

Diabetic foot and wound assessment: stick and rudder or instrument-rated?

I was recently reminded of a wonderful, lively, high-level discussion many years ago at the Symposium on Advanced Wound Care in Dallas on the new era of diagnostics and ‘theragnostics’ to better allow us to measure what we manage (Armstrong, 2011). Let me summarise that discussion in this editorial.

Diabetic foot ulcers occur and recur on the foot because of a multitude of factors (*Figure 1*). These include, but are not limited to, neuropathy, deformity, increased stress and peripheral artery disease (Armstrong et al, 2017). When present, current methods to assess progress have often been limited to visual cues. Even when measurement occurs, it is frequently inaccurate, leading to difficulties in measuring what we manage (Rogers et al, 2010; Armstrong et al, 2015).

Other promising techniques, such as assessment of serine and matrixmetalloprotease levels (Salvo et al, 2017), TNF-alpha (Salvo et al, 2017), thermometry (Armstrong and Lavery, 1996; Sibbald et al, 2015; Salvo et al, 2017), C-reactive protein (Salvo et al, 2017), bacterial load (Gardner et al, 2013; Spichler et al, 2015), biopsies to identify viable growth factor receptor expression (Brem and Tomic-Canic, 2007; Ramirez et al, 2015), nitric oxide or other analytes (Margolis et al, 2017) and even wound pH (Schneider et al, 2007; McArdle et al, 2014) have not yet been sufficiently quantified or gained widespread acceptance (Serena et al, 2016).

Over the past generation, many potential therapeutics have been developed by device and biotechnology industry collaborators. What has been lacking, in our view, has been sufficient attention to what may be best termed ‘companion diagnostics’ (Armstrong and Giovinco, 2011; Armstrong et al, 2013; 2015; Izzo et al, 2014).

The fact is that, despite efforts over the past few years, the bulk of our assessments are visual and empiric in nature. In many ways, we’re like early aviators — strictly piloting our patients by ‘visual



Figure 1. Occurrence and recurrence of diabetic foot ulcers (Armstrong et al, 2017).

flight rules’ without the benefit of instruments (Ottati et al, 1999). While I would suspect this is a romantic notion for clinicians, I would argue that the stick and rudder method of caring for patients ought to allow for a bit more navigational assistance from instruments. With the impending arrival of new diagnostics and ‘theragnostics’ to assist us in quantifying inflammation, infection, blood flow, and presence and quantity of ‘receptive receptors’,



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perhaps we can now augment our stick and rudder skills with an ‘instrument rating’ (Weislogel and Miller, 1970). I would hope this will allow us to fly through those therapeutic cloud banks where our visibility is limited. Here’s to that next jump in wound navigation. ■

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