nurses were tested for using the Mann Whitney  $U$  test and graphically explored using Receiver Operating Curves (ROC).

**Results:** Specialists identified more true positive cases than the generalist nurses: 75% vs. 59% for the diagnostic judgement ( $p < 0.01$ ) and 70% vs. 60% for the treatment judgement. They were significantly more sensitive to the signals present ( $d'$  1.68 vs. 1.08 for the diagnostic judgement and 1.62 vs. 1.11 for the treatment judgement). Specialists exhibited a significantly higher bias towards initiating treatment ( $C = .81$  vs.  $.56$ ,  $p < 0.01$ ) but this did not extend to their diagnostic judgements. Specialists also varied slightly less in their signal detection abilities.

**Conclusions:** Nurse specialism was associated with better, but still variable, clinical diagnostic and treatment signal detection in simulated venous leg ulcer management.

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### What is already known about the topic?

- Caring for patients with leg ulcers is a significant part of many community nurses' workloads. Despite being faced with uncertainty, nurses must still make the judgements and decisions that determine the care and treatment received. Some nurses are employed as experts in the area and undertake the role of "Tissue Viability Specialist" – or one of its synonyms/variants.
- The care and management of this group of patients varies and some of this variation may be due to nurses' clinical judgements and decisions.
- Evidence based guidance on treatment and management for patients with venous leg ulcers exists. Nurses' clinical judgements and decisions are one of the mechanisms by which this guidance is enacted in clinical practice.

### What this paper adds

- This is the first signal detection analysis of the judgements and decisions of community nurses caring for people with venous leg ulcers.
- Whilst specialist tissue viability nurses were more likely to correctly identify and treat a patient with venous leg ulceration, their abilities varied as much as a generalist group of nurses.
- The study reveals that variation in clinical practice may be partly due to differences in nurses' receptiveness to clinical information and their propensity to diagnose and treat venous leg ulceration in patients.

## 1. Background

With between 0.6 and 3.6% of adults developing a leg ulcer in their lifetime, caring for patients with leg ulcers is a significant component of community nurses' workloads (Graham et al., 2003; Posnett et al., 2007). Leg ulceration is also expensive: the UK NHS spends between £168 and £600 million (at least) on care and treatment in this group of patients (Posnett et al., 2007; Nelzon and Leg Ulcers, 2000). These societal burdens are mirrored in the individual burden experienced by patients. Pain, diminished mobility and self-image, smell and fatigue are all experienced by patients with leg ulcers. Venous insufficiency is the most common cause of chronic leg ulceration (British, 2008).

Good quality evidence exists to guide clinical practice in some aspects of caring for people with venous leg ulcers. To aid diagnosis, the use of Doppler technology to measure the ankle brachial pressure index (ABPI) and identify arterial insufficiency is well established (Callam et al., 1987). For promoting healing, the use of multi-layer high compression and pentoxifylline as an adjuvant therapy to compression are also evidence-based strategies (O'Meara et al., 2012; Jull et al., 2012). Many aspects of caring for patients with leg ulcers do not have systematic reviews and randomised controlled trials available to inform practice. Even where these exist, the evidence is often of too poor quality to be relied upon; an example being choosing which dressing to put onto a venous leg ulcer

(Briggs et al., 2012; O'Meara et al., 2014; O'Meara and Martyn-St James, 2013). The care of patients with leg ulcers varies widely from high quality and evidence based to suboptimal (Royal College of Nursing, 2001, 2008; Srinivasaiah et al., 2007a,b; Vowden and Vowden, 2009).

Nurses are the healthcare professionals often charged with diagnosing, treating, and managing a person with a venous leg ulcer (Srinivasaiah et al., 2007a,b). Meeting this responsibility requires nurses to use their judgement to weigh up the information within the clinical environments and make choices that maximise the chances of healing and improved quality of life. This is not straightforward. Nurses must collect, synthesise and make sense of multiple sources of information: a patient's medical history, biography, social circumstances, clinical signs and symptoms, whilst being mindful of the patient's preferences. Nurses use their clinical, experiential, and academic knowledge and their previous experience to make sense of the information they are confronted with. They use a variety of modes of reasoning and cognitive shortcuts (heuristics) to process this information (Tversky and Kahneman, 1974). The information available to nurses will be of variable quality and so will contribute varying amounts to the accuracy of judgements and the success of decisions (Dowding and Thompson, 2003). As a decision maker in this complex clinical environment the nurse's key function is to separate valuable information (the signal) from the less valuable (noise). Some nurses will be better than others at separating signals from noise. This variation in the ability to handle uncertainty, or the ratio of signal to noise in wound care, is an important determinant of unwarranted variations in practice (Eddy, 1994).

Perhaps because of the challenges involved in the care of patients with leg ulceration, nursing has developed the specialism of tissue viability and roles such as tissue viability specialist as part of the multidisciplinary team (MDT). Given the title, their role in the MDT, and specialist status, it is not unreasonable to assume that these nurses are better at discriminating signals from noise when caring for patients. Research suggests that this assumption may be misguided. When claims in favour of specialism are adjusted for the quality of the research underpinning such claims the universally positive impacts assumed to accompany specialism becomes less sustainable (French et al., 2003; Cruickshank et al., 2008). Specialism comes at a cost in healthcare systems, but the costs associated with the tissue viability specialist workforce are not available so exploring TVN value is unknown (Holmes, 1945; Baicker and Chandra, 2004; Bloor et al., 2012). However, if the judgements and decisions of specialist nurses are no better than cheaper generalists then scarce financial and human resources may be better spent elsewhere in the system.

## 2. Research questions

In this paper we aim to examine wound care nurses' diagnostic and treatment judgements by examining their abilities to separate a clinical signal from clinical noise. To achieve this aim we ask, "What is the variation in the ability within and between specialist and generalist nurses to discriminate between a signal and noise when (i)

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