

Abstract

Objective: To identify the prevalence and incidence of pressure ulcers in people with long term conditions resident in care homes or nursing homes

Method: We followed the PRISMA guideline for systematic reviews however due to funding constraints we do not claim this review to be systematic but it is a narrative review informed by PRISMA. We searched Embase, Medline and CINHAL for observational studies reporting incidence or prevalence data. Data reported relevant head to toe examination of the pressure ulcer in residence of care or nursing homes. Internal and external validity of the included studies were assessed using the checklist devised by Hoy et al. ⁽¹⁾

Results: Seventeen studies met the inclusion criteria and included in the study. Some studies gave a full breakdown by grade, some only gave overall figures and some excluded grade I pressure ulcers. However within those constraints certain patterns are clear. Prevalence rates varied from 3.4% to 32.4% and large differences in prevalence in different countries was not explained by methodological differences. While some countries such as Germany, the Netherlands and the USA had robust data some countries such as the UK had none.

Conclusion: Pressure ulcers are a common problem in long term care. However there are substantial differences between countries and many countries have no published data.

What is known about this topic

Pressure ulcers (also known as pressure sores, bedsores, decubitus ulcers and pressure injuries) are wounds due to local interference with circulation and have been known since the time of the ancient Egyptians. ⁽²⁾ Prolonged pressure on a part of the body due to the weight of the body or a limb or a shearing force can cause such ulcers especially in patients with poor nutrition. They can range from reddening of the skin (nonblanchable erythema) grade 1, to grade 2 where the skin is broken (partial thickness skin loss) to grade 3 (full thickness skin loss) and 4 (full thickness tissue loss) which are deep ulcers with exposed bone, tendon or muscle. ⁽³⁾ Pressure ulcers (especially severe ulcers) can become infected and cause septicaemia and death. Even mild cases can be painful and disfiguring.

Pressure ulcers are common in the elderly but also in people who are disabled or frail or wheelchair users. ⁽⁴⁾ It has been assumed that all pressure ulcers are avoidable and that poor nursing care is the cause of such injuries though that is disputed. ⁽²⁾ It was found, for example, that in 100 consecutive admissions for fractured neck of femur, most, if not all, pressure ulcers could be attributed to immobility prior to admission to hospital or during accident and emergency stay or while in operating theatre ⁽⁵⁾ rather than due to poor nursing care on the ward. The problem has been that a pressure ulcer may occur at any stage in the patient journey to the ward, but becomes evident after admission to the ward as it may take days for a deep tissue injury to break the skin exposing a severe pressure ulcer.

Pressure ulcers are expensive to treat as well as being painful. Recent estimates of the cost of wounds (of which pressure ulcers are one type) suggests a figure of £4-5 billion to-£5.1 billion annually in the UK. ⁽⁶⁾ It has been estimated that a pressure ulcer adds about seven days to a patient stay. ⁽⁷⁾ In the USA, the treatment cost for an adult of a hospital-acquired grade 4 (most severe) pressure ulcer has been estimated to be over \$129,000 ⁽⁸⁾ and there may be other costs, including litigation. Costs increase with ulcer severity because the time to heal is longer and the incidence of complications is higher in more severe cases. ⁽⁹⁾ Dealey et al went on to give UK figures of treatment

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from £1,214 (grade I) though £5241 (grade II), £9041 (grade III) to £14,108 (grade 4). The UK figures for adults are much lower but the cost of treatment in the USA is higher than the UK. Even using UK figures, the money (as well as suffering) is significant.

Appropriate preventative interventions have been reported to reduce the prevalence/incidence of avoidable pressure ulcers. (10) However some pressure ulcers appear to be unavoidable in the sense that when risk assessment has been conducted and all risk reduction strategies put into place, some still occur – especially at end of life. (10) We have shown by using Pressure Ulcer Daily Risk Assessment (PUDRA), built around the SSKIN (Surface, Skin inspection, Keep moving, Incontinence and moisture, Nutrition and hydration) care bundle developed in 2009, (11) that avoidable pressure ulcers can be reduced. (10) Thus raising awareness (which is all a risk tool can do) leads to meaningful prevention.

Given the long history of pressure ulcer research, especially as it is a condition so common in elderly frail people, one might assume long term care homes for the elderly would have strategies for preventing pressure ulcers. However in Wales (for example) Police in Operation Jasmine investigated 100 alleged victims of negligent care and the Flynn report (12) concluded in those care homes investigated under Operation Jasmine “older people’s injuries, pain and life-threatening deep pressure wounds were unobserved, unreported, reported inaccurately and/or reported belatedly”. Before a problem can be addressed it has to be acknowledged. Thus knowledge of the extent of problem of pressure ulcers in long term care is needed.

What this paper adds

We have updated the figures for prevalence of pressure ulcers in long term care from the previous review in 1995. (13) We have found differences in prevalence between countries and some countries (the UK being an example) have no published data on long term care.

Introduction

There is no recent review of prevalence and incidence studies of pressure ulcers in long term care, the latest review was published in 1995. (13) However Smith et al focused on the elderly which left a potential gap in the literature. There are recent reviews of pressure ulcers in acute care institutions such as secondary or tertiary hospitals. Reviews in acute care include that of Tubaishat et al (14) and there are reviews of pressure ulcer incidence and prevalence in intensive care units (15, 16) and in children. (17) Moore et al (18) considered all care settings (hospitals, hospices, children, community and care homes) but only in Ireland, Denmark, Sweden, Norway and Iceland. In this study long term care incidence was 6.63% (95% confidence interval 3.1-8.4%) but there were only five long term sites in this review and the focus was Scandinavia, Ireland and Iceland. Hahnel et al (19) reviewed skin conditions including pressure ulcers and had data for care homes but only gave overall prevalence figures and included studies where no head to toe physical examination had been conducted - thus comparisons between countries were difficult to evaluate. Similarly in an Austrian review (20) which was not solely focussed on pressure ulcers, data from studies which used surveys were discussed and no study employing head to toe physical examination was offered.

Measuring prevalence may have an impact on prevalence as shown in Germany (21) where a total prevalence was 14.5% (7.9% excluding grade 1) in 2001 in the first prevalence survey but fell the

next year to 10.2% (6.4% excluding grade 1). There was a significant increase in re-positioning which may have accounted for the change in prevalence.

Therefore the objective of this study is to identify the prevalence and incidence of pressure ulcer in people with long term conditions in care homes or nursing homes.

Methods

We originally intended to conduct a systematic review but were unable to obtain the resources needed for a full systematic review. This review is informed by systematic review methodology but we only claim to have conducted a narrative review, albeit a robust narrative review.

We used guidance and instructions suggested in the PRISMA statement (Preferred Reporting Items for Systematic reviews and Meta-Analyses).⁽²²⁾ The standard for conducting systematic reviews is that of the Cochrane Collaboration and normally the Cochrane Handbook of Systematic Reviews⁽²³⁾ would give the methodological underpinning for a review. However most reviews are concerned with the synthesis of evidence of effects, particularly trying to establish the effectiveness of various treatments.⁽²⁴⁾ Our interest is prevalence and incidence so our methods will also be informed by the chapter on systematic reviews of prevalence and incidence studies in the Joanna Briggs *Institute Reviewer's Manual*.⁽²⁴⁾ As pointed out in this chapter “no clear guidance currently exists on synthesizing frequency data from incidence and prevalence estimates” and the Joanna Briggs manual addresses this shortcoming. The area of prevalence and incidence studies are increasingly seen as important to estimate the burden of healthcare both now and in to the future.⁽²⁴⁾ Unlike randomised controlled trials (RCTs) which aim to establish if an intervention is superior to another intervention (which may be a control), prevalence and incidence studies are observational. They give evidence of the size of a medical condition but also where the condition occurs. In this case we are concerned not just with how common pressure ulcers are, but where and when they occur. Geographical location and variation between groups (for example gender, ethnic origin, pre-existing medical conditions, age groups) inform health care planning and allocation of resources.

We registered the protocol on Prospero (www.crd.york.ac.uk/PROSPERO/) as advised by the PRISMA statement⁽²²⁾ with number CRD42017070047. Modifications to a protocol may be needed as reviews are by their nature iterative. Public registration allows a judgement to be made whether any modifications are appropriate. Even prior to registration we made some amendments based on expert review. However we made no further changes to the protocol.

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We have designed our search strategy employing the methodology advocated by the Peer Review of Electronic Search Strategies (PRESS) for systematic reviews.⁽²⁵⁾ PRESS was designed by a survey of experts and a consensus development forum to develop an evidence based guideline to assess systematic reviews and other evidence synthesis studies. The reason for PRESS was that review of 100 medline searches showed most contained errors. The process involves two researchers, a requester and reviewer, both of whom are assumed to be skilled in searching bibliographic databases. The requester gives the search strategy to the reviewer, using a form designed for the process. The reviewer reviews the search strategy using the PRESS 2015 Guideline Evidence-Based Checklist (available as Table 1 in McGowana et al, 2016). This covers six areas: translation of the research question, Boolean and proximity operators, subject headings, text word searching, spelling/syntax/line numbers and limits/filters. If major amendments are proposed by the reviewer then a second PRESS review is undertaken after such amendment.

Specifically the search designed by two of the team, both of whom have conducted earlier reviews, was reviewed by an external reviewer who is an expert in systematic review of prevalence and

incidence of wounds including pressure ulcers. Changes were made to the strategy including adding the database embase, medline and CINAHL and expanding searches from keywords to full text. It was also decided to expand the focus from elderly care to all long term care of adults. Thus we conducted a population study of all adults in long term care whereas the earlier review of Smith focused on the elderly. The databases used were medline, embase and CINAHL employing the following Boolean string and searching on all text.. Additionally, reference lists in papers were examined for relevant papers.

(Preval* OR incid*) AND (pressure ulcer* OR decubitus ulcer* OR bedsore*) AND (residential facility* OR homes for the aged* OR nursing home* OR rehabilitation center* OR long term care* OR health services for the aged)

These search terms are an amalgam of those employed in published reviews of long term care and reviews of pressure ulcer incidence and prevalence.

We employed searching on all text with truncation operators to ascertain if the numbers of papers returned were too many to manage. If this were to be the case we could have used proximity operators (for example) but the numbers returned were manageable so we used the simpler, more general search.

Selected papers were evaluated using the Joanna Briggs Institute Critical Appraisal Instrument for Studies Reporting Prevalence Data. ⁽²⁴⁾ We used the Joanna Briggs Institute Data Extraction Form for Prevalence and Incidence Studies. ⁽²⁶⁾ This tool collects data on study methods, subjects' characteristics, outcomes, ethical issues etc. Unlike the standard extraction tool for systematic reviews which considers interventions and effect sizes, this tool considers prevalence, incidence and 95% confidence intervals which is more appropriate for this review.

Studies were assessed for external and internal validity using a checklist devised by Hoy et al. ⁽¹⁾ External validity includes: target population and sampling frame, random selection and non-response bias. Internal validity includes the process and mode of data collection, case definition, reliability and validity of used study instruments and information about prevalence reporting and transparency. "High risk" papers are those with insufficient information. Papers are given scores for overall low, moderate or high risk of bias. There are currently no tools for evaluating the methodological quality of secondary data analysis as noted by Hahnel et al ⁽²⁷⁾ who employed the Hoy tool for such studies and we did also.

Inclusion criteria

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We limited papers considered to those with an abstract, published from 2000 (as we are interested in contemporary data) and where a full paper is available. Papers in English, German, Dutch, French, Arabic or Farsi were considered. However if a paper appeared from its title to be relevant and had no abstract we did attempt to locate the full paper and included it if found to inform the reviews. We only included studies where a head to toe physical examination of the resident had been conducted employing standard pressure ulcer classification such as the European Pressure Ulcer Advisory Panel minimum data set and grading system or the equivalent US National Pressure Ulcer Advisory Panel methodology. Most studies employed two raters to examine residents but we included studies that only used one as there is evidence that this is no worse than two raters. We allowed Minimum Data Set (MDS, the current version is MDS 3.0) collected for Medicare or Medicaid. Data for MDS 3.0 are collected from residents on admission, discharge and at regular intervals during their stay (how frequent depends on their clinical condition). The assessments are carried out by qualified nurses who are required to physically inspect the resident or minimally to

have received a report from staff who have. Data on severity (grade) and anatomical location are recorded. The nurse is personally responsible for accuracy of data and breaches of data collection result in withholding funds. Thus while ideally head to toe physical examination of residents by independent assessors is the gold standard, data collected by MDS 3.0 are robust. Similar data are collected in Canada.

Exclusion criteria

Any study with a moderate or high risk of bias, which is a score of below 8 in the Hoy checklist, was not selected. Any study that did not report prevalence or incidence data, or where the sample size was not given, which were the most common reasons for low scores on the Hoy checklist, were not selected.

Abstracts of papers were read and where it appeared they might meet the inclusion criteria they were obtained in full text. One author selected the papers and a second checked the selection was appropriate. Similarly one author read and assessed the selected papers and removed any that did not meet the inclusion criteria and a second checked this final selection was appropriate.

Assessment of bias is recommended by PRISMA ⁽²²⁾ who also recommend publication bias should be evaluated. However publication bias in prevalence or incidence studies we believe is less likely to be a problem as in these studies the outcome of interest is the size of the problem and not whether a treatment does or does not work. Investment in the efficacy of a treatment may cause (often inadvertent) bias as treatments that fail to show significant effects may be less likely to be published – or even submitted for publication. However the size of a problem is likely to be of interest regardless of the precise number obtained.

We decided not to combine prevalence rates of the studies due to different methodological approaches. For example the US and Canadian studies employed administrative databases (albeit collected robustly by trained nurses employed in the care homes) and other studies used independent assessors.

Results

Sensitivity: Internal
From an original search 815 references were retrieved after removal of duplicates. 50 appeared to meet inclusion criteria following abstract screening of which 33 were found to not meet them in the full text screening. Common reasons included data taken from medical records, surveys or interviews with no physical examination, no data on prevalence or incidence or no sample size given. This left 17 selected for the final review.

Only one study reported incidence ⁽²⁸⁾ of 25% in Hong-Kong care homes but this was a small sample (N=346). Only one study, ⁽²⁹⁾, gave 95% confidence intervals (3.8% – 4.9% for all pressure ulcers and 2.4% – 3.2% excluding grade I) so we have not reported them for other studies. Some studies reported unclassified pressure ulcers and/or suspected deep tissue injury, but most did not.

Four studies gave prevalence rates for several years, ⁽²⁹⁻³²⁾ in which case we chose the most recent one. Some studies gave a full breakdown by grade, some only gave overall figures and some excluded grade I pressure ulcers. However within those constraints certain patterns are clear. There are large differences between countries, see Table 1. This cannot be explained purely by different methods as in many case (comparisons between Germany and the Netherlands being the prime

example) the methods are identical and the surveys carried out simultaneously by a combined team from both countries.

Internal and external validity of the studies.

The Hoy scores for each included study are given in Table 2.

Discussion

Where surveys are repeated in the same population the later surveys show lower prevalence. This is possibly due to the effect of the survey in raising awareness of the problems of pressure ulcers.

Very high prevalence of severe ulcers (grades III or IV) is seen in the Netherlands but the data are twenty years old. Given their overall figures have gone down from 32.4% in 1998 to 29.2% in 2003 it is likely current figures will be improved. In the very large and relatively recent survey in the USA 5.2% have a severe ulcer. Even the lowest prevalence of severe ulcers (Germany) was nearly 1%.

There are large gaps in the literature in geographical terms (nothing from the UK for example – though the Welsh Wound Innovation Centre have given prevalences of 7.7%(N=117) and 15.6% (N=134) for two care homes. ⁽³³⁾ In many studies the grades of ulcer are not reported. Incidence is given in one small scale study. There is a need for further prevalence studies. Incidence studies are also needed though these are more expensive to conduct.

Comparing these results to the previous review of Smith et al ⁽¹³⁾ shows little progress in pressure ulcer prevention. The earlier review considered only elderly nursing home residents. While this review is wider in scope in practice we only found data from care homes and most of the residents of these institutions are elderly so a direct comparison is reasonable. In Smith et al's review prevalence was 7% to 23%. The later German studies in this review are lower than any figure in Smith et al but the Netherlands figures are higher than any seen in Smith et al. As they pointed out "residents at higher risk for developing ulcers are those who have limited ability to reposition themselves, can-not sense the need to reposition, have fecal incontinence, or cannot feed themselves" and later "because resident characteristics can identify residents likely to develop ulcers, preventive measures can be implemented early". As the German studies show annual prevalence surveys have led to reduced prevalence which was attributed to preventive interventions. While not all pressure ulcers are avoidable, simple preventive measures reduce incidence - and hence prevalence. Despite the improvements in some countries there remains scope for significant improvements in many others.

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Limitations

We have limited papers to those written in English, German, Dutch, French, Arabic or Farsi. We found most almost all relevant papers were written in English or German so this is unlikely to affect the results.

Conclusions

Pressure ulcers are a common problem in long term care. However there are substantial differences between countries and many countries have no published data. Prevalence varied by a order of magnitude between countries with rates of 32.4% in the Netherlands and 3.4% in the most recent German study. However the Netherlands study is dated and prevalence may be lower now. Some countries have no data, for example the UK. Germany is unusual in having annual prevalence studies which show a continual reduction in pressure ulcer prevalence.

Given the lack of data from many countries, including the UK, there is a need to conduct similar prevalence surveys in (for example) the UK as those completed in Germany.

The potential nationwide savings are huge. There are about 290,000 residents in nursing/care homes in England and Wales ⁽³⁴⁾ so about 58,000 pressure ulcers may be expected in this population. If half were grade I (cost about £1.2K) and the rest grade II-IV, and the lowest cost of about £5.2K ⁽⁹⁾ for a grade II ulcer were used for all ulcers about grade I then about £90 million could be saved if the reduction were similar to Germany (50%)

We have recently conducted a survey of care homes in the UK asking for their estimates of prevalence in their homes and information on preventive measures in use. We anticipate this review and the survey may result in greater awareness of the problem of pressure ulcers in long term care. However data from audit (for example) will be an underestimate and independent head to toe examination of a large sample of residents in diverse geographical areas is needed. We have applied for funding to conduct such a prevalence survey. We encourage colleagues in other countries with few or no data to conduct such surveys. Currently we are exploring possible work in Saudi Arabia.

Conflict of interest

None.

Ethical approval

None was required as this is a review of previous studies.

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