

## 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

<b>TITLE (PROVISIONAL)</b>	THE ASSOCIATION OF 12 HOUR SHIFTS AND NURSES' JOB SATISFACTION, BURNOUT AND INTENTION TO LEAVE: FINDINGS FROM A CROSS-SECTIONAL STUDY OF 12 EUROPEAN COUNTRIES
<b>AUTHORS</b>	Dall'Ora, Chiara; Griffiths, Peter; Ball, Jane; Simon, Michael; Aiken, Linda

### VERSION 1 - REVIEW

<b>REVIEWER</b>	Sung-Heui Bae The University of Texas at Austin , School of Nursing
<b>REVIEW RETURNED</b>	05-Mar-2015

<b>GENERAL COMMENTS</b>	<p>Abstract In page2, line 9, just make consistent, please use intention to leave if it is your research focus and evidence you found.</p> <p>Background In page 4, line 18, any reasons how European countries started to use shifts of 12 hours. In the U.S., nursing shortages were the main reason to start with. In the U.S. when nurses work the 12 hour shift, they work only 3 days a week. In Europe, is this similar or different? In page 5, line 3, in the previous studies, did they examine whether those nurses had a second position when they worked 12 hour shifts. This could be another confounder to examine the impact of the shift length on nurse outcomes. In page 5, line 25, currently some states in the U.S. have regulations regarding work hours and mandatory overtime. Please see the article below. Bae, S-H. &amp; Yoon, J (2014). Impact of states' nurse work hour regulations on overtime practice and work hours among registered nurses. Health Services Research, 49 (5):1638-58</p> <p>Methods In page 6, line 10, do you have the percentage of direct care hours for the inclusion criteria (e.g., 50%)? If you have previous manuscripts which describe your survey method more detail, please cite them. Also all nurses included are full time employees? Any part time employees?</p> <p>Measurements Is the survey focusing on nurses' principal position? Does shift length mean the scheduled work hours for the shift or actual work hours for the shift? Not include any overtime?</p> <p>Data analysis Teaching status: only hospitals providing training to undergraduate medical students? What about any residents or interns?</p> <p>Results</p>
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	<p>Is working overtime based on their last shift? Or weekly work hours? Any distinction in overtime like voluntary or mandatory?</p> <p>Discussion          If you can provide some comparison of your outcome variables with previous study findings, that will help readers understand your study sample (especially in European nurses).          Also shift lengths and overtime are related to nurse staffing and how to manage nurse shortages (like hiring temporary nursing staff or requiring permanent nurses' overtime). What are the practice implication of your study findings in regard to nurse staffing? Also based on the current regulations of work hours in European countries, how your study findings will contribute to the policy implementation?</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer 1

Reviewer's comment	Action taken	Example of revision
In page2, line 9, just make consistent, please use intention to leave if it is your research focus and evidence you found.	Corrected.	
<p>In page 4, line 18, any reasons how European countries started to use shifts of 12 hours. In the U.S., nursing shortages were the main reason to start with.</p> <p>In the U.S. when nurses work the 12 hour shift, they work only 3 days a week. In Europe, is this similar or different?</p>	Information added	<i>"This change is mainly driven by managers' perceptions of improved efficiency" and then "previous studies on shift length in Europe did not provide evidence of nurses working a compressed work week, so it is not clear if working 12 hour shifts is associated with fewer days at work"</i>
In page 5, line 3, in the previous studies, did they examine whether those nurses had a second position when they worked 12 hour shifts. This could be another confounder to examine the impact of the shift length on nurse outcomes.	Information added	<i>"although the nature of these (commitments) was not examined (e.g. having a second job, having caring responsibilities at home and other potential confounders on the impact of 12 hour shifts on nurse outcomes)."</i>
<p>In page 5, line 25, currently some states in the U.S. have regulations regarding work hours and mandatory overtime. Please see the article below.</p> <p>Bae, S-H. &amp; Yoon, J (2014). Impact of states' nurse work hour regulations on overtime practice</p>	Thank you for picking up on this. Corrected.	<i>"The U.S. has regulations governing nurses' work hours that differ from the European Working Time Directive, in terms of limiting weekly hours, including overtime, and providing extra protection for between-shift rest hours and night work"</i>

and work hours among registered nurses. Health Services Research, 49 (5):1638-58		
Methods In page 6, line 10, do you have the percentage of direct care hours for the inclusion criteria (e.g., 50%)?	Information added	<i>"No minimum working hours or percentage of direct care hours were set as inclusion criteria."</i>
If you have previous manuscripts which describe your survey method more detail, please cite them.	Information added	<i>"Further details on the sample selection are available on the RN4CAST protocol (citation)."</i>
Also all nurses included are full time employees? Any part time employees?	Information added	<i>"working either full time or part time"</i>
Is the survey focusing on nurses' principal position?	Information added	<i>"The survey did not enquire if nurses were holding their principal position at the hospitals they were surveyed"</i>
Does shift length mean the scheduled work hours for the shift or actual work hours for the shift? Not include any overtime?	Information added	<i>"Shift length was recorded by asking the actual number of hours worked on the most recent shift."</i>
Teaching status: only hospitals providing training to undergraduate medical students? What about any residents or interns?	Yes, it was only hospital providing training to undergraduate medical students	
Is working overtime based on their last shift? Or weekly work hours?	Information added	<i>"reported working overtime on their last shift"</i>
Any distinction in overtime like voluntary or mandatory?	Information addressed in limitations	
If you can provide some comparison of your outcome variables with previous study findings, that will help readers understand your study sample (especially in European nurses).	Information added	<i>"Our findings show that the odds of intending to leave their job due to job dissatisfaction were increased by 31% for nurses working 12 hours or more in comparison with nurses working 8 hours or less: this finding is consistent with previous research [14]."</i>
Also shift lengths and overtime are related to nurse staffing and how to manage nurse shortages (like hiring temporary nursing staff or requiring permanent nurses' overtime). What are the practice implication of your study findings in	Added	<i>"suggesting that overtime may not be a useful strategy to cope with nursing shortages"</i>

regard to nurse staffing?		
Also based on the current regulations of work hours in European countries, how your study findings will contribute to the policy implementation?	We believe this is covered in the conclusions, please see column "example of revision".	<i>"In the context of austerity measures leading to cuts in spending on public services in Europe, it is particularly important for policymakers and managers to have good evidence on which to base decisions on hospital nurse work hours to ensure that the well-being of workers and the quality of care is maintained and nurses are retained in practice."</i>

### VERSION 2 - REVIEW

<b>REVIEWER</b>	Sung-Heui bae University of Texas at Austin, USA
<b>REVIEW RETURNED</b>	16-Jun-2015

<b>GENERAL COMMENTS</b>	<p>In the measure, how did you find the overtime? Beyond the certain number of hours per shift? Or more than planned work hours?</p> <p>In the table, I am not able to find the model of nurse outcomes by overtime. How you can conclude "suggesting that overtime may not be a useful strategy to cope with nursing shortages"?</p> <p>""The U.S. has regulations governing nurses' work hours that differ from the European Working Time Directive, in terms of limiting weekly hours, including overtime, and providing extra protection for between-shift rest hours and night work" What about variation across European countries? In the study, 12 European countries were included, can you provide variation of regulations among those countries? If you can provide some summary regarding regulation, that would be informative. In the finding, 99% of Poland nurses worked 12 hours shifts (majority had less than 15%), I can see huge variation in terms of 12 hour shift work among European countries.</p> <p>"working either full time or part time" how did you define "part time" by work hours per week?</p>
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### VERSION 2 – AUTHOR RESPONSE

Reviewer's comment	Response	Action taken
In the measure, how did you find the overtime? Beyond the	Overtime was defined by asking the nurses whether they had	

<p>certain number of hours per shift? Or more than planned work hours?</p>	<p>worked overtime on their last shift; please see in the Measurements section:</p> <p><i>“A further question inquired whether nurses had worked overtime on their last shift”.</i></p> <p>We treated overtime as a dichotomous variable (yes/no), and we report this in the Data analysis section; please see:</p> <p><i>“We then controlled for potential confounding variables, including [...] overtime (yes/no)”.</i></p>	
<p>In the table, I am not able to find the model of nurse outcomes by overtime. How you can conclude “suggesting that overtime may not be a useful strategy to cope with nursing shortages”?</p>	<p>Thank you for picking up on this. Even if we do not report this in the tables, we mention this in the Results and Discussion section; please see:</p> <p><i>“Our study indicates that working overtime on a shift is associated with poor nurse outcomes independent of the total hours worked on that shift”</i></p> <p><i>“Since the literature has suggested an interaction between shift length and working overtime,[17] we modelled the interaction between shift length and working overtime (model not shown – available from authors) but the relationship was not significant: both shift length and overtime had independent effects on the variables of interest.”</i></p> <p>Because overtime was not the primary focus of our study we have not included it in the tables, but we report that the model is available from us if requested.</p>	
<p>“The U.S. has regulations governing nurses’ work hours that differ from the European Working Time Directive, in terms of limiting weekly hours, including overtime, and providing extra protection for</p>	<p>None of these European countries have country-specific regulations regarding shift length or working times. All the countries refer to the European Working Time directive which, as reported in the text, only offers protection</p>	

<p>between-shift rest hours and night work” What about variation across European countries? In the study, 12 European countries were included, can you provide variation of regulations among those countries? If you can provide some summary regarding regulation, that would be informative. In the finding, 99% of Poland nurses worked 12 hours shifts (majority had less than 15%), I can see huge variation in terms of 12 hour shift work among European countries</p>	<p>on weekly hours, between shift rest hours, and night work.</p>	
<p>“working either full time or part time” how did you define “part time” by work hours per week?</p>	<p>Thank you for picking up on this. The operational definition of full time/ part time was added.</p>	<p>We added: “(...) <i>and a further question asked whether they worked full time at the hospital</i>”</p>

This manuscript received three reviews in the previous BMJ Journal. However, the other referees have declined to make their reviews public.