

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form ([see an example](#)) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below. Some articles will have been accepted based in part or entirely on reviews undertaken for other BMJ Group journals. These will be reproduced where possible.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Evolution of the Hip Fracture Population: Time to Consider the Future? A retrospective observational analysis
AUTHORS	Baker, Paul; Salar, Omer; Ollivere, Benjamin; Forward, Daren; Weerasuriya, Namal; Moppett, Iain; Moran, Christopher

VERSION 1 - REVIEW

REVIEWER	Ian A McMurtry James Cook University Hospital, Middlesbrough
REVIEW RETURNED	17-Dec-2013

GENERAL COMMENTS	An excellent review of the epidemiological change in the fracture neck of femur population over a significant period of time, with consistent data recording. It confirms the increasing health burden of this population, although it demonstrates it may not be as exponential as expected. This study does increase awareness that not only is the volume of the fractured neck of femur population increasing, but perhaps more importantly, the level of dependency within this cohort is increasing more significantly. The implication on future planning of community social care for this population is likely more pressing than for acute secondary care, and this paper highlights this. I am not aware of this being so elegantly demonstrated in a previous paper.
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REVIEWER	Dr Stuart White Brighton and Sussex University Hospitals NHS Trust - Member of the Association of Anaesthetists of Great Britain and Ireland (AAGBI) Hip Fracture Guidelines Working Party - Council member of the Age Anaesthesia Association whom he represents at the National Hip Fracture Database - national research co-ordinator for the Hip Fracture Perioperative Network - Anaesthesia Sprint Audit of Practice (NHFD hip fracture) steering group
REVIEW RETURNED	05-Feb-2014

GENERAL COMMENTS	I think it is really important that national centres of excellence publish their results in order to benchmark the quality of care for certain pathologies. Nottingham is just such a centre of excellence, with regard to hip fracture, and is recognised nationally as having one of the most accurate hip fracture databases. This is a single-centre, retrospective, 13-year service evaluation that attempts to extrapolate its findings (if not its figures) nationally,
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without proposing a coherent research question.

There are a number of false assumptions, the most notable of which is the UK prevalence of hip fracture appears to be falling (by 0.6%/year) rather than remaining unchanged, thereby overestimating the stated 2030 figures (White SM. Injury 2011; 42: 1230-3 - not referenced in this paper).

How much of the more complex medical needs are due to more accurate data collection, how much are due to increased willingness at a centre of excellence to operate on the elderly, and how much are due genuine increases?

How much of the recent increase trend in patient numbers is due to Major Trauma Centre status at Nottingham, and is this expected to continue indefinitely? What is the role of social care reconfiguration in altering residential status, ADLs and walking ability?

There are a number of unsubstantiated statements e.g. 'The population is from a mixed urban and rural environment and likely to be representative of the UK population'. Also, the Nottingham hip fracture population are slightly younger and fitter than the general hip fracture population, making extrapolation more difficult.

Also e.g. 'While the National Hip Fracture Database (NHFD) publishes yearly reports on management of the hip fracture population it has only been reporting national results since 2009; NHFD only has limited data on dependency and does not collect data on co-morbidities' - but is has collected 30 times as many patients' data as this study, and the recent ASAP report collected 11, 000 patient's worth of data about co-morbidities ...

The results are presented as graphs and repeated unnecessarily as text. In fact, many of the values do not change much, and so make for uninformative graphs, when proportion tables might suit better. A lot of results are presented, but lack a structured approach, possibly due to the lack of a basic research question.

Perhaps most surprisingly, no outcomes, or Nottingham Hip Fracture Score-adjusted outcomes, are presented, and so the reader is left wondering whether the results presented have had any effects on whether patients die less frequently or leave hospital any quicker. This is essential information that should be included in any revision of this paper.

Data publication of this type would normally require Caldicott Guardian approval.

The conclusion is weak, consisting of generalisms, without reinforcing the primary findings or suggesting future research directions.

Could I suggest Professor Iain Moppett at Nottingham is asked to help revise this paper, as a co-author?

VERSION 1 – AUTHOR RESPONSE

Reviewer Name : Ian A McMurtry, James Cook University Hospital, Middlesbrough

An excellent review of the epidemiological change in the fracture neck of femur population over a significant period of time, with consistent data recording. It confirms the increasing health burden of this population, although it demonstrates it may not be as exponential as expected. This study does increase awareness that not only is the volume of the fractured neck of femur population increasing, but perhaps more importantly, the level of dependency within this cohort is increasing more significantly. The implication on future planning of community social care for this population is likely more pressing than for acute secondary care, and this paper highlights this. I am not aware of this being so elegantly demonstrated in a previous paper.

Response: We thank this reviewer for his comments. We do not believe there is any specific action required as a result of these comments.

Reviewer Name: Dr Stuart White, Brighton and Sussex University Hospitals NHS Trust

I think it is really important that national centres of excellence publish their results in order to benchmark the quality of care for certain pathologies. Nottingham is just such a centre of excellence, with regard to hip fracture, and is recognised nationally as having one of the most accurate hip fracture databases.

Response: We thank this reviewer for his comments and compliments about the Nottingham Hip Fracture Database. No specific action required.

This is a single-centre, retrospective, 13-year service evaluation that attempts to extrapolate its findings (if not its figures) nationally, without proposing a coherent research question.

Response: The issue of the research question has been addressed and is discussed above.

There are a number of false assumptions, the most notable of which is the UK prevalence of hip fracture appears to be falling (by 0.6%/year) rather than remaining unchanged, thereby overestimating the stated 2030 figures (White SM. Injury 2011; 42: 1230-3 - not referenced in this paper).

Response: Within the revision we have made a number of references to the observation reported by a number of papers that the age related prevalence of hip fractures is decreasing. For example in the introduction: "Despite a decline in the age specific incidence of hip fractures over the last decade 5,6,7, these population changes mean the overall number of hip fractures will continue to increase 5,6".

We have not changed our projection but have made it clear that the projection is based upon the prevalence of hip fractures being static over the next 20 years. We have now alluded to this in the limitations section to make it this point clear for the readership.

Additional references have been added including the White et al paper mentioned above:

- White SM, Griffiths R. Projected incidence of proximal femoral fractures in England: A report from the NHS Hip Fracture Anaesthesia Network (HIPFAN). Injury 2011;42:1230-1233.
- Holt G, Smith R, Duncan K, Hutchinson JD, Reid D. Changes in population demographics and the future incidence of hip fracture. Injury 2009;40:722-726.
- Fisher AA, O'Brien ED, Davis MW. Trends in hip fracture epidemiology in Australia: Possible impact

of bisphosphonates and hormone replacement therapy. Bone 2009;45:246-253.

How much of the more complex medical needs are due to more accurate data collection, how much are due to increased willingness at a centre of excellence to operate on the elderly, and how much are due genuine increases?

Response: This point is raised in the discussion:

“Changes in the prevalence of specific co-morbidities may be a direct manifestation of an increasingly frail elderly population within declining health. Some of this effect may be attributable to greater data accuracy as the hip fracture database matured and administrators became more familiar with the datasets. However, this is unlikely to account for the magnitude of the observed changes in each of the co-morbidities.”

We do not think the willingness of the centre to operate on the elderly is pertinent as this analysis encompassed all admissions irrespective of whether they underwent surgery and we do not report on the outcome of surgery.

How much of the recent increase trend in patient numbers is due to Major Trauma Centre status at Nottingham, and is this expected to continue indefinitely? What is the role of social care reconfiguration in altering residential status, ADLs and walking ability?

Response: Discussed in the limitations section:

“During the study period the trauma service at Nottingham was awarded major trauma centre status. This is, however, unlikely to have had a significant impact upon the number of hip fracture admissions and our future hip fracture projections as referral to a major trauma centre is triggered primarily based upon mechanism of injury. As the majority of hip fractures occur after low energy injuries such as fall from standing height they should not trigger the major trauma pathway and should be taken to their nearest orthopaedic unit as previously.”

There are a number of unsubstantiated statements e.g. 'The population is from a mixed urban and rural environment and likely to be representative of the UK population'. Also, the Nottingham hip fracture population are slightly younger and fitter than the general hip fracture population, making extrapolation more difficult.

Response: These statements have been removed.

Also e.g. 'While the National Hip Fracture Database (NHFD) publishes yearly reports on management of the hip fracture population it has only been reporting national results since 2009; NHFD only has limited data on dependency and does not collect data on co-morbidities' - but it has collected 30 times as many patients' data as this study, and the recent ASAP report collected 11, 000 patient's worth of data about co-morbidities ...

Response: We have acknowledged the size and scope of the NHFD. We have also referenced the ASAP sprint audit although could not find any published results from this audit to include at the present time.

The results are presented as graphs and repeated unnecessarily as text. In fact, many of the values do not change much, and so make for uninformative graphs, when proportion tables might suit better. A lot of results are presented, but lack a structured approach, possibly due to the lack of a basic

research question.

Response: We agree with this comment. We have now added two tables. The first outlines baseline data for the study cohort, the second combines information from 5 of the figures in tabular form. The revised manuscript therefore has 2 tables and 5 figures rather than the 10 figures in the original paper. We have thinned out the text of the results and have been careful to avoid repetition of information within the text, tables and figures.

Perhaps most surprisingly, no outcomes, or Nottingham Hip Fracture Score-adjusted outcomes, are presented, and so the reader is left wondering whether the results presented have had any effects on whether patients die less frequently or leave hospital any quicker. This is essential information that should be included in any revision of this paper.

Response: We have considered this comment carefully. The papers intended aims was to report changes in demographics, physical functioning and social dependence in the hip fracture population. Recent work done with the NHFS suggests NHFS predicted mortality using the original equation is a bit high and unlikely to be accurate across the period of study. We have seen that living at home is increasingly becoming less of a marker of lack of dependency than previously, and therefore any scores which use it in this way (NHFD, NHFS and others) may need re-calibrating. Data available on the NHFS suggests that mortality fluctuated more than we might have realised, independently of morbidity (I.e. NHFS smooths but doesn't eliminate the fluctuations). Given this we have concerns about the validity of the additional NHFS work that one reviewer requested.

We have raised these concerns within the discussion:

“There are also implications for benchmarking and audit systems, such as the National Hip fracture Database and the Nottingham Hip Fracture Score that use living at home versus living in an institution as a surrogate for frailty 17,18. Our data suggest that this distinction may be becoming less clear cut. Such scores may therefore need re-calibration in future years.”

Data publication of this type would normally require Caldicott Guardian approval.

Response: Issues relating to the data storage and handling are mentioned at the end of the first paragraph of the methods:

“Audit data is strictly confidential and is managed in accordance with national data protection (Caldicott) guidelines.”

The conclusion is weak, consisting of generalisms, without reinforcing the primary findings or suggesting future research directions.

Response: The conclusion has been revised.

Could I suggest Professor Iain Moppett at Nottingham is asked to help revise this paper, as a co-author?

Response: As suggested Iain Moppett has been added to the paper and has been integral to the revision process.