

Reducing iatrogenic harm in the foot and ankle

David Wylie, Pauline Johnston, Nicola Greenwood, Julie Smart and Violet Butters

In June 2018, the NHS Greater Glasgow and Clyde podiatry service redesigned its offerings to accept responsibility for all foot and ankle wounds across the health board. This included inpatient pressure damage for individuals who did not have diabetes and were not previously managed by podiatry, as well as those who did. This article describes the impact this radical redesign had on referrals to the podiatry service and on clinical outcomes.

Pressure ulcers (PUs), also described as bedsores or pressure sores, may develop following continued pressure on parts of the body with prominent underlying bony structures, such as the hips, heels and lower back (Joyce et al, 2018). Heels are the second most common site for the development of PUs (Fowler et al, 2008). Low levels of protective subcutaneous tissue and lack of muscle and fascia surrounding the heel render it vulnerable to pressure, friction and shear forces, presenting significant clinical challenges for the healthcare team and considerable discomfort and reduced quality of life for the affected individual (Davies, 2018). Pressure damage to the heel and associated structures in the foot accounts for 30–38% of all PUs (Bååth et al, 2016; Thorpe, 2017; Stolt et al, 2019). It has a reported prevalence of around 15% in inpatients (Børsting et al, 2018; Aljezawi and Tubaishat, 2018) and 21% across all stages of the care delivery chain (Muntlin Athlin et al, 2016).

Pressure injury is typically precipitated and accompanied by the main foot-specific risk factors of diabetes: peripheral arterial disease, neuropathy and deformity (Delmore et al, 2015; Lazzarini et al, 2015, 2016). Heels are more likely to be associated with poor peripheral circulation than other sites like the buttocks and hips, increasing the risk of tissue damage (McGinnis and Stubbs, 2014). Poor mobility and prolonged bed rest are major contributing factors (Muntlin Athlin et al, 2016; Koh et al, 2018). However, in addition to these

challenges, the structures and processes surrounding the delivery of healthcare may contribute to both the development and poor healing of pressure wounds on the foot and ankle (Joyce et al, 2018). The healthcare economic costs associated with avoidable PUs on the foot and ankle are significant – ranging from £11,800 to £15,519 per annum per ulcer (Grothier, 2013; Chan et al, 2017). It is, therefore, important to identify ways of improving practice, reducing harm and enhancing patient quality of life.

Staff knowledge and education needs

Recent research (Stolt et al, 2019; Walker et al, 2019) has found that over 90% of hospital-based staff involved in patient management had little to no confidence in the management of pressure injuries and diabetic foot complications. Walker and colleagues also reported that 41.3% of respondents cited lack of knowledge as the main barrier to wound care, indicating that nurses in long-term care settings might benefit from in-depth in-service education focusing on the treatment and prevention of heel ulcers.

Education is not the only non-patient-related factor in PU development. Evidence suggests that by implementing standardised clinical pathways, the incidence of iatrogenic harm can be significantly reduced (Atherton and Joannides, 2019). By identifying at-risk individuals early in their admission process as part of a consistent, documented risk assessment, a more judicious

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Article points

1. NHS podiatry services can work with other professions to take responsibility for all foot and ankle wounds, including pressure ulcers.
2. Podiatrists can effect significant service improvement by taking responsibility for leading on and reporting iatrogenic tissue damage to the foot and ankle.
3. Implementing 'CPR for Feet' can lead to reductions in iatrogenic harm to inpatients' lower limbs.

Key words

- Ankle
- Foot
- Iatrogenic harm
- Inpatients
- Podiatry

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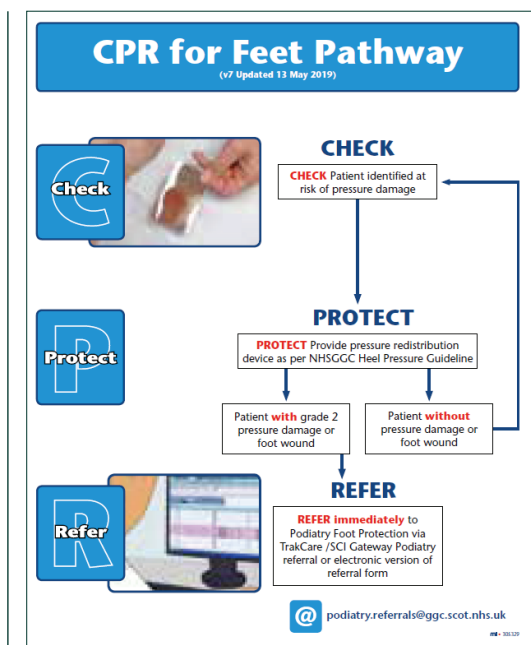


Figure 1. CPR for Feet Pathway poster.

approach to performing recommended pressure redistribution interventions is achievable (Hödl et al, 2019). Koh et al (2018) reported that by implementing such strategies, a reduction of around 50% in stage 1 heel pressure ulcers was achieved in an orthopaedic ward – traditionally one of the most challenging inpatient environments for heel pressure damage. Additionally, Laakso et al (2017) suggest that the organisational processes wrapped around inpatient care can have a significant impact on clinical outcomes relating to pressure damage affecting the lower limb. There is therefore compelling evidence that NHS organisations need to explore improvements in inpatient organisational processes and pathways as well as education and training to reduce iatrogenic harm to the foot and ankle. This provided the impetus for a foot protection service redesign led by the NHS Greater Glasgow & Clyde (NHSGG&C) podiatry service.

Background and context

The NHSGG&C Board has a population of 1,169,110 (21.6% of the Scottish population) and is associated with some of the poorest health outcomes in the UK (Walsh et al, 2017; Hurst et al, 2020). In 2013, the first Scottish Inpatient Diabetes Foot Audit was carried out across all NHS Boards in Scotland (O’Regan et al, 2018). NHSGG&C

had poorer than average performance across the three key domains of foot checking, provision of foot protection for at-risk individuals and rapid referral to podiatry services (National Institute for Health and Care Excellence, 2016). Although 46.4% of individuals with diabetes had received foot checks on admission to NHSGG&C services, as opposed to 41% of inpatients nationally, only 42.3% of at-risk individuals had received foot protection by comparison with 49% across NHS Scotland. Furthermore, NHSGG&C reported that only 57.1% of inpatients had received foot checks, compared to 64% nationally.

As a result of the audit, further improvement in this important area was considered necessary both nationally and locally. At the national level, the Scottish Diabetes Foot Action Group launched the Check, Protect and Refer ‘CPR for Feet’ campaign, see Figure 1. The aim of this project was to raise awareness of the importance of foot checks on admission, as well as improving assessment and management of the foot and ankle in inpatients with diabetes (O’Regan et al, 2018). At a local level, the NHSGG&C podiatry service began a whole-system redesign in 2012 (Wylie, 2019). The aims of the service redesign were to fully implement CPR for Feet and reduce iatrogenic harm in the foot and ankle. To support these clinical aspirations, the podiatry service set a key performance indicator of assessing 90% of all foot and ankle wound referrals within 2 working days. In June 2018, the service – in partnership with tissue viability colleagues – took full responsibility for all tissue damage to the foot and ankle in the 280 wards across the Board. This article describes the inpatient element of the redesign and reports the outcomes achieved so far.

Method

Service redesign focused on three key areas identified as needing improvement by the 2013 audit:

- Risk assessment on admission
- Application of pressure redistribution products
- Immediate referral to podiatry.

A robust methodology for foot checks on admission, access to foot protection devices, referral pathways, incidence reporting, supportive peer review and data analysis was designed and

Table 1. Foot ulcer referrals to podiatry.

Geographical quadrant	Year		Percentage increase
	2015	2019	
West	71	225	216.9
East	121	280	131.4
South	125	448	258.4
Clyde	91	226	148.4
Total	408	1,179	189.9

education plan was initiated for each hot spot to reduce the potential for future incidents. Further work was done to support the use of pressure redistribution products and mattresses. All wards were also provided with information on how to electronically refer patients to podiatry. Data reports provided robust information on the incidence, grading and avoidability of iatrogenic foot and ankle tissue damage.

A repeat of the 2013 Scottish Inpatient Diabetes Foot Audit was carried out in 2019 to measure performance against the three major risk factors in the development of tissue damage to the foot and ankle:

- Foot checks on admission
- Foot protection for individuals identified as being at risk of tissue breakdown
- Timely referral to NHSGG&C podiatry service for individuals with grade 2 tissue damage.

Results

When comparing the results of the 2013 and 2019 audits, significant improvements were found in the three key target areas (*Figure 2*). Across the 280 wards, the percentage of feet checked on admission had risen from 46.4% in 2013 to 96.1% in 2019. The application of pressure distribution devices in individuals at risk of pressure damage had risen from 42.3% to 70.9%. The proportion of patients requiring and receiving a timely referral to podiatry had risen from 57.1% to 76.1% between 2013 and 2019.

There was a 190% increase in the number of foot ulcer referrals in 2019 when compared to referral rates prior to the service redesign (*Table 1*). The

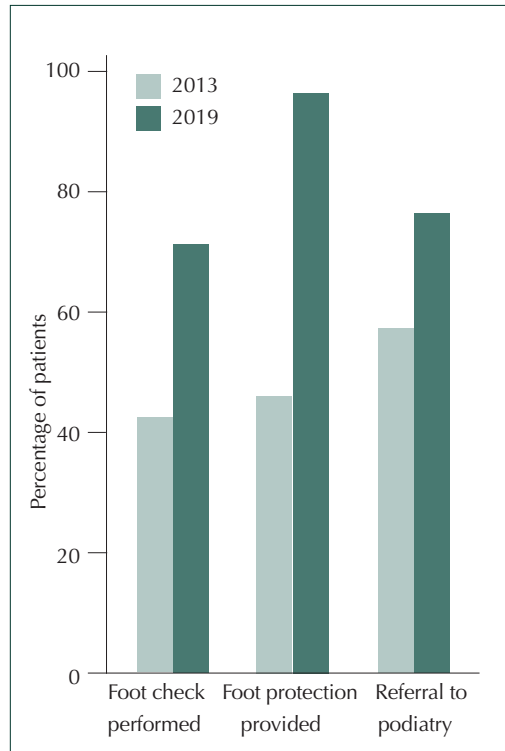


Figure 2. Check, Protect, Refer for feet audit results.

implemented across 280 wards. Each ward was provided with information and educational support from practice development podiatrists relating to the revised process for incidence reporting. Recognising that individuals typically adopt and prefer one or two out of four learning styles (Activist, Theorist, Pragmatist and Reflector) and that a mismatch between teaching and learning styles may lead to learners' needs not being met, a multifactorial approach designed to accommodate all learning styles was adopted (Honey and Mumford, 1989; Astin et al, 2006). This included on-site ward visits, drop-in sessions, managed clinical network study days, tissue viability nurse study days, Care Assurance Standards World Café events and web-based learning via the online NHS Learnpro educational platform.

Procedurally, the DATIX incident reporting system was adapted to collect eight data items to determine whether the reported incident constituted avoidable or unavoidable pressure damage to the foot and ankle. The data were collected and analysed to identify hot spots – defined as areas on a ward where two or more avoidable incidents had taken place. An action and supportive learning and

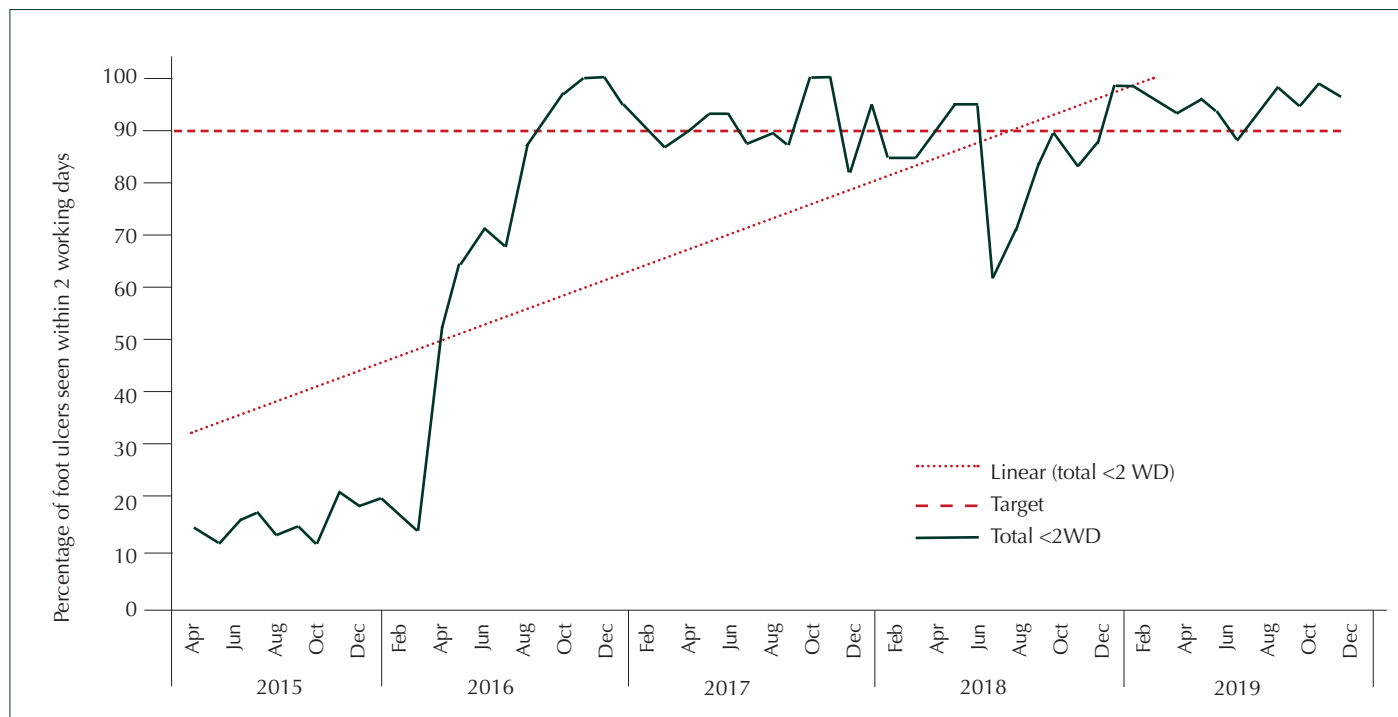


Figure 3. Percentage of foot ulcers seen within 2 working days by the podiatry service.

numbers of patients with foot and ankle ulceration referred to the podiatry service increased steadily between April 2015 and December 2019 (Table 1). Despite the increase in demand, the proportion of patients with assessed within 2 working days improved from an average of 16.7% in 2015 to 94.4% in 2019 (Figure 3). This represents a 467% improvement and now consistently exceeds the 90% target.

There was a 56.5% reduction in the incidence of avoidable iatrogenic pressure damage classified as Grade 2 or above over the 6-month period between October 2018 and March 2019 (Figure 4). The number of wards reporting 300 or more PU-free days rose from 115 (41%) to 188 (67%) during the 18 months to September 2019 (Figure 5), representing a 55% improvement.

Discussion

Despite a significant increase in referrals over the period between the two audits, an average of 94.6% of patients were assessed within 2 working days. This represents a huge increase in performance and brings the service closer to complying with the Scottish Intercollegiate Guidelines Network (2017) and National Institute for Health and Care (2016)

guidelines that recommend a 2-day response time. A workforce redesign running parallel to the service redesign enabled increased demand on the service to be met using existing resources. Under-utilised areas of the service were reconfigured into foot protection resources, increasing capacity. This change was supported by a planned programme of learning and development for staff members (Wylie, 2019). Further vascular training was provided to equip staff with the skills and confidence to assess and manage all ulceration affecting the foot and ankle, not just DFUs.

The results of the Scottish Inpatient Diabetes Foot Audit in 2019 showed that 96% of individuals with diabetes received a foot check at on admission compared to a national average of 67%. This represents a 107% improvement in NHSGG&C since 2013. When combined with the 67.6% improvement in application of pressure redistribution for individuals at risk of pressure damage and a 33% increase in timely referral to podiatry, this represents a significant improvement in the prophylactic management of diabetic foot disease across NHSGG&C.

The Board has an annual incidence of around 200 new foot and ankle pressure wounds of Grade

2 or above in inpatients. The increased use of foot protection and 56.5% reduction in iatrogenic harm to the foot and ankle appear to support the findings of several studies. Rajpaul and Acton (2016) found that consistent and early use of heel protectors improved patient outcomes and reduced the costs of care. Clegg and Palfreyman (2014) reported that heel-boot elevation devices were beneficial in reducing pressure damage; however, they also found that data linking these benefits to specific cost savings were limited. The potential annual cost saving to the Board was an estimated to be £727,000 using the 2018 NHS Improvement national PU productivity calculator. Further detailed health economic analysis is needed to render this calculation fully robust.

These results are encouraging, however, it is not possible to accurately quantify the contribution of foot protection to the overall reduction in iatrogenic harm due to the multifactorial nature of this pathology. What can be evidenced is that the main change implemented during this period was the podiatry-led foot protection service redesign.

Although these improvements should, in theory, lead to a reduction in major lower limb amputation rates, these correlations are notoriously difficult to establish due the number of confounding variables involved (Kennon et al, 2012). Notwithstanding this, the service redesign has proved to be an operational and clinical success. There is improved clarity and consistency across the NHSGG&C acute system pertaining to the pathway for inpatient foot and ankle damage. Since its implementation, there has been a significant reduction in iatrogenic harm in the inpatient population.

The podiatry service is now a primary stakeholder in the NHSGG&C Prevention and Management of PUs Steering Group, working in partnership with nursing, tissue viability and practice development services to shape pressure prevention policy, thereby influencing and enabling the delivery of improved service outcomes. Further work needs to be done to fully integrate the prevention and management of foot and ankle pressure damage within existing nurse education strategies. This will be a key deliverable of future service provision.

The work performed in secondary care needs to be expanded into community settings. We need to longitudinally extrapolate and quantify the

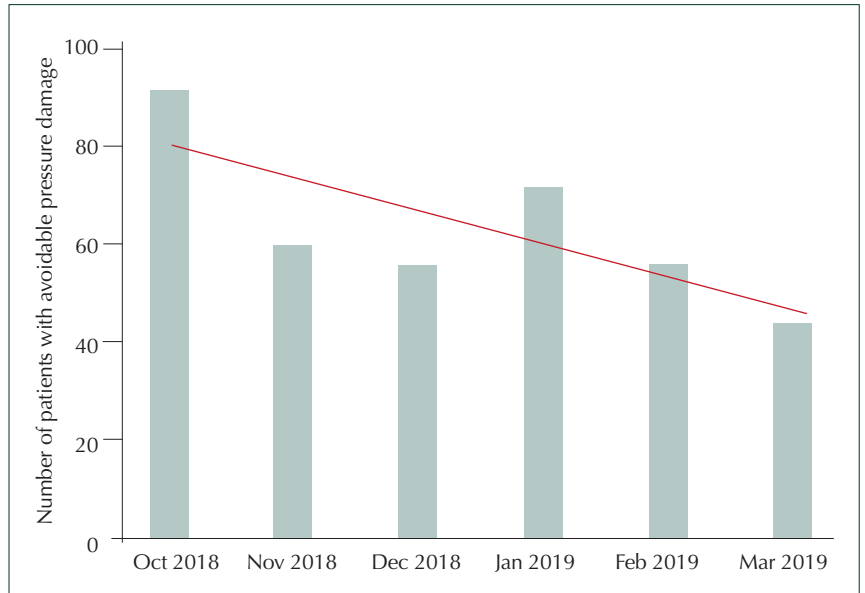


Figure 4. Avoidable grade 2 iatrogenic foot and ankle pressure damage reported over time.

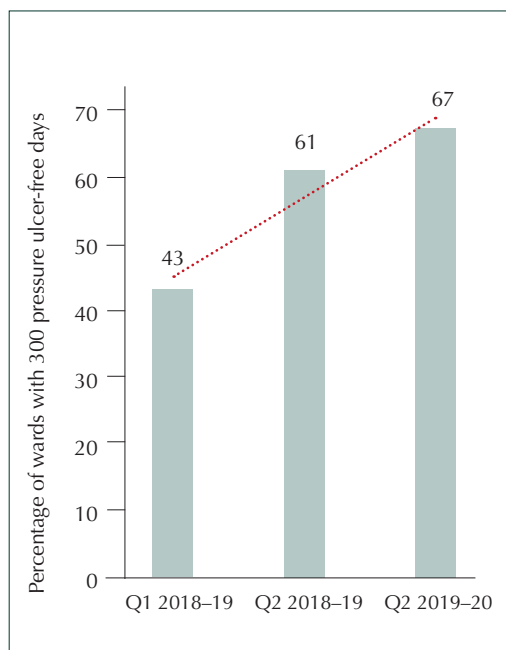


Figure 5. Percentage of wards with 300 pressure ulcer-free days.

service improvements described in this article in terms of actual, realised reductions in amputation and mortality rates, cost savings and quality of life indicators. Particular attention needs to be given to exploring the potential of future radical service and workforce redesign to deliver improvements in this area. This is particularly important in geographical

areas blighted by poverty and deprivation, where tissue damage, amputation and mortality rates are most prevalent and challenging.

Conclusion and recommendations

The NHSGG&C podiatry service has demonstrated improved key service outcomes following a service redesign to take responsibility for all foot and ankle pressure damage across the Health Board. It has reduced inpatient iatrogenic harm in the foot and ankle, ensured timely referral to podiatry for patients with pressure damage and increased the number of PU-free days on wards. Further work is required to expand these improvements to the community setting and to determine the effect of service changes on cost savings and amputation rates. ■

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