PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Electronic Capture of Patient and Clinician Reported Outcome Measures in an Elective Orthopaedic Setting: a retrospective cohort analysis
AUTHORS	Malhotra, Karan; Buraimoh, Olatunbosun; Thornton, James; Cullen, Nicholas; Singh, Dishan; Goldberg, Andrew

VERSION 1 - REVIEW

REVIEWER	Nick Black LSHTM. UK
REVIEW RETURNED	07-Apr-2016

GENERAL COMMENTS	This is a very welcome demonstration of the feasibility of implementing PROMs data capture using electronic technology. Although there has been much talk of such a development (and successful examples in Sweden), this is the first large scale demonstration in England. It was interesting that patients only criticism concerned not the technology (the subject of this study) but the face validity of the PROM. This will be of concern to the original developers who, presumably, based its development on qualitative research with relevant patients. Have you informed them of this finding? It rather undermines the validity of the PROM data. Some further discussion of this would be appropriate. You mention the cost of the paper based PROM programme but provide no indication of the costs of your scheme. If it required 4 full time staff (I estimate a cost of about £80K pa in salaries and on-costs alone), then that equates to £36 per patient to obtain PROMs! I think you should include some data and discussion of the approximate costs of your approach. Minor points P4 line 23: there are currently no plans to expand the so-called National PROMs Programme. Would be better to say " ...but as the use expands.." as further developments are going to be 'bottom-up' rather than driven by NHSE. Should be 'EQ-5D-5L' P5 line 53: zero on the EQ-5D represents death not an intolerable health state. P6 line 3: would be clearer to refer to a Pain-VAS rather than just VAS which could apply to all manner of constructs. P6 line 46: I don't think Figure 2 is helpful (but then I don't much like pie charts!). Same applies to Figure 4. P6 line 58: a correlation coefficient of -0.1 hardly demonstrates that age and patient experience are correlated. It shows no or only very weak correlation. P10 line 18: RNOH is a tertiary setting rather than secondary.

REVIEWER	S.A.Spencer National Clinical Lead for Hospital Specialties Health & Social Care Information Centre England I have previously co-authored an informatics paper with Andy Goldberg.
REVIEW RETURNED	08-Apr-2016

GENERAL COMMENTS	The analysis demonstrating a relationship between satisfaction with the data collection process and PROMS scores is not mentioned as an objective. It should be if this outcome is to be included. SNOWMED needs correction to SNOMED. It would be useful to have a couple of lines description of SNOMED because many clinicians do not know about this. In the introduction "resistance by management" is mentioned. This term is often used to refer to any hospital staff who disagree with doctors. It would be better to refer to people who helpfully suggested that the methodology required validation by job title and to portray their views in a non judgemental way. The stats in this paper are complex and normally when scores are analysed non parametric stats are required. I am not qualified to judge whether the stats are appropriate in this situation and have therefore recommended statistical review.

REVIEWER	Miranda Wolpert UCL and Anna Freud Centre UK
REVIEW RETURNED	19-Apr-2016

GENERAL COMMENTS	The implementation and use of PROMs isan important area of work. The focus and scope of this paper is not clear The authors say in the abstract that they set out to determine if an entirely electronic system could be used to capture patient reported outcome data and clinician validated diagnostic ad complexity data could be an elective surgical orthopaedic outpatient setting and found they could. However, they also report finding that 32% did notfeel the ePROMS adequately captured their symptoms and the detail of why not and what their concerns were is not captured in this paper. This paper would be strengthened by widening the original question to focus both on the electronic capture (and in particular more detail about the service to increase relevance and learning for others - the paragraph on p 9 could be expanded for example) and also to look in more detail at the experience of the e PROMS. The finding that people will fill forms in electronically in one particular specialist orthopaedic service is of limited interest. If this could be combined with the analysis of what people made of the questions themselves and how helpful they found the experience it would be of more interest. The quantitative findings of who was concerned about the

	limitations of ePROMs would be significantly enhanced by a qualitative analysis of the themes arising.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1 (Nick Black, LSHTM. UK)

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We thank the reviewer for his comments and have made amendments as below

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"This is a very welcome demonstration of the feasibility of implementing PROMs data capture using electronic technology. Although there has been much talk of such a development (and successful examples in Sweden), this is the first large scale demonstration in England."

"It was interesting that patients only criticism concerned not the technology (the subject of this study) but the face validity of the PROM. This will be of concern to the original developers who, presumably, based its development on qualitative research with relevant patients. Have you informed them of this finding? It rather undermines the validity of the PROM data. Some further discussion of this would be appropriate."

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We are in close dialogue with Jill Dawson, who developed the MOxFQ. Indeed lack of pain is a recognised limitation of a predominantly pain related clinical score and this is the first time its use has been evaluated on a large scale clinical population outside of a study setting. We have now expanded the discussion as requested.

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"You mention the cost of the paper based PROM programme but provide no indication of the costs of your scheme. If it required 4 full time staff (I estimate a cost of about £80K pa in salaries and on-costs alone), then that equates to £36 per patient to obtain PROMs! I think you should include some data and discussion of the approximate costs of your approach."

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We thank the reviewer for this useful comment and have now included real and estimated costs and discussed these as requested.

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"Minor points"

"P4 line 23: there are currently no plans to expand the so-called National PROMs Programme. Would be better to say " ...but as the use expands.." as further developments are going to be 'bottom-up' rather than driven by NHSE."

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We have made this change as suggested

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"Should be 'EQ-5D-5L'"

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We have adjusted this throughout the text and abstract, and figures

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"P5 line 53: zero on the EQ-5D represents death not an intolerable health state."

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Although generally stated that a score of 0 represents ‘death’, according to EuroQol, a score of 0 actually represents a state of health so bad, that in general patients would rather be dead that continue with their current health. i.e. using TTO measurements, they would give up all their remaining years of life to improve their health state. We have however, amended the line to read: ‘a

score of 0 represents a health state considered equivalent to death.'
http://www.euroqol.org/fileadmin/user_upload/Documenten/PDF/User_Guide_v2_March_2009.pdf (pages 19/20)
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"P6 line 3: would be clearer to refer to a Pain-VAS rather than just VAS which could apply to all manner of constructs."
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We have amended the line to read 'We also use the VAS-pain scores, which is a similar…'
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"P6 line 46: I don't think Figure 2 is helpful (but then I don't much like pie charts!). Same applies to Figure 4."
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Figure 4 illustrates the breakdown of reasons patients did not find PROMs adequately captured their symptoms. As other reviewers have suggested we need to address this topic in more detail, we feel including it would be helpful for those interested in this finding.
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"P6 line 58: a correlation coefficient of -0.1 hardly demonstrates that age and patient experience are correlated. It shows no or only very weak correlation."
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This is correct, and we thank the reviewer for pointing out our oversight. We have amended the line to reflect that this is a very weak correlation.
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"P10 line 18: RNOH is a tertiary setting rather than secondary."
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We have corrected this
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Reviewer: 2 (S.A.Spencer, National Clinical Lead for Hospital Specialties Health & Social Care Information Centre, England)
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We thank the reviewer for his comments which we have attempted to address as below
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"The analysis demonstrating a relationship between satisfaction with the data collection process and PROMS scores is not mentioned as an objective. It should be if this outcome is to be included."
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This was not an expected finding, however, we have included a line stating that we also examined patients' experience of the electronic system and factors which affected this. We have also added this to our abstract Objectives.
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"SNOWMED needs correction to SNOMED. It would be useful to have a couple of lines description of SNOMED because many clinicians do not know about this."
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Apologies for this oversight, which is indeed a typo. We have made the correction throughout the text and added the description as suggested.
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"In the introduction "resistance by management" is mentioned. This term is often used to refer to any hospital staff who disagree with doctors. It would be better to refer to people who helpfully suggested that the methodology required validation by job title and to portray their views in a non judgemental way."
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The initial proposal was presented to the Trust Board, which includes all the senior executive management as well as the non-executives, which includes lay experts. This is now made clear in the text and it is not meant to be judgemental but they rightly had concerns over an unproven system and the purpose of the pilot work was to produce the requisite evidence.
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"The stats in this paper are complex and normally when scores are analysed non parametric stats are required. I am not qualified to judge whether the stats are appropriate in this situation and have therefore recommended statistical review."
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This is a large study with patients numbering in the hundreds for each group. Furthermore, the data was tested for normality using Shapiro-Wilks test and found to be normally distributed. We have slightly reworded the stats section to clarify this. In this situation parametric stats are acceptable. http://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-5-35
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Reviewer: 3 (Miranda Wolpert, UCL and Anna Freud Centre, UK)
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We thank the reviewer for her comments and suggestions which we address as below
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"The implementation and use of PROMs is an important area of work."

"The focus and scope of this paper is not clear. The authors say in the abstract that they set out to determine if an entirely electronic system could be used to capture patient reported outcome data and clinician validated diagnostic and complexity data could be an elective surgical orthopaedic outpatient setting and found they could. However, they also report finding that 32% did not feel the ePROMS adequately captured their symptoms and the detail of why not and what their concerns were is not captured in this paper."
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32% of those leaving comments (i.e. 9% of all patients) reported ePROMs inadequately capturing their symptoms; this was not an expected finding. We have amended our abstract objective and conclusions to reflect that we also examine patients' experience of PROMs and factors impacting their experience. We also have added to the discussion to address this finding and possible causes in greater detail.
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"This paper would be strengthened by widening the original question to focus both on the electronic capture (and in particular more detail about the service to increase relevance and learning for others - the paragraph on p 9 could be expanded for example) and also to look in more detail at the experience of the ePROMS."
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We have made changes to this as above. There is much literature on the subject of innovation and

service improvement and we do not feel that this paper could do this subject justice by just the addition of just one paragraph. This might be the subject of a separate paper however. We feel that we have covered the most important learning point, which is that technology alone cannot lead to service improvement and cannot replace process and can only help facilitate process where it becomes intricate to the service proposition.
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"The finding that people will fill forms in electronically in one particular specialist orthopaedic service is of limited interest."
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We would argue that as the PROMs were filled in by ALL patients prior to any clinical contact, that the results should be generalizable. It just so happens that the system was introduced in a very specialist setting, but the patients are the same patients that could attend a diabetic clinic or an endocrinology clinic the following day. Indeed our list of co-morbidities collected by our clinicians suggests that our patient population have much co-morbidity to support this fact.
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"If this could be combined with the analysis of what people made of the questions themselves and how helpful they found the experience it would be of more interest. The quantitative findings of who was concerned about the limitations of ePROMs would be significantly enhanced by a qualitative analysis of the themes arising."
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We very much intend to now carry out further qualitative work on our patients to expand on the issues highlighted by the reviewer. This is future work. However, the study in question was a retrospective series and hence we can only analyse further details from actual comments left by patients. We have amended the discussion accordingly. Figure 4 gives the breakdown of reasons that patients felt PROMs did not adequately capture their symptoms.
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VERSION 2 – REVIEW

REVIEWER	S A Spencer Keele University UK HSCIC UK Previously co- authored paper with Andy Goldberg
REVIEW RETURNED	17-May-2016

GENERAL COMMENTS	SNOMED-CT should be SNOMED CT Page 5 line 16 delete "a" It would be helpful to indicate in the discussion whether the differences that are statistically significant are clinically significant. Some of these differences are 4 or 5 points on a 100 point scale. In an individual patient how much improvement would you expect on these scales for you to feel treatment had been successful. For those not used to these scales it is difficult to judge how different clinically the patients in the different groups are.

REVIEWER	Miranda Wolpert UCL and Anna Freud Centre UK Not sure if this is a conflict of interest but I am Director of Child Outcomes Research Consortium - a not for profit collaboration that

	looks at best ways to implement patient reported outcome measures.
REVIEW RETURNED	13-May-2016

GENERAL COMMENTS	Thank you for addressing the comments put by the reviewers. I have no further comments. I think this paper will be of interest to many considering best ways to capture and use patient reported outcome measurement.