Author's response to reviews

Title: Hospital process orientation from an operations management perspective: development of a measurement tool and practical testing in three ophthalmic practices.

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Author's response to reviews: see over
Rotterdam, 15 August 2013

**Concerning**: submitting revised manuscript

Dear Dr Christopher Morrey,

On behalf of the authors, it is my pleasure to resubmit to you the manuscript entitled ‘Hospital Process Orientation from an operations management perspective: development of a measurement tool and practical testing in three ophthalmic practices’ for consideration by the BMC Health Services Research Editorial Board (submission no.: MS: 2810215729029190).

We would like to thank the reviewers for their constructive and detailed comments, which have led to many improvements to the manuscript. We believe that we have addressed all the major comments from both reviewers, as well as the minor and technical corrections, and hope that you will find the revised manuscript suitable for publication in BMC Health Services Research.

A detailed response to all referees’ comments is appended after this letter. We have written a point-by-point response to the concerns. The changes we have made are beneath each comment of the reviewers in italics.

We look forward to hearing from you.

Yours sincerely,

Marie Louise Hagenbeek

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Referee #1
1. The main purpose of the paper is to further operationalize constructs to measure process orientation in a hospital. They identified these constructs from previous research and they operationalized them from an OM perspective. Although the purpose is well described, it is not clear what the meaning is of the OM perspective. This is due to the fact that (1) the explanation of the meaning of operations in a hospital on page 5 and 6 (“Operations in hospitals can be grouped into …”) is not clear and (2) by consequence the authors did not convince the reader that their approach is different from previous studies which addresses PO from a management and organization theory perspective or from an information system perspective. The added value of their study is really based on this positioning.

The ‘Process orientation and operations management’ paragraph on page 4, 5 and 6 has been revised to describe the OM perspective better. We used new literature (Hayes & Pisano 1994; Hayes & Upton 1998) to explain the meaning of the OM perspective more clearly. We divided the OM perspective into 1. operations strategy which deals with the reconciliation of market requirements and operations resources and 2. operations management which deals with the adjustment and allocation of operations resources to patient care processes and healthcare delivery patterns. Hence, we defined the OM perspective as the design, planning, and control (improvement) of aligned, integrated and coordinated process activities. (Page 8) By revising the “Existing tools for measuring process orientation” paragraph on page 8 and 9 we hope we now convince the reader the OM perspective adds value to previous research. For the added value of this study we would like to refer to the response on comment 2.

2. The authors prefer to practically test the measurement tool rather than to statistically validate a possibly deficient tool. It is a strong point that they first want to test the tool from a practical point of view, but it is a rather weak point that they do not statistically validate their tool. This study produces a tool with face validity and some reliability, but no construct validity or other types of internal validity. In other words if we want to use this tool we are not sure that the proposed tool captures the 5 dimensions as described in the paper. Is the new tool better capturing the 5 dimensions of PO than the original tool as developed by McCormack? Of course the authors try to avoid this critique by indicating that they add a new perspective to the tool (the OM perspective), but as already described it is not clear that this new perspective makes the tool really different from the tools in the previous studies.

To clarify the difference between our measurement tool and the tools from previous studies, we added Table 1. As revealed in Table 1 our study does not only cover all eleven items in the measurement tools developed by McCormack (2001) and Gemtel (2008), but adds some relevant items from the domain of Operations Management, Quality Management and some items from other studies (Hinterhuber 1995, Edwards 2000, Reijers 2006, Hammer 2007), which have all been specified and adapted to hospital settings and operationalized applying an OM perspective. Therefore, our new measurement tool has a multidimensional perspective, where it really differs from existing tools.

As suggested by the reviewers we performed some statistical analysis. The Cronbach’s alpha statistics and total-item correlation show that our items are internal consistent and that they measure the dimensions reliably.
3. The study of Gemmel et al. (2008) formulated the following statement: “A second observation is that many of the items as defined in the original BPO survey (McCormack & Johnson, 2001a) are retained in our analysis (such as PM1, PM2, PM4 and PM5, PV3 and PV4, PJ1, PJ2 and PJ3). In the case of the dimension of Process Jobs, no one of the four added items are retained in the final factor analysis...This confirms that most of the items as defined in the BPO components of McCormack and Johnson (2001a) are robust and useful even in a healthcare environment, which is fundamentally different from the business sectors where the BPO tool was validated. In other words the HPO is not fundamentally different from the BPO.” With the current study we cannot check whether this is the case. So it might happen that after statistical validation that we end up with the same list of 3 or 5 dimensions as defined in the basic article of McCormack?

We agree with the reviewer that BPO and HPO are fundamentally not different at all, but the context in which they are being used is. Process orientation has been studied extensively in the manufacturing industry but not in the service industry. Certainly, in some ways the approach will be the same but goods and services can never be dealt with the same way especially in hospitals, where the service context is extremely complex (co-creation between professionals & patients and interaction with different health providers). For this reason HPO might be different in its appearance in hospitals compared to the manufacturing industry (BPO).

In addition, our first statistical analysis, cronbach’s alpha and total-item correlation, shows that our items are internal consistent and that they are measuring the five PO dimensions in hospital settings reliably. These first indications are not pointing in the direction of eventually the validation of 11 items or 3 dimensions only.

4. The practical testing of the tool was performed in a rigorous way (description p.18 and p 19). It is a good approach that they went back to the participants to test the comprehensibility and that they collected quantitative data on hospital operations to verify the respondents perceptual responses. How the thirteen indicators are used to verify the respondents' responses is not very clear. These indicators are also very general indicators. It is not clear to what extent they are related to PO.

We agree with the reviewer. The sentence ‘To test whether the participants’ perception of the extent of PO in their hospitals corresponds to quantitative data on hospital operations, we collected data on thirteen indicators for hospital outcome, service delivery and availability of resources’ is misleading in how we made use of the indicators. We did not test it, but we used the basic operations management indicators to increase contextual understanding and give recommendations for further research and development of the measurement tool. This sentence was revised: ‘In order to increase contextual understanding and to be able to reflect on and give recommendations for further research and development of the measurement tool, we collected data on thirteen indicators for hospital production, service delivery and availability of resources (Appendix 1).’ (page 17).

5. On page 13 to 17 the authors describe how they operationalized and measured each dimensions with a number of items. For instance PV is described through 11 items. It is not clear how the 11 items are selected based on the method they used. So we are missing a
research protocol showing how you go from the data (interviews) to the list of items. In other words the relationship between the data and the items selected per dimensions is not clear. Are we sure that the researcher does not have an impact on the final selection of the items?

Please see Table 1. First, we invested a lot of time in the identification of the relevant literature, Second, we carefully analysed the literature and developed a preliminary measurement tool. This preliminary tool we used to interact with hospital practice (focus group and pre-testing of the measurement tool). This process led to the 39 items we used during the interviews. After the interviews with the participants we revised almost all of the items and added 2 items on the basis of their input.

So, the researchers developed the first preliminary measurement tool based on literature and existing tools, but went on to develop and revise the measurement tool in accordance with the input from hospital practice.

6. The authors state very clearly that ‘the case studies allowed a deep understanding of the nature and complexity of the complete phenomenon (PO), which could be translated into recommendations to improve the measurement tool for measuring hospital process orientation’. But at the end, we do not know whether it is statistically valid tool which is better than the tools which have been proposed earlier by other scholars.

Indeed, our study did not provide a statistical validated measurement tool. But we believe that research into this complex topic should be done carefully and should explore this topic extensively before passing on to rigorous statistical testing of underdeveloped measurement tools. For this reason we took more time to explore this topic in hospitals settings and interact with the hospital practice (pre-testing in a non-participating hospital, focus group and interviews).
The outcomes of the interviews and the internal consistency, comprehensibility & reliability tests indicate that our new measurement tool is performing satisfactorily.

7. The authors clearly indicate that the tool is measuring the difference in perception between respondents (p.27). It would be good to make this clear from the beginning of the paper. The tool is perception-based.

We added in the abstract (Methods section) on page 2 and in the Methods paragraph on page 15 that our measurement tool is based on respondents’ perception:

‘Based on five dimensions of an existing questionnaire a new HPO-measurement tool was developed to measure the degree of PO within hospitals on the basis of respondents’ perception.’ (page 2).

‘Since our purpose was first to assess the difference in perception between participants, i.e. the degree of PO in hospitals by measuring the scores on different dimensions and not to develop a HPO maturity model at this stage, all experts agreed that each dimension and each item should be considered as equally important.’ (page 15).

8. They make clear that the objective was to practically test the measurement tool and its contents as a first step towards statistical testing of validity and measurement precision. Of
course the question is who will do the statistical testing, because this is a necessary step before the tool can be used in practice. If the statistically testing was performed, it would be advisable to include the results in this paper.

*We believe that, with regard to Hospital Process Orientation as a construct, we should be careful to proceed towards full statistical testing as long as we do not understand HPO sufficiently. That is why we did not follow this path at this moment. However, we tried to collect as much evidence as possible for validity and reliability, within the limitations of our study, i.e. a multiple case study with a limited number of participants. Therefore we are happy with the suggestion of Cronbach’s alpha. We see the full statistical testing of the measurement tool as a possible follow up step, that requires careful preparation and learning from small scale case studies At the moment we are conducting further research. Yet, still in small scale case studies. Our aim ultimately is to test the measurement tool in a large study.*

9. The authors have identified the relevant studies which have been working on the development of a process orientation tool. There is also a pretty elaborate literature on Business Process Maturity tools (see for instance Van Looy, De Backer and Poels, Total Quality Management & Business Excellence, Volume 22, Issue 11, 2011). How does the study on process orientation relate to the process maturity models?

*This measurement tool is based on measuring the degree of hospital PO (perception of participants), using the different dimensions as equally important and not trying to combine these dimensions into an overall score (see response 7). Therefore we did not and cannot make any statement about the relation of our PO degree to process maturity models at this stage.*

10. The authors should recognize that the term “hospital process orientation” has been first introduced in the paper of Gemmel et al. 2008.

*We added this on page 9 ‘Gemmel et al. (2008) who first introduced the term ‘hospital process orientation (…)’.*

**Minor editorial remarks:**

1. p.8 can you explain ‘sequential modelled care processes’?

*We mean that the patient care process exists of a sequence of care activities. We changed ‘sequential modelled care processes’ in to “sequential care activities”.*

2. p.16 It is not clear what you mean with the following sentence: “The cultural context of a process-oriented hospital needs to correspond with the process approach culture”.

*For the explanation of ‘a process approach culture’ we would like to refer to Vom Brocke & Sinnl (2011). For the purpose of our paper it is not necessary to explain this in depth.*
Therefore, we opted to remove this sentence. The paragraph still describes what we would like to make clear at this moment.

4. p.19 It is not clear why the researchers decided originally to use a four-point Likert scale. It is not a surprise in the end that they changed the scale to a 7-point Likert scale.

We added an explanation on page 17: The purpose of the empirical study was to test and evaluate the items of the measurement tool and give recommendations for further development of the tool, so we did not want the participants to spend too much time in scaling the items and prevent a deliberation of the score (e.g. do I need to score 5 or 6 on a seven point scale).

5. p.22 The low PMM score was probably due to a lack of outcome indicators to measure the performance of the begin-to-end. I assume that you could have verified this during the interviews?

Yes, we verified this. Both Healthcare Transparency Programme (Zichtbare Zorg) or the Dutch Healthcare Inspectorate (IGZ) use a very limited amount of outcome indicators which are able to measure the performance of begin-to-end care processes.

We added a sentence on page 21: ‘Hence, these indicators do not measure the performance of begin-to-end care processes and have little input for the improvement of internal care processes as both measures are not able to predict the results of the care processes.’

6. p.24 “A result that was not foreseen was that hospital 3 came out with the highest average score” (for the PJ and PVB dimensions). Can this not be linked to the smaller scale of the Hospital 3 department? In smaller teams, PJ and PVB are perhaps part of the job?

We welcome the input of the reviewer for a possible explanation, but we cannot verify this. The interviewees were very friendly and avoided giving criticism in this hospital, so they were probably giving socially acceptable answers.

7. p.25 The average score of the team leaders was often lower than the average score of the healthcare professionals. The authors try to give an explanation for this. Is there literature supporting this explanation?

We revised this part and the explanations on page 24 (before page 25) have been supported with literature: Griffin (2012) and Lega & DePietro (2005).

8. p.29 I do not understand why the fact that the hospital will have to adapt existing medical guidelines to local circumstances and preferences in order to define a care process description is one of the biggest obstacles to acquire an adequate process view in hospitals.
Adapting existing medical guidelines to local circumstances and preferences needs consensus among healthcare professionals and management on how to interpret and work with these guidelines. We added a sentence to clarify this: Achieving consensus in a local care setting is one of the biggest obstacles to acquire an adequate process view in hospitals (page 27).

9. p.30 The study suggests that by measuring the 41 items, a hospital can assess the degree of PO of the organization. Please add here from an ‘OM perspective’.

This suggestion was added on page 29: ‘The study suggests that by measuring the 41 items, a hospital can assess the degree of PO of the organization from an OM perspective’.
Referee #2

1. Based on a literature search authors identified several studies where process orientation is measured. Authors are right in recognizing that these studies are not conducted based on an operations perspective. But there is more theoretical argumentation necessary in order to justify a new measurement which contains a large number of items based on individual perceptions. My idea here would be to argue for the necessity in the context of operations strategy (e.g. Hayes and Pisano), i.e. evaluate whether or not operations are able to increase process orientation. This is important if process orientation is an element of corporate strategy. Overall I believe the position of the paper has to be sharpened for a particular audience.

We would like to thank the reviewer who provided us with a point of view (use of operations strategy theory) to stress the need of the OM perspective on PO even more. We have elaborated more on this topic (operations strategy) in the paragraph “Process orientation and operations management” on page 4, 5 and 6.
We agree with the referee that our paper has to have an audience, and it also does: Hospital personnel in general. The reason why we did not pick a more specific audience is because we do not think that the achievement of a process-oriented hospital is solely a task for the hospital board, managers and team leaders, but does need the willingness and support of the healthcare professionals also. That is why we kept it more accessible to everyone (e.g. accessible terms and language use, did not provide in-depth management theories and/or otherwise explained).

2. The first paragraphs up to page 12 are somewhat long. A clearer focus is needed in order to motivate the reader to accept the need for a new measurement. A possible logic could be: 1. Why PO (only for hospitals!?) is relevant for OM? 2. Why don’t existing measures fulfill this need? For example, existing measures are not hospitals specific or not useful in order to evaluate operations (see also comment 1)

We have implemented this suggestion for revision and reduced the paper with two pages.

3. In paragraph 3 on page 6 authors state that OM helps to design efficient services. It remains unclear how process orientation is the relevant and perhaps most important issue to this end. Here a more stringent argumentation is necessary (see also 1)

We adjusted this paragraph by stating that: ‘Different authors (Hayes & Pisano 1994, Hayes & Upton1998, Vissers & Beech 2005, Slack & Lewis 2007) argued that superior operations strategy and effectiveness are related to a sustainable competitive advantage. When superior operations effectiveness is based on skills and capabilities that are embedded in the people and operating processes of the organization and enable them to excel, it not only serves to strengthen a company’s existing competitive position, but is also inherently difficult to copy. Operations strategy contributes to the constant reconciliation of market requirements, i.e. patient demand, evolving regulations and emerging technologies, and operations resources, i.e. personnel, equipment, beds and specialist-time, by shaping the long-term capabilities of the business activities. (...)’. But operational effectiveness cannot be achieved
without the support, aid and drive from corporate and business strategy, i.e. the top and middle management (Acur 2001). This is where PO plays a major role. PO has the capacity to function as the foundation for the achievement of operational effectiveness. Indeed, PO establishes an approach to link organizational strategy to implementation within operational processes and it is a manner of putting external emphasis on outcome and customer satisfaction rather than internally driven hierarchical structures or functions (Armistead 1999).

4. Development of the measurement tool: the categories from McCormack (1999) are used as a theoretical concept. Without further discussion, the relationship to the other identified measurements remains unclear. The theoretical foundation needs more elaboration. The authors have to clarify what the level of measurement (corporate, department, process) is and who (Manager, Physicians etc) the target group filling out the questionnaire is.

‘The five dimensions defined by McCormack are the foundation for our measurement tool. The reason for this is the fact that the five dimensions have been used, tested and validated throughout the years.’ This explanation was added on page 11.
In addition, we added on page 15 that: “According to Hellström et al. (2010) processes can be studied from an organization, division or department perspective. This research will study processes from the ophthalmology department perspective of three hospitals and try to identify how these processes fit in the organization (hospital) perspective.” to the Methods section (page 15) and changed the paragraph title to “Study design and data collection”.
Due to the fact that we are studying processes from the ophthalmology department perspective and try to identify how these processes fit in the organization it was not necessary to specify the target group. Our target group is all personnel of the departments.

5. Evaluation method: I appreciate the collection of questionnaires and additionally conducting interviews with participants. This reduces the disadvantage of the small sample size, but does not eliminate it. Furthermore, the authors present and discuss only mean values essentially rather than the whole distribution of the evaluation measures. Are the differences significant as expected based on the objective data and interview information? To show validity of the measurement tool, this connection of all data sources seems to be essential.

The objective data, i.e. data on thirteen indicators for hospital production, service delivery and availability of resources were used to increase contextual understanding and give recommendations for further research and development of the measurement tool. Due to the fact that we collected data on hospital operations, we could have identified for instance that participants were indicating on item PV4 a higher score than the actual percentage of patient groups for which a care process description have been described and documented. This led to the recommendation to look for metrics for each dimension to counterbalance the interpretation of the participants’ perception.
The interaction with hospital practice (focus group, pre-testing of the measurement tool and interviews) was to increase the validity and relevance of the measurement tool for hospitals.
6. Why do authors not provide some quantitative information on reliability, e.g. alpha. Is the small sample size the only reason for this?

We believe that, with regard to Hospital Process Orientation as a construct, we should be careful to proceed towards statistical testing as long as we do not understand HPO sufficiently. That is the reason why we chose not to provide detailed statistical/quantitative data.

But we agree with both referees that some statistical data may help to indicate consistency and validity of the items in the measurement tool. Therefore, we provided the Cronbach’s alpha statistics in Table 6.

7. Implication: To state that this is a first step towards statistical testing (p28) and that there is a need to objectively measure each dimension is no implication. The question remains, in which situation and how can I use the new measurement (see also 4.). Authors shouldn’t end the paper without any clear guidance on how to use it at least as a preliminary tool.

Guidance on the use of the measurement tool was added (conclusion section, page 29): ‘By applying this measurement tool hospitals can classify the perception of process orientation within their organization on the basis of mean values. Consequently, hospitals will be able to identify strong areas of PO within their organizations and areas for improvement’.

Minor editorial remarks:
1. Figure 1 is confusing. What is the definition of a department and what is the task of the departments. In both hospital types, the functional hospital and the process oriented hospital, the patients go through several of the same (?) departments, although the service flow and bed occupation should be quite different? Modify or even skip the picture.

Even though we are convinced that a hospital will never be able to adopt a purely process-oriented structure, in other words we will not be able to get rid of hospital departments, we have to agree with the reviewer that this figure is confusing. Consequently, we removed it from this revised document.

2. Critiques on page 11 are somewhat harsh. Note that the perspective of the other papers is not OM and rather strategic management or information management. I suggest comparing your new measure and the other identified explicitly.

We have already stated that different authors are measuring PO from different perspectives, and the aim of this paragraph was to provide facts why we want to propose a new and improved measurement tool.

It was, of course, never our intention to be harsh, but to present in a precise way the state of the art. Therefore, we made some changes to this paragraph.

3. I was looking for a descriptive outline of the hospitals based on data structure as presented in appendix 1.
We opted for a narrative description in order to better present the case studies and give the reader some insight in the developments within each hospital and/or department.

4. Explanations on page 25 are too speculative. Overall, although the points above contain a lot of criticism, the authors' basic idea of the paper, especially the need for such a measurement, is sound. However, I would like to see a more elaborated manuscript.

We revised this part and the explanations on page 24 (before page 25) have been supported with literature: Griffin (2012) and Lega & DePietro (2005).

In summary, the new elaborated paper should provide a deeper theoretical justification compared to the existing identified measures and their relationships to the new measurement. Also data analysis could be strengthened in order to validate the new measurement and prove reliability. Collecting new data could help, too, but is not a must.