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ORIGINAL ARTICLE

Estimating the costs associated with the management of patients with chronic wounds using linked routine data

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Abstract

Chronic wounds are known to represent a significant burden to patients and National Health Service (NHS) alike. However, previous attempts to estimate the costs associated with the management of chronic wounds have been based on literature studies or broad estimates derived from incidence rates and extrapolations from relatively small-scale studies. The aim of this study is therefore to determine the extent of resource utilisation by patients classed as having chronic wounds within Wales using linked routine data – available through the Secure Anonymised Information Linkage (SAIL) database – to estimate the costs associated with the management of these patients by the NHS in Wales. The SAIL database brings together, and anonymously links, a wide range of person-based data from general practitioner (GP) practices within Wales, which includes primary and secondary care consultations to create an encrypted anonymised linking field for each individual. This linkage allows the patient pathway to be tracked through the NHS system both retrospectively and prospectively from a specific reference date. The estimated costs were derived by extrapolating to an all-Wales level from the results gleaned from the SAIL database using the respective READ codes to capture relevant patients with chronic wounds. The number of patients identified as having chronic wounds within the SAIL database was 78 090, which equates to 190 463 across Wales as a whole and a prevalence of 6% of the Welsh population. The total cost of managing patients with chronic wounds in Wales amounted to £328·8 million – an average cost of £1727 per patient and 5·5% of total expenditure on the health service in Wales. A relatively few READ codes represented a significant proportion of expenditure, with diabetic foot ulcers, leg ulcers, foot ulcers, varicose eczema, bed sores and postoperative wound care constituting 93% of total expenditure. When a more conservative perspective was used in relation to classification of chronic wounds, the total cost amounted to £303 million. However, these are likely to be underestimates because of the lack of information for patients with treatments lasting over 6 months and not including patients who might have entered the health care system of wound management elsewhere – such as patients contracting pressure ulcers in hospitals and having surgical wound infections.

Introduction

Chronic wounds represent a significant burden to patients and National Health Service (NHS) alike (1). Chronic wounds are defined as the ones 'which have failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity over a period of 3 months' (2). It has been estimated that there are between 70 000 and 190 000 individuals in the UK with an open venous leg ulcer at any one time, with prevalence rates increasing markedly with age. The number of patients developing new ulcers within a year was estimated to be more than 100 000, with an annual direct cost between £168 million and £198 million to the NHS in 2005/2006 (3), not including the costs associated with anxiety, depression and feelings related to social isolation (4,5). Further, diabetic foot ulcers are common and widely acknowledged to be a source of major distress and morbidity in a predominantly elderly population, and are an enormous drain on health care resources (6–11). Not only does diabetes make the foot more liable to ulceration, but it also impairs the process of healing, and diabetic foot ulcers readily develop into chronic wounds, with a significant negative impact on health-related quality of life (1,8,11). There are ∼24 000 hospital admissions for diabetic foot ulcers each year in the UK (8) and ∼15% of all ulcers in the UK result in some form of amputation (8). In addition, pressure ulcers were estimated to cost between £1·76 and £2·64 billion at 2005/2006 prices to the UK NHS (3), resulting in an estimate of the annual direct cost to the UK NHS of caring for patients with chronic wounds in the range of £2·3–£3·1 billion, which is ∼3% of the total expenditure on health. The burden to health care systems of managing patients with chronic wounds is likely to increase, because, in part at least, of the increase in ageing population and increases in the prevalence of obesity, diabetes and lower extremity arterial disease (3,12,13), which have led to calls for higher prioritisation (9).

However, the problem with previous attempts to estimate the costs and burden associated with the management of chronic wounds is that they were based on literature studies or broad estimates derived from incidence rates and extrapolations from relatively small-scale studies. The aim of this study is therefore to determine the extent of resource utilisation by patients classed as having chronic wounds within Wales using linked routine data – available through the Secure Anonymised Information Linkage (SAIL) database (14) – and estimate the costs associated with the management of these patients by the NHS in Wales.

The SAIL database brings together, and anonymously links, a wide range of person-based data from 41% of general practitioner (GP) practices within Wales, which includes GP records, outpatient (OP) clinical data, inpatient (IP) episodes and accident and emergency (A&E) department data, to create an encrypted anonymised linking field for each individual. This linkage allows the patient pathway to be tracked through the NHS system both retrospectively and prospectively from a specific reference date.

The estimated costs have been derived by extrapolating to an all-Wales level from the results gleaned from the SAIL database using the respective READ codes to capture relevant patients.

Key Messages

- chronic wounds represent a significant burden to patients and NHS
- previous estimates have suggested that management of chronic wounds consumes 2–4% of NHS expenditure
- this paper has derived estimates of prevalence and cost from routine NHS data that link primary and secondary care
- chronic wounds have a prevalence of 6% and consume at least 5·5% of NHS expenditure

Methods

The SAIL database was used as the source routine data to capture the extent of resource utilisation by patients classed as having chronic wounds. At the time of the analysis, the SAIL database contained patient-level information from 41% of the GP practices in Wales. Therefore, the all-Wales figures were extrapolated from the number of patients identified with chronic wounds in the SAIL database.

The classification of patients was based on READ codes and the initial contact with the GP – linked to the respective code – was used as the reference date for the particular patient. The patient pathway over a 6-month period after the first initial GP visit was used to document the array of health care usage and to derive an estimate of the costs incurred in the management of patients with chronic wounds, as only a tiny proportion of patients had resource utilisation data recorded post 6 months from the reference date. READ codes were selected by three tissue therapy clinicians from the Welsh Wound Innovation Centre to determine which patients would be included in the relevant data set for inclusion in this study (indicated in Appendix). A reduced data set based on fewer READ codes – with READ codes excluded shown in Appendix – to reflect a more conservative perspective on what constitutes chronic wounds was analysed as part of the sensitivity analysis.

All patients linked to the READ codes were deemed as being suitable for inclusion and were tracked through primary care settings recording their level of GP visit/practice nurse utilisation, wound treatment utilisation (e.g. dressings, bandages, etc.) and the extent of district nurse time involved in the management of their wounds for the 6-month period following initial GP visit. Linking to their READ code also ensured that only 'wound-related' visits/contacts were included. The care pathway of selected patients was also tracked to secondary care settings to capture the extent of outpatient attendances and inpatient episodes in hospitals during the 6-month period.

Direct health care costs were calculated using a bottom-up micro-costing approach. The costs were reported from the perspective of the UK NHS and comprise costs for GP, practice nurse and inpatient services. The costs were reported at 2012/2013. The unit costs for health care utilisation were obtained from a number of sources (15–17) and are shown in Table 1. The READ code system for a patient recorded on a particular date lacks sufficient detail to be able to accurately specify the nature of the 'GP-visit'. Therefore, in costing GP visits, the

Table 1 Health care unit costs

Cost component	Unit costs (£)	Source
GP visit	£45 per consult (assume 7 minutes)	PSSRU Unit Costs of Health and Social Care 2013
GP practice nurse	£13 per consult (assume 15 minutes)	PSSRU Unit Costs of Health and Social Care 2013
District nurse	£35 per home visit (assume 30 minutes)	PSSRU Unit Costs of Health and Social Care 2013
Inpatient stay	£237·65–£1769·77	All Wales Costing Return 2011–2012
Outpatient attendance	£120·47	All Wales Costing Return 2011–2012
Dressings, etc	£0·05–£43·18	British National Formulary (BNF) 2013

GP, general practitioner; PSSRU, Personal Social Services Research Unit.

Table 2 Resource utilisation

Resource utilised	Number in cohort	Unit cost (£)	Cost (£)	Cost at all-Wales level (£)
Initial GP visit	78 090	45	3 514 050	8 570 854
Subsequent GP visits	1 249 809	13	16 247 517	39 628 090
Number of dressings	2 344 930		3 964 537	9 669 602
Number of district nurse attendances	703 479	35	24 621 765	60 053 085
Number of outpatient attendances	68 662	120·47	8 271 711	20 174 905
Number of inpatient episodes	14 697		78 204 577	190 742 871
Total expenditure			134 824 157	328 839 408
Average cost per patient				1726·53

GP, general practitioner.

unit cost for 'GP visit' has been used for the initial visit and the unit cost for 'practice nurse visit' for the subsequent GP visits.

A further assumption related to the number of district nurse attendances. The SAIL database did not contain any usable data relating to the number of district nurse visits with the variable field only very scantily populated and bearing no resemblance to the actual management of such patients. The assumption was that district nurses were involved in changing 30% of dressings – in line with previous work (18).

Results

The number of patients identified as having chronic wounds within the SAIL database was 78 090, which equates to 190 463 across Wales as a whole [(78 090/41) × 100] and a prevalence of 6% of the Welsh population. Diabetic foot ulcers comprised 68% of this population.

The total number of GP visits by these patients amounted to 1 327 899 – an average of 17·0 visits per patient over a 6-month period – and a cost of £48·2 million when extrapolated to the Welsh population. The number of dressings used by the cohort amounted to 2 344 930 – an average of 30·0 per patient over a 6-month period – at a cost of £9·7 million at an all-Wales level. District nurse attendances relating to the management of chronic wounds were assumed to be 703 409 – at a cost of £60·0 million to the NHS Wales. Primary care costs in managing patients with chronic wounds over a 6-month period therefore amounted to £117·9 million.

The total number of outpatient attendances amounted to 68 652, with 37% of patients being referred to outpatient management – and a cost of £20·2 million. The number of inpatient episodes was 35 714, with 19% of patients being admitted with an average length of stay of 12·8 days– and a cost of £190·7 million to the NHS Wales.

Thus, the total cost of managing patients with chronic wounds in Wales amounted to £328·8 million – an average cost of £1727 per patient and 5·5% of total expenditure on the health service in Wales. A relatively few READ codes represented a significant proportion of expenditure, with diabetic foot ulcers, leg ulcers, foot ulcers, varicose eczema, bed sores and postoperative wound care constituting 93% of total expenditure.

When the alternative set of codes was used, the number of patients identified as having chronic wounds was 74 882, which equates to 182 639 across Wales. The number of dressings and district nurse visits used by the cohort did not change when the revised data set was used, while there were 16·0 visits per patient over a 6-month period at a cost of £115 million at an all-Wales level. The costs of outpatient and inpatient attendances amounted to just over £188 million, with the revised data set and thus the total cost of managing patients with chronic wounds in Wales amounted to ∼£303 million (Table 2).

Discussion

This is the first Welsh study to estimate the cost of wound management for chronic wounds in primary and secondary care settings based on routine data sources. The study has confirmed the findings from previous studies that the costs associated with the management of wounds represent a significant proportion of NHS expenditure but has estimated that the management of patients with chronic wounds amounts to 5·5% of NHS expenditure in Wales as opposed to a previous UK estimate, which is widely quoted, of 3% (2).

While a few READ codes represented the largest proportion of expenditure, further work is required to assess the accuracy of coding on which the estimate is based and the type of consultation. Further, the lack of detailed recording has meant that an assumption had to be made in relation to the number of district nurse attendances to change dressings and manage the

patient within their own home, while the lack of any significant information post 6 months from the reference date has not enabled a complete picture of patient management and resource utilisation to be constructed. The estimate is therefore likely to be a significant underestimate as many of these chronic wounds are known to persist for significantly longer than 6 months (1).

It should be noted that the trigger for documenting the resource utilisation of such patients was the initial contact with the GP. It therefore does not include patients who entered the health care system of wound management elsewhere – such as patients contracting pressure ulcers in hospitals and having surgical wound infections – thereby further emphasising the conservatism of this estimate.

Conclusion

The aim of this study has been to determine the costs associated with the management of patients with chronic wounds by the NHS in Wales. Interrogation of the SAIL database produced a prevalence rate of 6% of people with chronic wounds in Wales and an expenditure of £328·8 million – or £303 million, when a more conservative perspective was used on the classification of chronic wounds – over a 6-month period, equivalent to 5·5% of the total NHS expenditure in Wales.

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Appendix

READ codes

READ code	Terminology description	Excluded in sensitivity analysis
2G510	Foot abnormality – diabetes related	Yes
2G511	Foot abnormality – non-diabetes	Yes
2G54.	O/E – right foot ulcer	No
2G55.	O/E – left foot ulcer	No
2G56.	O/E – amputated right forefoot	No
2G57.	O/E – amputated left forefoot	No
2G58.	O/E – right foot deformity	Yes
2G59.	O/E – left foot deformity	Yes
2G5A.	O/E – right diabetic foot at risk	No
2G5B.	O/E – left diabetic foot at risk	No
2G5b.	O/E – right foot colour abnormal	No
2G5c.	O/E – left foot colour abnormal	No
2G5C.	Foot abnormality – diabetes related	No
2G5D.	Foot abnormality – non-diabetes	No
2G5E.	O/E – right diabetic foot at low risk	No
2G5F.	O/E – right diabetic foot at moderate risk	No
2G5G.	O/E – right diabetic foot at high risk	No
2G5H.	O/E – right diabetic foot – ulcerated	No
2G5I.	O/E – left diabetic foot at low risk	No
2G5J.	O/E – left diabetic foot at moderate risk	No
2G5K.	O/E – left diabetic foot at high risk	No
2G5L.	O/E – left diabetic foot – ulcerated	No
2G5S.	O/E – right healed foot ulcer	No
2G5T.	O/E – left healed foot ulcer	No
2G5V.	O/E – right chronic diabetic foot ulcer	No
2G5W.	O/E – left chronic diabetic foot ulcer	No
2G5Y.	O/E – abnormal foot colour	No
8C1M.	Postoperative wound care	No
8C1M.	Postsurgical wound care	No
G8 …	Vein, lymphatic and circulatory diseases NOS	No
G830.	Varicose veins of the leg with ulcer	No
G831.	Varicose eczema	No
G831.	Varicose veins of the leg with eczema	No
G832.	Varicose veins of the leg with ulcer and eczema	No
G833.	Varicose veins of the leg with rupture	Yes
G835.	Infected varicose ulcer	No
G836.	Varicose vein of leg with phlebitis	Yes
G837.	Venous ulcer of leg	No
G844.	Perianal haematoma	Yes
G844.	External thrombosed haemorrhoids	Yes
L3945	Infection of obstetric surgical wound	No
L443.	Other complication of obstetric surgical wound	No
L443.	Haematoma – perineal wound	No
L443.	Infection – perineal wound	No
L4430	Other complication of obstetric surgical wound unspecified	No
L443z	Other complication of obstetric surgical wound NOS	No
M27..	Chronic skin ulcer	No
M270.	Bed sore	No
M270.	Pressure sore	No
M270.	Plaster ulcer	No
M270.	Decubitus (pressure) ulcer	No
M271.	Neurogenic leg ulcer	No
M271.	Foot ulcer	No
M271.	Leg ulcer NOS	No
M271.	Trophic leg ulcer	No
M271.	Non-pressure ulcer lower limb	No
M271.	Ischaemic leg ulcer	No
M2715	Venous ulcer of leg	No
M2716	Traumatic leg ulcer	No
M272.	Ulcer of skin	No
M27y.	Chronic ulcer of skin, other specified sites	No
M27z.	Chronic skin ulcer NOS	No
SP232	Surgical wound necrosis	No
SP23z	Delayed healing surgical wound	No
SP23z	Healing delayed surgical wound	No
SP23z	Wound surgical healing delayed	No
SP23z	Operation wound disruption NOS	No

NOS, Not Otherwise Specified.