Received: 27 July 2020 | Revised: 23 October 2020 | Accepted: 27 October 2020

DOI: 10.1111/iwj.13522

ORIGINAL ARTICLE

IWJ WILEY

A relational database within the Leg Club Network: an audit

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Abstract

The growing prevalence of venous leg ulcers in an ageing population presents challenges for wound care and management. The Lindsay Leg Club model is an alternative approach to the management of leg health that can improve patient outcomes. This article reports on an audit of a relational database located within the Leg Club Network, containing records of more than 17 000 patients (known as members) who attended a Leg Club in a 5-year period (2014-2019). Overall, over 266 000 member leg assessments and treatments were entered into the database. The average nurse-member attendance time was 28 min, with a skill mix of 23% senior nurses, 70% qualified and associate nurses, and 7% nurses in supervisory roles. Healing rates averaged 62% after 12 weeks. Recurrence rates were 20% after 12 weeks. Annual clinical and volunteer hours averaged 821 and 800 h, respectively. Staffing costs were £28 per wound treatment or leg assessment with a typical duration of 27 min; 71% of members were aged 70 to 94 years old, which indicates the need for a service that caters to the specific requirements of this age group. However, no data on psychosocial and well-being outcomes were recorded. Their inclusion in further developments of this database is recommended.

KEYWORDS

database, evidence-based wound care, leg ulcers, Lindsay Leg Clubs, psychosocial model of care

1 | INTRODUCTION

In the United Kingdom, venous leg ulcer care is estimated to cost the National Health Service (NHS) £1.98 billion annually.[1] For patients, venous ulcers and other lower limb problems can be a cause of embarrassment, anxiety, stigma, loneliness, and depression, in addition to serious clinical morbidities.[2,3] Such low levels of well-being can have negative implications for patients' adherence to wound care protocols and on their physical health.[4] Leg ulcers are particularly common among older adults,[5] who may be living alone and facing loneliness and social

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isolation.[6] Therefore, improving outcomes for patients with venous leg ulcers necessitates the provision of wound care that addresses both medical and psychosocial needs.

In 1995, former district nurse Ellie Lindsay, OBE, set up the first social leg ulcer clinic that has developed into a network of Lindsay Leg Clubs based on a psychosocial model of care. Leg Clubs are community partnerships that bring together district and practice nurses from the NHS and General Practice (GP) consortia; volunteers from the community; and individuals living with, or at the risk of developing, leg wounds (in Leg Clubs, such individuals are referred to as 'members'). Members attend Leg Clubs on a drop-in no-appointment basis for collective treatment, preventative care, and social interaction in communal, non-medical spaces.

The delivery of care in Leg Clubs falls into two categories: "Treatment" for members with active leg ulcers and "Well Leg" for members whose ulcers have healed or who attend for preventative care or peer support. Members receive leg care together, in small groups, in an open area on one side of the communal venue. The other side of the venue is reserved for social interaction over refreshments and other activities provided by volunteers. Leg Clubs are self-funded. Although medical care is provided by the NHS, rent, assisted transport solutions, and the cost of refreshments are covered with funds raised by the volunteers. **There are currently 44 Leg Clubs in the UK Leg Club Network and several more Leg Clubs in Australia, Germany, and Finland.**

The growing popularity of the Leg Club model requires evidence of its effectiveness in the wound care community. The heterogeneity of the population of people with wounds requires a broad approach to evidence[7]; evidence should be examined at all levels "to get a full picture of how best to treat the patient".[8] Existing published evidence behind Leg Clubs' success includes anecdotal reports of the benefits of Leg Clubs for members' physical and social health,[9,10] member satisfaction surveys,[11,12] and reviews of evidence-based best wound care practices.[13]

Perhaps most significant as a source of evidence is a relational database created for the Lindsay Leg Club Foundation, along with the amount of data that it has generated. This article describes an audit of this database, conducted in May and June 2020, summarising 5 years of data (2014-2019) generated by all 44 UK Leg Clubs.

The goal of this audit was to assess the database's ability to demonstrate the performance and outcomes from Leg Clubs. Below, we explain the rationale for the development of the database, present the preliminary findings of our descriptive analysis of the data it stores, and interpret these findings to ascertain the evidence behind the claims of Leg Clubs' effectiveness. Finally, we consider the implications for future research and development of the database.

Key Messages

- assessment of the effectiveness of Lindsay Leg Clubs requires systematic data collection and analysis with regard to cost, healing and recurrence rates, staffing, attendance, and member demographics
- currently providing information on 17 000 members and 266 000 recorded treatments and evaluations, the Lindsay Leg Club Network database has significant implications as an assessment tool within the fields of leg health and wound management
- further development of the database should include the parameters to systematically measure psychosocial and well-being outcomes

2 | METHODS

2.1 | The development of relational database within the Leg Club Network

The accumulation of good data has always been an important component of the Leg Club model. After the opening of the first Leg Club in 1995, a paper-based audit measurement tool was created. It included data on the demographics, assessment, ankle-branchial pressure index (ABPI) measurement performed, dressing and treatment costs, healing rates, and "Well Leg" attendances. Building upon this article-based data collection process, a relational database was subsequently developed. This encompassed methodology, workflows, rules, defined inputs and outputs, and reporting, supported by comprehensive training materials. The selection of data collection parameters in the database were informed by the professional practice of the founder of the Lindsay Leg model in consultation with a chartered engineer, Richard Lindsay.

In phase one, the process was trialled with a single, well-established Leg Club. The trial highlighted the need for comprehensive error checking of submitted data and the provision of associated error feedback reports. The second phase introduced automatic error checking for manual data entry. The third phase sought to eliminate the cost, risk, and inconsistency of manual processing by developing a systems prototype to focus exclusively on the use of easy-to-process code letters. This was tested in nine Leg Clubs to debug and refine the process and

software. In the final phase, error checking during data entry was automated for cost saving and quicker feedback. Following the testing in trial phases, the database was rolled out for UK Leg Clubs at the beginning of 2015 to allow for the collection of anonymised, simple, and easy-to-process real-life data on wound healing, recurrence, and wound management costs.

2.2 | Data collection

The current Leg Club data collection system consists of two forms completed separately by the volunteer who welcomes members at the Leg Club reception and the nurse who delivers wound treatment or preventative care for that member. Paper documentation is transferred onto the data acquisition tool provided for each Leg Club. This process is conducted independent of any documentation required by the NHS.

Upon registration of a new member, the volunteer records basic information including age, gender, referral route, and reason for attendance. Each member is then assigned a unique personal number and allocated a record sheet of which they become a custodian. The sheet is updated by the receptionist on each visit, creating a cumulative record of the member's Leg Club attendance. When waiting in the refreshment area to see a nurse, the member's attendance form is prepared for the nurse's attention. It is filled in by the nurse immediately on completion of "Treatment" or "Well Leg" maintenance.

For each leg, there are only two multiple choice items to highlight: the reason for attendance and the ongoing attendance status. The attending nurse assesses and records the type of wound by an identification initial: 'S' for Simple ulcer (wound area $< 100\ cm^2$ and/or wound present <6 months), 'C' for Complex ulcer (wound area $\geq 100\ cm^2$ and/or wound present ≥6 months),* 'I' for Injury, 'O' for Other, or 'A' if Advice was given.

The sheet is marked with the exit status of "Treatment" or "Well Leg" (if healing is complete for each wound).

When a member is seen by a clinician for an initial assessment and leg ulcer treatment or for advice and maintenance of 'Well Leg', this is recorded as a nurse consultation; a member with bilateral ulcers is recorded as two nurse consultations to track the progress of each leg separately. The exit status and the date of the next recommended nurse consultation are then recorded.† Finally, the hours worked by nurses from each clinical staff grade are also recorded, along with the number of volunteers and the hours that they worked. At the end of each session, the data are encrypted and emailed to a central database for the generation of a comprehensive view of Leg Club activity and performance information in standard reports, which are exportable to Excel spreadsheets.

2.3 | Data analysis

The analysis of the data stored in the database occurs periodically, typically at 3-month intervals and for designated sets of Leg Clubs.‡ However, for the audit described here, the entire database of Clubs was examined. The reports generated by the audit focused on:

- age and gender profile of individual Clubs;
- referral method (ie, by the GP, nurse, or self-referral);
- types of wound treated in the reporting period;
- exit status (percentage of breakdown of members in "Treatment" and "Well Leg");
- percentage of ulcer healing and recurrence rates at 12-week periods (amenable for direct comparisons with other approaches to lower limb wound management);
- staffing costs

The associated staffing costs were calculated using published costing data,[16] which offer hourly nursing costs for each NHS Grade based on either salary only or fully loaded costs. As per the database design, NHS Grades were used to identify the nursing skills corresponding with the following levels of experience:

- Grades 1 to 4: Nursing Associate
- Grade 5: Qualified Nurse
- Grade 6: Nursing Specialist or Senior Nurse
- Grade 7: Advanced Nurse or Nurse Practitioner

The duration of a consultation (ie, the time a member spent with a nurse in "Treatment" or "Well Leg") was calculated from the length of each Leg Club session and the number of nurse consultations recorded. It is important to stress that the total time each nurse spent with a member could have been longer, depending on whether single or bilateral care was delivered.

3 | RESULTS

Figure 1 summarises the key outcomes and performance of the Leg Clubs based on the data on over 17 000 members and over 266 000 recorded nurse consultations over the 5-year period of 2014 to 2019.

Of all recorded nurse consultations, 31% accounted for ulcer treatment, 14% for injuries and other conditions, and 55% for advice and "Well Leg" maintenance.

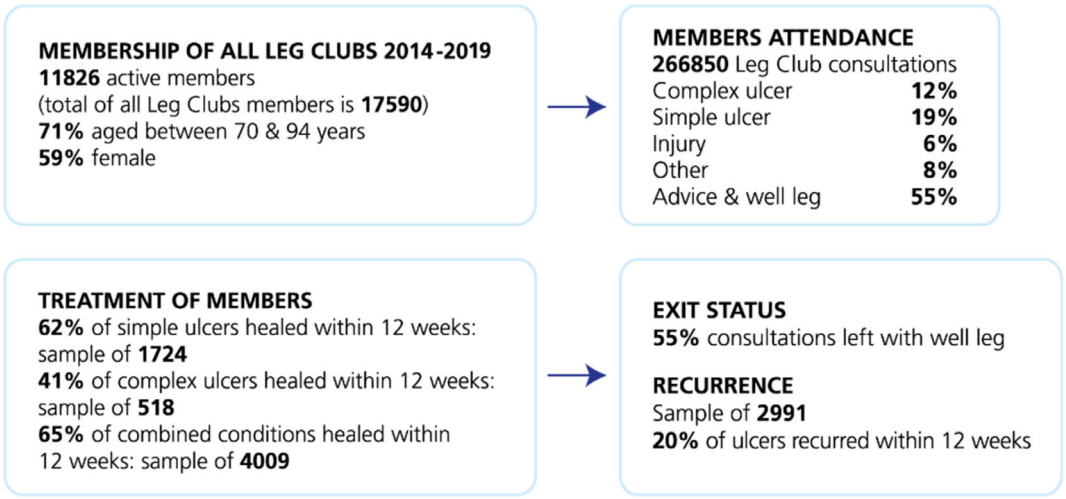

FIGURE 1 Summary of Leg Club outcomes

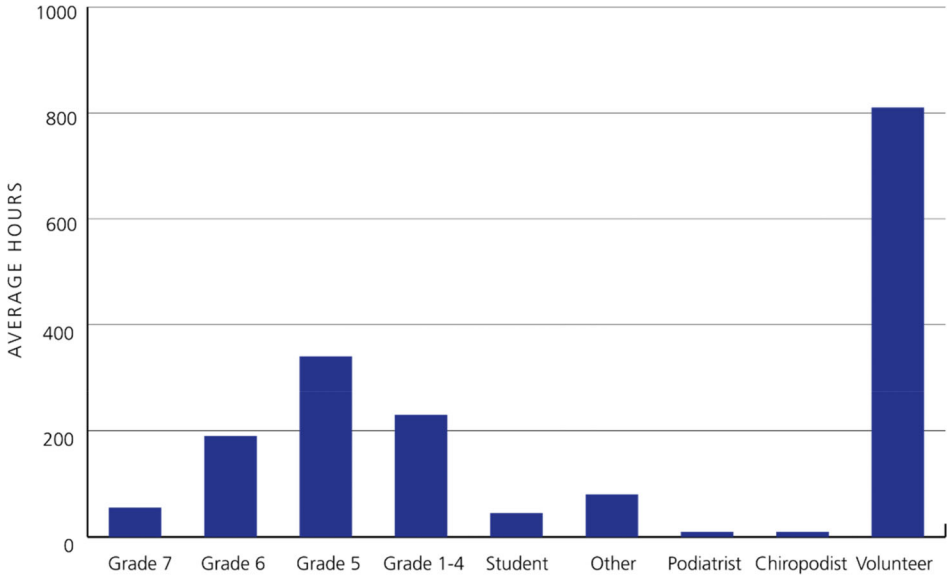

FIGURE 2 Average annual hours worked by volunteers and clinicians (by grade and/or function)

The audit also revealed that, while the majority of members were referred by GPs or nurses, over 20% of members self-referred or followed a family recommendation.

The simple ulcer-healing rate averaged 62% at 12 weeks over the 5-year period, as shown in Figure 1, but this increased to 78% in a 6-month period.[§]

The database also records ulcers that healed with delayed attendance. The likely reasons for this can include hospital admission or being unable to attend because of ill health. Importantly, delayed attendance can adversely affect the healing rate by as much as 15%.

"Recurrence" included healed ulcers breaking down and subsequent ulcers occurring on the same leg because of the underlying condition. The average recurrence rate after 12 weeks over the 5-year period was 20%, increasing to 24% after 6 months.

The audit revealed that a typical Leg Club session ran for 3.5 h and used an average of 13.5 h of nursing time. Figure 2 shows the average annual hours worked by volunteers and various clinicians by function and/or grade.

Staffing varied considerably across Leg Clubs. On average, NHS Grades 4 and 5 nurses constituted approximately 70% of the nursing resource and Grade 6 nurses approximately 23%. Grade 7 nurses performed more supervisory roles. NHS podiatrists and chiropodists also attended sessions as required.[¶] The contribution of the volunteers providing organisation and support for the Leg Club sessions was significant.

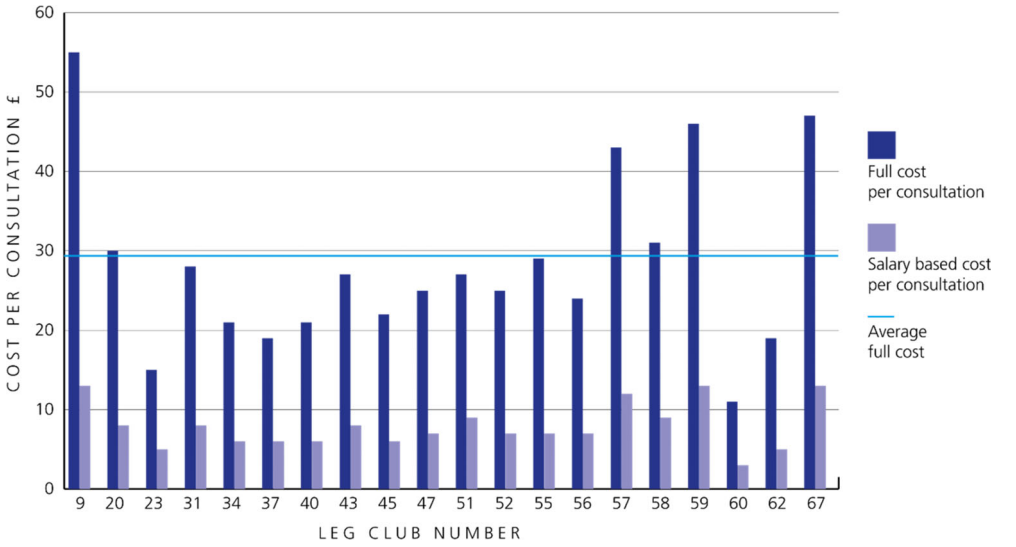

FIGURE 3 Costs per visit

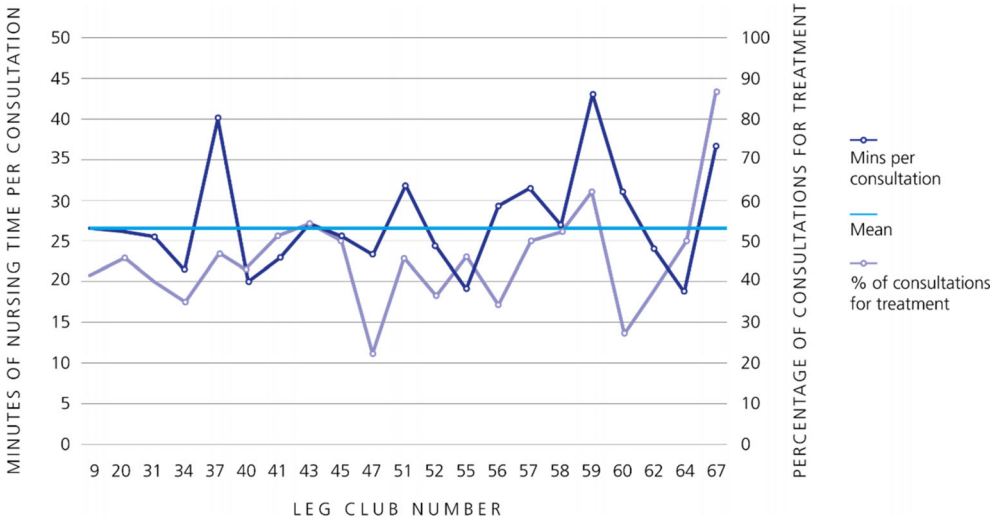

FIGURE 4 Duration of nurse-member consultations and percentage of members' visits for "Treatment"

The Leg Club model's average cost of a nurse consultation was £28. Using the nursing hours and grades recorded in the database, Figure 3 shows the calculated costs for 20 Leg Clubs in 2019 for both salary-based and full cost-based scenarios.

Combining the Leg Club session nursing time with the number of consultations in each session gave a clear indication of how nursing time was utilised. Figure 4 illustrates the duration of nurse-member consultations and percentage of members' visits in the "Treatment" category across 20 Clubs. The average consultation lasted 27 min.

The percentage of consultations involving 'Treatment' rather than assessment in the "Well Leg" regime was derived by using the member exit status from the Club reports. Figure 4 also shows how that time was apportioned.

The audit further looked at nursing skill mixes in Leg Clubs, expressed by nursing grades, and the associated numbers of visits for leg assessment in the "Well Leg" bracket. We carried out a study of eight Leg Clubs from Figure 3, chosen for the diversity of their skill mix. Figure 5 shows the skill mix for those Clubs, grouping the most skilled and experienced Grades 6 and 7 together and similarly less experienced Grades 4 and 5 together for each Leg Club. Overlaying the 'Well Leg' regime data again on Figure 5 revealed that two of the Clubs with the highest percentage of 'Well Leg' consultations were resourced by the less-experienced nurses.

Next, the simple ulcer-healing and recurrence rates after 12 weeks (Figure 1) were overlaid onto the skill mix for the same Clubs, as shown in Figure 6.

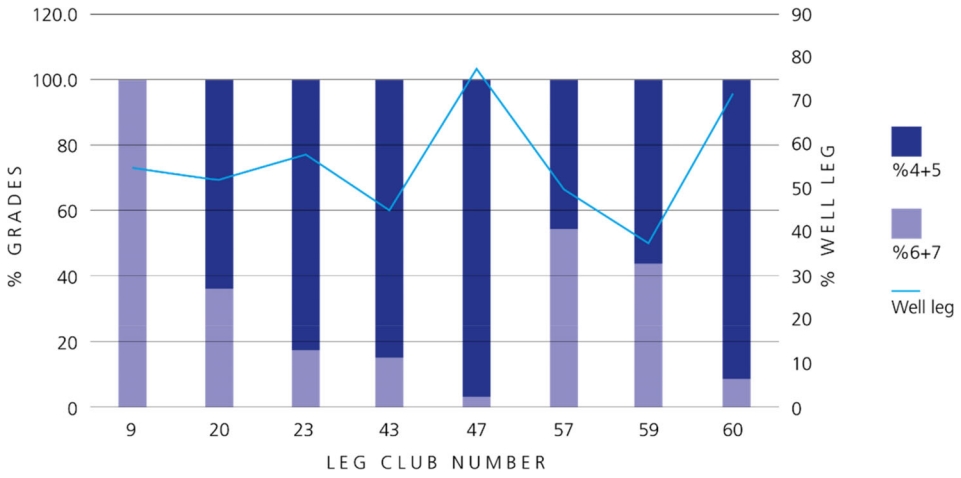

FIGURE 5 Nursing skill mix, by grades, and associated visits for "Well Leg"

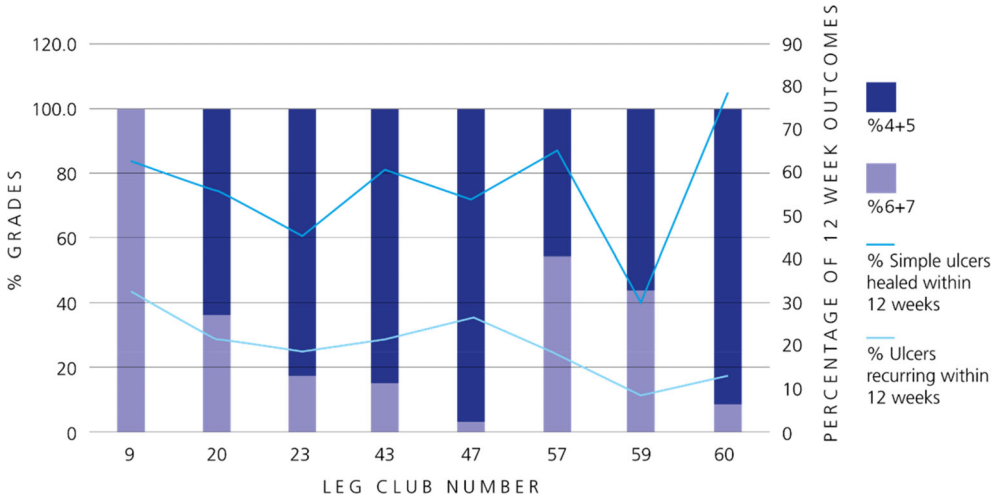

FIGURE 6 Nursing skill mix, by grades, and associated healing and recurrence rates

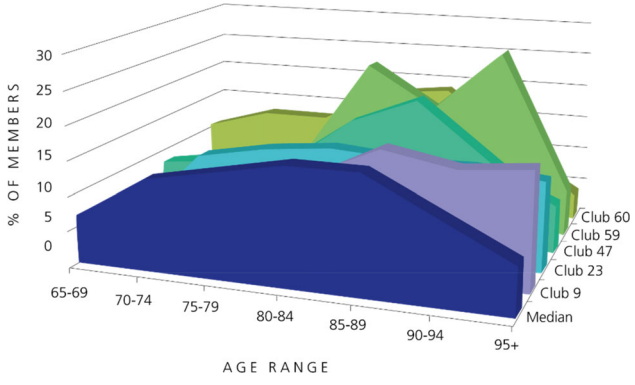

FIGURE 7 Members' age distribution for a subset of Leg Clubs

Club 60 showed above-average simple ulcer-healing rates after 12 weeks against a less-experienced skill mix. This was in contrast to Club 9, which had the most experienced skill mix, but here, the recurrence rates after 12 weeks were over 40%, visibly above the average recurrence rate of 20% (Figure 1).

To understand this further, members' age profile for a subset of those Clubs was investigated.

Figure 7 shows the average age ranges of members in the subset of Leg Clubs. Our audit revealed that 71% of the members were between 70 and 94 years old. Figure 7 shows the percentage of members in 5-year age groups in each Leg Club from the subset. Leg Clubs 59, 47, and 9 has a visibly higher percentage of older members.

A comparison of the age distribution of those Clubs with their healing and recurrence rates in Figures 8 and 9 showed that the recurrence rates increased for Clubs with a very elderly population. Similarly, Clubs with a younger population demonstrated a higher healing rate.

Finally, an analysis of healing trends showed a consistent pattern of over 50% of all simple ulcers treated in Leg Clubs healed on a year-by-year basis (Figure 10).

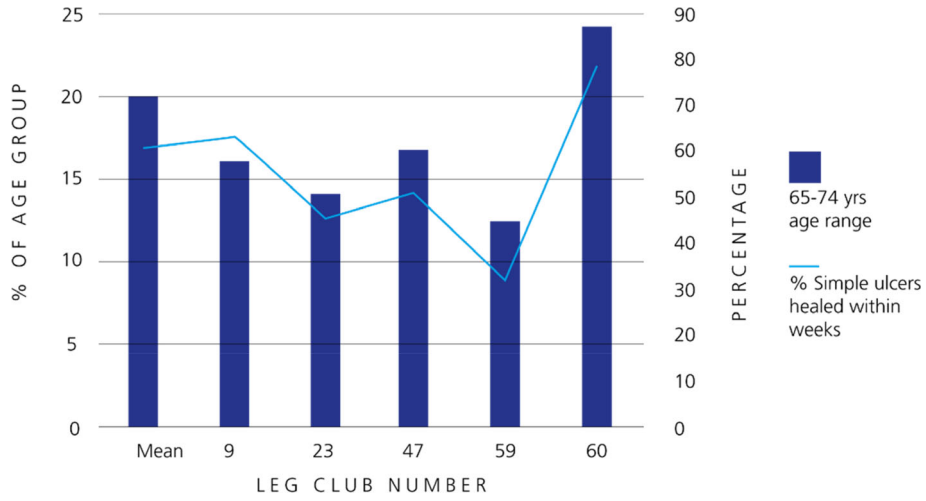

FIGURE 8 Healing rates for members in the 65 to 74 year age range

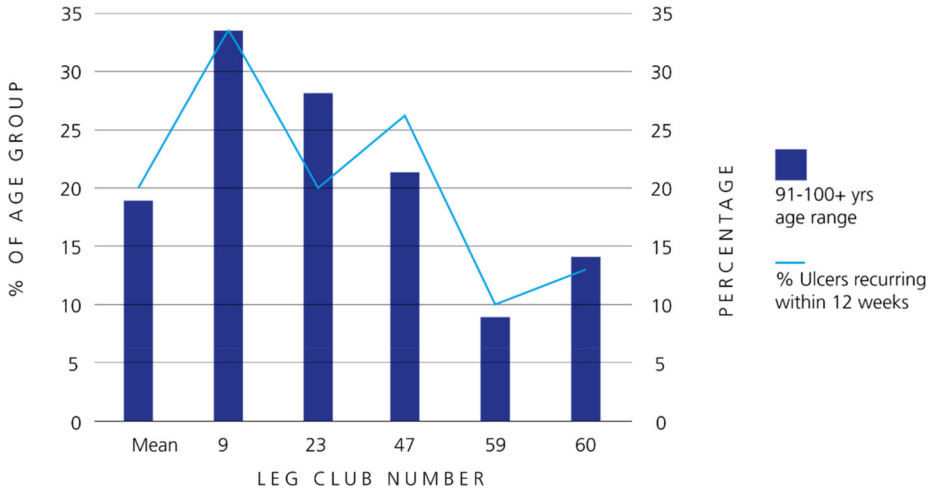

FIGURE 9 Recurrence rates for members in the 91 to 100+ year age range

4 | DISCUSSION AND CONCLUSION

The prevalence of venous leg ulcers in an ageing population presents a growing challenge in wound care and has a negative impact on the quality of life.[17] Therefore, lower limb and leg ulcer care requires a comprehensive approach to maximising medical and psychosocial patient outcomes. Leg Clubs offer such an approach.[18,19] However, to date, there has been a paucity of research on outcomes for members attending a Leg Club. In this article, we report, for the first time, on an audit of a relational database within the Leg Club Network. Here, we found a highly significant volume of data that has the potential to be of interest to NHS providers and health economists.

Cost is often used as a key measure of effectiveness in the treatment of lower leg wounds. The analysis has

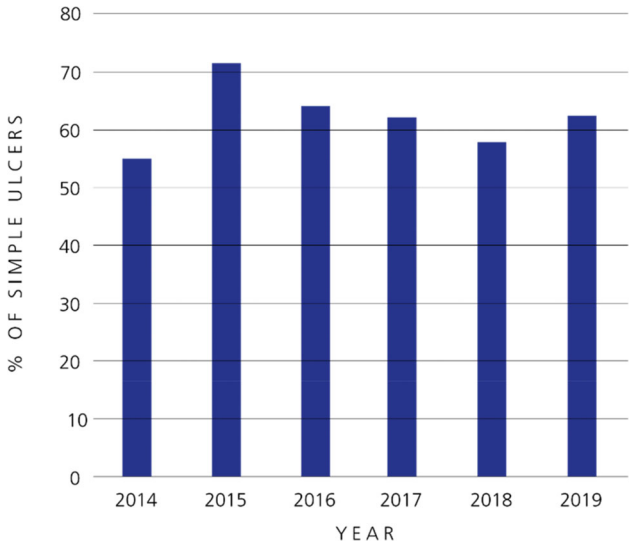

FIGURE 10 Percentage of simple ulcers healed in 12 weeks

shown that the combined cost of wound "Treatment" and "Well Leg" assessment in a collective Leg Club environment, standing at £28, compares very favourably against the estimated £75 cost of a home visit for wound treatment alone.[16] Given that 55% of members attended for 'Well Leg' assessment, in the longer term, costs are likely to reduce further as new ulcers are promptly identified and treated (based on the assumption that the choice and cost of dressings and hosiery will be the same in whatever environment the person is treated). This audit confirmed the previously reported cost savings in district nursing time because of the faster healing times and reduced recurrence in a Leg Club environment.[20]

Analysis of the mix of skills across the Leg Clubs showed that the two Clubs with the largest population of 'Well Leg' members were able to operate with a lower skill mix. This may give managers the opportunity to use their nursing resources in the most cost-effective way.

The rates of wound healing and recurrence have also been used as a standard measure of treatment effectiveness.[21,22] Clark[23,24] reported significantly improved outcomes using national figures in a Leg Club setting. However, our audit showed that member age may be a significant factor in outcomes, which warrants further investigation. Hellström et al[25] stated that the majority of individuals with hard-to-heal leg ulcers are of advanced age (>80 years) and have impaired mobility. Individuals in this age group frequently suffer from health problems, including pain and sleep disturbances, which could affect their overall well-being, as well as the healing process. To date, the impact of age and accompanying multimorbidity on the effectiveness of existing and emerging treatment approaches for chronic wounds is poorly understood as older adults tend to be excluded from randomised clinical trials.[26]

This audit suggests that healing and recurrence outcomes may be better interpreted by considering individual Leg Club age profiles. For example, the recorded age range for one Club (Club 60) contained fewer than average members older than 90 years of age and more members younger than 75 years old. This Leg Club has above-average healing rates. Conversely, the recorded age range for Leg Club 9 had a significant population over the age of 95 years and demonstrated Leg Club 5-year heal rates but with higher recurrence rates.

Given the unique demographic profile of Leg Club members and the high rates of attendance for "Well Leg" maintenance, it is also likely that an important part of members' therapeutic journey lies in their social interactions.[27] The importance of social contact and partnerships for members' well-being is regularly stressed in anecdotal reports of the performance of Leg Clubs.[28] It is therefore important to measure and understand it better. At present, the database does not include the parameters for systematically measuring social and well-being outcomes.

As the number of Leg Clubs expands, there will be a need for long-term technical enhancements of the database, such as data entry, instant remote reporting, and server expansion. These are in development. Additional data parameters could also include measures of psychosocial and well-being outcomes. Nonetheless, the audit revealed that the Leg Club Network database already has good evidence demonstrating how the Leg Club approach to wound care delivery can transform lower limb health care in a positive way.

The authors believe that the results of further audits, once the datasets have expanded and include criteria relating to psychosocial and well-being outcomes, are likely to be of great benefit to multiple stakeholders, including the Leg Club Network, collaborating health service organisations, wound clinicians, health care policymakers, health economists, and researchers studying the organisation of care in the community.

ACKNOWLEDGEMENTS

This article is dedicated to the memory of the late Richard Lindsay, C.Eng FIMechE, for his original creation, design, training, and implementation of the Foundations data programme. We also thank Jo Cottrell for her continuous support and invaluable input on collating and classifying the data reports.

CONFLICT OF INTEREST

Dr Anna Milena Galazka contributed to this publication during her post-doctoral research training funded by *Mölnlycke Health Care* via the Welsh Wound Innovation Centre. The funder had no involvement in the preparation of the article. No financial or conflicts of interest exist for the remaining authors of this article.

ENDNOTES

* The criteria to determine whether the wound was a simple or complex venous leg ulcer incorporated the NHS's Any Qualified Provider guidance[14] and the venous leg ulcer assessment pathway.[15] The SIGN guideline on the care of chronic ulcers suggests that the surface area of the ulcer be measured successively over time.

† This does not refer to any non-Leg Club referrals or preclude the member choosing to attend on earlier dates.

‡ The reports can be refined into an executive summary "dashboard", giving key indicators of Leg Clubs' performance. The combined reports also enable a comparison of results from individual Leg Clubs with the mean values across all the Clubs, such that any significant variance from the mean could be highlighted and investigated.

§ These results are based on the data for members who followed the prescribed treatment schedule.

¶ Many Leg Clubs had regular visitors from Age Concern or private foot care professionals.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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How to cite this article: McIntyre N, Galazka AM, Lindsay E, Bawden R, Renyi R. A relational database within the Leg Club Network: an audit. *Int Wound J*. 2020;1–9. https://doi.org/10.1111/iwj.13522