

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)	One-year trial of 12-hour shifts in a non-intensive care unit and an intensive care unit in a public hospital: A qualitative study of 24 nurses' experiences
AUTHORS	Ose, Solveig Osborg; Tjønnås, Maria; Kaspersen, Silje Lill; Færevik, Hilde

VERSION 1 - REVIEW

REVIEWER	Meeta Prasad Kerlin University of Pennsylvania, United States of America
REVIEW RETURNED	08-Jul-2018

GENERAL COMMENTS	<p>The authors performed a qualitative study of nurses' perceptions regarding 12-hour shifts on weekend days, a newly instituted program at a single center. Participation in both the 12-hour shifts (previously, all shifts were 8-hour) and in the interviews was voluntary. The authors are to be congratulated for collecting a large amount of qualitative data regarding an important and complex nursing staffing question; however, I have several concerns about this manuscript that the authors could address.</p> <ol style="list-style-type: none">1. The introduction is very lengthy and reads more like a narrative review than an introduction to a research study. Please consider shortening it considerably and framing it so as to better set up the importance of the research question.2. The methods section lacks enough detail for this study to be replicated. For example, how many coders specifically reviewed each interview? What qualitative method was used to develop and refine the codes? The code list was reportedly revised several times "during the process" - what does this mean? Were prior interviews coded again retrospectively when the code list was updated? Were interviews coded in real time, or in batches, or at the end of interview completion? Was the interview script modified based on coding? How were disagreements between coders resolved? All of these issues, and more, should be addressed in detail. The authors could benefit from reviewing the COREQ checklist for reporting qualitative research and modifying the methods accordingly.3. A more detailed description of the shifts in the methods section would be helpful. The results reference 1-hour breaks frequently and previous 10-hour night shifts, but I did not find a description of these details in the methods.
-------------------------	---

	<p>4. The results are fairly lengthy, which is of course common for qualitative studies where results are typically very text-heavy; however, I think the results could be shortened. For example, the section 3.2 ("Organising the 12-hour shift schedule") might be shortened considerably or even removed altogether, as there are no quotes and the themes may be captured in other sections.</p> <p>5. In the discussion section, the second paragraph comments about how respondents feel about their work environment. I could not map these comments in the discussion to any results that were reported; therefore, if there were themes related to work environment, that should be included in the results explicitly, if they are to be commented upon in the discussion.</p> <p>6. In section 4.1 ("Job satisfaction") - there is a comment that more nurses wanted to try the extended shift. How was this information obtained, if the interviews were of only those nurses that participated in the 12-hour shifts?</p> <p>7. That this is a single-center study including only two ICUs should be highlighted as a, if not the, major limitation of this study. The generalizability of these data is very, very limited, in my opinion, and this needs to be emphasized.</p> <p>8. In general, the discussion section seems to reiterate the results in more detail than necessary. As with other sections, I think this would benefit from being more concise and highlighting major conclusions that can be drawn from the results, rather than restating so many of the results.</p> <p>9. Typos: In multiple places throughout the manuscript, "managers" is spelled as "mangers" and should be corrected.</p>
--	--

REVIEWER	Justine Schneider Professor of Mental Health and Social Care University of Nottingham, UK
REVIEW RETURNED	23-Aug-2018

GENERAL COMMENTS	<p>I have some minor editorial queries which I list here first, followed by two issues that may require more substantial revisions to the text.</p> <p>1. 'bed post' is an unfamiliar term. Do you mean 'nursing station' or 'ward'?</p> <p>2. p 10 "The employees did not want to work 12-hour shifts on weekdays, because of concerns about patient treatment and employee preferences." This is confusing. Can you be more specific?</p> <p>3. P 16 "+*At the end ..." punctuation not clear.</p> <p>4. P29: "Others were indifferent about the decision not to continue the 12-hour shifts". Whose decision? The following paragraph after the quotation refers to staff opting out of the pilot, is it their decision to which this statement refers?</p> <p>Issues:</p>
-------------------------	---

1. Participants are self-selected, so there is a great bias in your results towards people who would consider 12-hour shifts. This is not given attention in the 'limitations'.

2. Is it misleading to refer to the pilot as a 'trial'?

3. The literature is a bit thin and old. Here are some supplementary references.

1. Burtney L, Buchanan P. Impact of Working Longer Hours on Quality of Care. Leeds: Skills for Care; 2015.

2. Cummings G, Estabrook C. The effects of hospital restructuring that included layoffs on individual nurses who remained employed: a systematic review of impact. *Int J Sociol Soc Policy*, 2003;23:8-53. doi: 10.1108/01443330310790633

3. Estry-Béhar M., van der Heijden BIJM. Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety. *Work* 2012;41:4283-4290. doi: 10.3233/WOR-2012-0724-4283

4. Fischer FM, Da Silva Borges FN, Rotenberg L, et al. Work ability of health care shift workers: What matters? *Chronobiol Int* 2006;23:1165-1179. doi: 10.1080/07420520601065083

5. Ganong WL, Ganong JM, Harrison ET. The 12-hour shift: better quality, lower cost. *J Nurs Adm* 1976;6:17-29. doi: 10.1097/00005110-197602000-00009

6. Geiger-Brown J, Rogers A, Trinkoff AM, et al. Sleep, Sleepiness, Fatigue, and Performance of 12-Hour-Shift Nurses. *Chronobiol Int* 2012;29:211-219. doi: 10.3109/07420528.2011.645752

7. Griffiths P, Dall'ora C, Simon M, et al. Nurses' shift length and overtime working in 12 European countries: the association with perceived quality of care and patient safety. *Med Care* 2014;52:975-981. doi: 10.1097/mlr.0000000000000233

8. He C. Physical and psychosocial demands on shift work in nursing homes. University of Cincinnati: Doctoral dissertation; 2013.

9. Hlatshwayo PS. Relationship of Healthcare assistants working hours, job tenure to job satisfaction and job-related affective well-being. Dublin DBS School of Arts: Undergraduate dissertation; 2014.

10. Hodgson LA. Nurses working 12-hour shifts in the hospice setting. *Palliat Med* 1995;9:153-63. doi: 10.1177/026921639500900206

11. Josten EJ, Ng-a-Tham JEE, Thierry H. The effects of extended workdays on fatigue, health, performance, and satisfaction in nursing. *J Adv Nurs* 2003;44:643-652. doi: 10.1046/j.0309-2402.2003.02854.x

12. Richardson A, Dabner N, Curtis S. Twelve-hour shift on ITU: a nursing evaluation. *Nurs Crit Care* 2003;8:103-8. doi: 10.1046/j.1478-5153.2003.00016.x

13. Richardson A, Turnock C, Harris L, et al. A study examining the impact of 12-hour shifts on critical care staff. *J Nurs Manag* 2007;15:838-46. doi: 10.1111/j.1365-2934.2007.00767.x

14. Royal College Of Nursing (RCN). Spinning plates: establishing a work-life balance: A guide for RCN representatives. [Online] Available at:

https://www.rcn.org.uk/__data/assets/pdf_file/0007/156166/003214.pdf [Accessed 28th April 2015].

	<p>15. Stimpfel AW, Aiken LH. Hospital Staff Nurses' Shift Length Associated with Safety and Quality of Care. <i>J Nurs Care Qual</i> 2013;28:122-129. doi: 10.1097/ncq.0b013e3182725f09</p> <p>16. Thomson, L, Schneider, J, Hare-Duke, L. Unregistered health care staff's perceptions of 12 hour shifts: an interview study. <i>Journal of Nursing Management</i> 2017; 25: 531-538.</p> <p>17. Trinkoff AM, Johantgen M, Storr CL, et al. Nurses' work schedule characteristics, nurse staffing, and patient mortality. <i>Nurs res</i> 2011;60:1-8. doi: 10.1097/nnr.0b013e3181fff15d</p> <p>18. Wooten N. Evaluation of 12-hour shifts on a cardiology nursing development unit. <i>Br J Nurs</i> 2000;9:2169-74. doi: 10.12968/bjon.2000.9.20.2169</p>
--	---

VERSION 1 – AUTHOR RESPONSE

Reviewer(s)' Comments to Author:

Reviewer: 1

Reviewer Name: Meeta Prasad Kerlin

Institution and Country: University of Pennsylvania, United States of America

Please state any competing interests or state 'None declared': None

Please leave your comments for the authors below

The authors performed a qualitative study of nurses' perceptions regarding 12-hour shifts on weekend days, a newly instituted program at a single center. Participation in both the 12-hour shifts (previously, all shifts were 8-hour) and in the interviews was voluntary. The authors are to be congratulated for collecting a large amount of qualitative data regarding an important and complex nursing staffing question; however, I have several concerns about this manuscript that the authors could address.

1. The introduction is very lengthy and reads more like a narrative review than an introduction to a research study. Please consider shortening it considerably and framing it so as to better set up the importance of the research question.

Yes, thank you. We think that removing the subheadings will make the introduction more similar to more quantitative research papers. The introduction shows the mixed results of previous research and motivates the qualitative study.

2. The methods section lacks enough detail for this study to be replicated. For example, how many coders specifically reviewed each interview? What qualitative method was used to develop and refine the codes? The code list was reportedly revised several times "during the process" - what does this mean? Were prior interviews coded again retrospectively when the code list was updated? Were interviews coded in real time, or in batches, or at the end of interview completion? Was the interview

script modified based on coding? How were disagreements between coders resolved? All of these issues, and more, should be addressed in detail. The authors could benefit from reviewing the COREQ checklist for reporting qualitative research and modifying the methods accordingly.

There is a reference to the method used. "A 10-step method has been developed to code and structure all text using Microsoft Word and Excel (Ose, 2016)". The text also includes the following text " The multidisciplinary team that conducted the interviews coded all interviews." This is part of the 10-step method that is published in Applied journal of Social Science. The interviews are coded by the team after all interviews were completed. We did not modify interview script. The dataset is not very complex and no disagreements within the team was experienced. We believe that the 10-step method referred to (Ose, 2016) gives all the information the reviewer asks for.

3. A more detailed description of the shifts in the methods section would be helpful. The results reference 1-hour breaks frequently and previous 10-hour night shifts, but I did not find a description of these details in the methods.

Yes, thank you. The description of the shifts includes the following: "Before the two units started the trial, the managers and employees agreed on a shift system with certain number of rest breaks during the 12-hours shifts and that only two 12-hour shifts should be worked per weekend (Friday included a regular 8-hour shift) and that the nurses would have the day before and the day after the work weekend off." As said in the text they agreed on a certain number of rest breaks. We have now included the following details: " They decided that the 12-hours shift should include 90 minutes rest breaks. The non-ICU decided to have one break lasting one hour and then a 30-minute break while the ICU decided to have 3 breaks each lasting 30 minutes."

4. The results are fairly lengthy, which is of course common for qualitative studies where results are typically very text-heavy; however, I think the results could be shortened. For example, the section 3.2 ("Organising the 12-hour shift schedule") might be shortened considerably or even removed altogether, as there are no quotes and the themes may be captured in other sections.

We agree that the result section is lengthy. However, organising the 12-hour shift schedule is not easy, and this paragraph explains why. We believe that this is important information that should be included. The examples used explain more about why it was difficult and without these the reader would probably not understand what is meant.

5. In the discussion section, the second paragraph comments about how respondents feel about their work environment. I could not map these comments in the discussion to any results that were reported; therefore, if there were themes related to work environment, that should be included in the results explicitly, if they are to be commented upon in the discussion.

Yes, this refers to the following text: " We asked all respondents how they perceived their work environment and all participating nurses had favourable perceptions of their work environment. This may be an important condition for implementing new shift arrangements." This is context information and because the article is not about work environment issues, we have not included quotes on that. We have many hundred quotes about work environment, but these are not related to 12-hours shifts.

6. In section 4.1 ("Job satisfaction") - there is a comment that more nurses wanted to try the extended shift. How was this information obtained, if the interviews were of only those nurses that participated in the 12-hour shifts?

As explained in the Study Design section, the study was planned together with managers and employees in the two units. This is how we know that more nurses wanted to try the extended shift.

7. That this is a single-center study including only two ICUs should be highlighted as a, if not the, major limitation of this study. The generalizability of these data is very, very limited, in my opinion, and this needs to be emphasized.

Yes we agree that the sample size is a key limitation, as said in the Strength and limitation section.

However, the aim of the study was to understand the nurses' individual experiences from working 12-hours shifts and why the quantitative research results are very mixed. We believe we have added some knowledge to this question by this paper.

8. In general, the discussion section seems to reiterate the results in more detail than necessary. As with other sections, I think this would benefit from being more concise and highlighting major conclusions that can be drawn from the results, rather than restating so many of the results.

As this is a qualitative paper and that the aim of the study is to learn more about the individual experiences, our intention is to add more insight and not to draw very bombastic conclusions.

9. Typos: In multiple places throughout the manuscript, "managers" is spelled as "mangers" and should be corrected.

Thank you for noticing this, we have corrected this.

Reviewer: 2

Reviewer Name: Justine Schneider Professor of Mental Health and Social Care

Institution and Country: University of Nottingham, UK

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

I have some minor editorial queries which I list here first, followed by two issues that may require more substantial revisions to the text.

1. 'bed post' is an unfamiliar term. Do you mean 'nursing station' or 'ward'?

Yes, we agree and have changed this to ward.

2. p 10 "The employees did not want to work 12-hour shifts on weekdays, because of concerns about patient treatment and employee preferences." This is confusing. Can you be more specific?

Yes, we see that this can be confusing. We have changed the sentence to "The employees did not want to work 12-hour shifts on weekdays, because of concerns about patient treatment on the busier weekdays".

3. P 16 "+*At the end ..." punctuation not clear.

Yes, sorry about that. This is corrected to "At the end"

4. P29: "Others were indifferent about the decision not to continue the 12-hour shifts". Whose decision? The following paragraph after the quotation refers to staff opting out of the pilot, is it their decision to which this statement refers?

No, it was the clinic manager who decided not to continue the 12-hours shifts. The sentence is changed to "The manger at the ICU decided not to continue the 12-hour weekend shifts after the trial period, whereas the manager at the non-ICU decided to allow more nurses to try out this approach." We hope the paragraph is clearer now.

Issues:

1. Participants are self-selected, so there is a great bias in your results towards people who would consider 12-hour shifts. This is not given attention in the 'limitations'.

Yes, and this is why we included the following sentence: " It is possible this study underestimates the risk of adverse outcomes from 12-hour shifts, as nurses who knew they would be susceptible to such outcomes likely chose not to participate." We also wrote that it would be unethical to force someone who did not want to work 12-hours shifts. At least in Norway. In the Norwegian system (see macro and micro setting sections) working hours is among the central topics in collective bargaining.

2. Is it misleading to refer to the pilot as a 'trial'?

The word "trial" is not reserved to clinical trials. It's not randomised or controlled, but it's still a trial.

3. The literature is a bit thin and old. Here are some supplementary references.

Thank you, we are aware of most of these studies and below we show why these are not referred to.

1. Burtney L, Buchanan P. Impact of Working Longer Hours on Quality of Care. Leeds: Skills for Care; 2015.

This is a report and not a peer-reviewed article. They conclude that the views are split.

2. Cummings G, Estabrook C. The effects of hospital restructuring that included layoffs on individual nurses who remained employed: a systematic review of impact. *Int J Sociol Soc Policy*, 2003;23:8-53. doi: 10.1108/01443330310790633

This is not about 12-hours shifts, it's about hospital restructuring.

3. Estry-Béhar M., van der Heijden BIJM. Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety. *Work* 2012;41:4283-4290. doi: 10.3233/WOR-2012-0724-4283

This is relevant, and they refer to the Wagstaff study which we have included. This is also used in the Dall'Ora, C., Griffiths, P., Ball, J., Simon, M., H Aiken, L.H. 2015 which we have included.

4. Fischer FM, Da Silva Borges FN, Rotenberg L, et al. Work ability of health care shift workers: What matters? *Chronobiol Int* 2006;23:1165-1179. doi: 10.1080/07420520601065083

This is a study from Brazil using cross-sectional data and they identify factors associated with inadequate (moderate and low scores) of the work ability index. However, this is part of a larger research study on tolerance to 12 h night work but we have not found a publication of these analyses.

5. Ganong WL, Ganong JM, Harrison ET. The 12-hour shift: better quality, lower cost. *J Nurs Adm* 1976;6:17-29. doi: 10.1097/00005110-197602000-00009

This is a publication from 1976 and we do not have access to the full text.

6. Geiger-Brown J, Rogers A, Trinkoff AM, et al. Sleep, Sleepiness, Fatigue, and Performance of 12-Hour-Shift Nurses. *Chronobiol Int* 2012;29:211-219. doi: 10.3109/07420528.2011.645752

This one is included.

7. Griffiths P, Dall'ora C, Simon M, et al. Nurses' shift length and overtime working in 12 European countries: the association with perceived quality of care and patient safety. *Med Care* 2014;52:975-981. doi: 10.1097/mlr.0000000000000233

We included another reference from this research group which is about 12-h shifts. This one is about overtime working.

8. He C. Physical and psychosocial demands on shift work in nursing homes. University of Cincinnati: Doctoral dissertation; 2013.

This one is about shift work in nursing homes and not in hospitals.

9. Hlatshwayo PS. Relationship of Healthcare assistants working hours, job tenure to job satisfaction and job-related affective well-being. Dublin DBS School of Arts: Undergraduate dissertation; 2014.

This study is conducted among healthcare assistant and not certified nurses.

10. Hodgson LA. Nurses working 12-hour shifts in the hospice setting. *Palliat Med* 1995;9:153-63. doi: 10.1177/026921639500900206

This study is in hospice and not in hospitals. This is very different type of work.

11. Josten EJ, Ng-a-Tham JEE, Thierry H. The effects of extended workdays on fatigue, health, performance, and satisfaction in nursing. *J Adv Nurs* 2003;44:643-652. doi: 10.1046/j.0309-2402.2003.02854.x

This is in nursing homes and not in hospitals.

12. Richardson A, Dabner N, Curtis S. Twelve-hour shift on ITU: a nursing evaluation. *Nurs Crit Care* 2003;8:103-8. doi: 10.1046/j.1478-5153.2003.00016.x

13. Richardson A, Turnock C, Harris L, et al. A study examining the impact of 12-hour shifts on critical care staff. *J Nurs Manag* 2007;15:838-46. doi: 10.1111/j.1365-2934.2007.00767.x

Both these studies are about critical care staff, and we did not focus on 12h shifts among these nurses. If they had been conducted at a newborn intensive care unit we would include these in the discussion.

14. Royal College Of Nursing (RCN). Spinning plates: establishing a work-life balance: A guide for RCN representatives. [Online] Available at: https://www.rcn.org.uk/__data/assets/pdf_file/0007/156166/003214.pdf [Accessed 28th April 2015].

This is a guide for RCN representatives written by the Royal College of nursing. They simply state that no shifts should be longer than 12-hours. This is not a peer-reviewed publication.

15. Stimpfel AW, Aiken LH. Hospital Staff Nurses' Shift Length Associated with Safety and Quality of Care. *J Nurs Care Qual* 2013;28:122-129. doi: 10.1097/ncq.0b013e3182725f09

This one also includes longer shifts: >13h and they show that most of the participants worked at least 12 consecutive hours so it is not straight forward to compare this to more specific 12h shifts and it was therefore not included.

16. Thomson, L, Schneider, J, Hare-Duke, L. Unregistered health care staff's perceptions of 12 hour shifts: an interview study. *Journal of Nursing Management* 2017; 25: 531-538.

This is not about nurses but about unregistered health care staff. We only included studies about nurses.

17. Trinkoff AM, Johantgen M, Storr CL, et al. Nurses' work schedule characteristics, nurse staffing, and patient mortality. *Nurs res* 2011;60:1-8. doi: 10.1097/nnr.0b013e318181fff15d

This is not about 12h shifts but about work schedules more generally.

18. Wooten N. Evaluation of 12-hour shifts on a cardiology nursing development unit. *Br J Nurs* 2000;9:2169-74. doi: 10.12968/bjon.2000.9.20.2169

This study is on a nursing development unit. We are not sure if this can be compared with an hospital unit and did not include this reference.