

Article details: 2020-0058	
Title	Burnout and distress among nurses in the Peter Munk Cardiac Centre
Authors	Barry Rubin MD PhD, Rebecca Goldfarb PhD, Daniel Satele MSc, Leanna Graham, BScPT MHSc
Reviewer 1	Farinaz Havaei
Institution	School of Nursing, The University of British Columbia, Vancouver, BC
General comments (author response in bold)	<p>Reviewer 1 comment 1. Abstract: Identify the study location (e.g., country, province) in the abstract Study location identified in the Methods section, which contains the following text: “We conducted a survey at the Peter Munk Cardiac Centre (PMCC) at Toronto General Hospital and Toronto Western Hospital, members of University Health Network (UHN) in Toronto, Canada. PMCC is cardiovascular centre at a quaternary referral hospital.”</p> <p>Reviewer 1 comment 2. Unclear how a 9-question survey measures so many constructs. \Please see the response to Editor comments 10, 11 and 12 above, which explains in detail how the 9-questions WBI survey works.</p> <p>Reviewer 1 comment 3. Multivariable logistic regression identified or were used to explored...? {editorial note: Multivariable logistic regression should be removed} Following discussion with Dr. Kelsall and Dr. Tomlinson, it was agreed that the binary multivariable analysis would remain in the manuscript. Please refer to the response to Editor comments 2 and 3 above.</p> <p>Reviewer 1 comment 4. The introduction needs to be expanded to better justify the need for this study (e.g., what is the knowledge gap), and identify your purpose and research questions. The description of WBI and what it measures should move to your measurement section. The introduction, reproduced below, explains why we did this study. “Burnout is a work-related syndrome characterized by emotional exhaustion, a sense of reduced personal accomplishment and depersonalization that may manifest as negativity, cynicism, and the inability to express empathy or grief.(1, 2) Burnout negatively impacts nurses’ physical and mental health, increases nursing turnover rates and is associated with poor job performance and threats to patient safety, and is more prevalent in hospitals with a higher number of patients per nurse.(3-5) Over 20% of nurses are at risk of post-traumatic stress disorder as a result of workplace mistreatment, and nearly half of all nurses experience burnout in some form, a rate more than twice that among professionals in other fields.(6) In addition to burnout, the clinically relevant dimensions of distress include meaning in work, severe fatigue, work-life integration, quality of life, and suicidal ideation.(7) The Institute for Healthcare Improvement has states that “if burnout in healthcare were described in clinical or public health terms, it might well be called an epidemic.”(8)” The aim of this research was to measure the prevalence of burnout and distress among nurses that practice in a cardiovascular centre at a quaternary referral hospital. We also compare the prevalence of burnout and distress between these nurses and nurses in practice in the United States at</p>

academic health science centres.(9)”

The description of the WBI Survey and what it measures has been moved to the Methods section, as suggested.

Reviewer 1 comment 5. Some of your acronyms are not defined (e.g., UHN and CWS)

All abbreviations have been explained, as suggested.

Reviewer 1 comment 6. How were these 493 selected? What is your sampling strategy? Any power calculation?

As noted in the Methods section, reproduced below, the WBI survey was open to all 483 nurses in the PMCC. We did not do any sampling or power calculations.

“The survey was open to all 493 PMCC nurses between December 1, 2018 and January 31, 2019. Posters (Appendix 1) describing the survey were placed in multiple areas across both locations. An independent third party (Canadian Viewpoint) sent an initial e-mail invitation (Appendix 2) and subsequent reminders to complete the survey to all nurses that practice in the PMCC.”

Reviewer 1 comment 7. I find your measurement section extremely confusing partly because you did not provide the required contextual information for the reader in the introduction. Additionally, the description of your measure/s should be under a separate heading (e.g., instruments or measurement). You could separate your measures into: (a) key predictors, (b) outcomes, and (c) control/confounding variables.

The methods section has been rewritten to address these significant concerns. Please see the responses to Editor comments 10, 11 and 12 above.

Reviewer 1 comment 8. The description of the 9-item WBI survey is very poor. What does this instrument measure? What is the overarching construct? Or does this tool measure multiple concepts using subscales? If multidimensional, was the tool factor structure checked using the study data? How many items under each subscale? What are the response options like? How do you obtain scores (mean or sum score)? What about internal consistency?

The ability of the WBI survey to measure multiple dimensions of distress, including fatigue, depression, burnout, anxiety/stress, and mental/physical quality of life has been validated in a sample of 812 nurses (Dyrbye LN et al. Efficacy of the Well-Being Index to Identify Distress and Well-Being in U.S. Nurses. Nurs Res. 2018;67(6):447-55; reference 13 in our manuscript). We now describe the WBI Survey in detail in the Methods section of the manuscript. Please see the responses to Editor comments 10, 11 and 12 above. The actual WBI survey questions are reproduced in Appendix 3 of the manuscript. Responses are either “Yes” or “No”, or involve the use of a 5- or 7-point Likert scale. We did not assess the internal consistency of responses.

Reviewer 1 comment 9. The same applies to other study measures (e.g., satisfaction with EHR), staffing adequacy, fair treatment. It is unclear if single items were used to measure these constructs? If so, how did you come up with these

items (researcher developed or part of a pre-existing instrument). Any evidence of their validity and reliability?

We selected the additional survey questions that were designed to assess work culture, including “please rate your satisfaction with your electronic health record (EHR)”, “the staffing levels in this work setting are sufficient to handle the number of patients”, and “I am treated fairly in the workplace” after discussion with Dr. L Dyrbye, Mayo Clinic, who kindly forwarded us a list of “Exemplary Survey Items to Explore Impact of Well-Being Initiatives”, as described in our response to Editor comment 13 (d), above.

Please note that the following sentences have been added to the limitations section of the manuscript:

“The previously described supplemental survey questions related to perception of the adequacy of staffing levels, fair treatment in the workplace, and satisfaction with the EHR were not subject to pilot evaluation in this study. While we cannot exclude the possibility that nurses experiencing burnout may be less likely to fill out a survey that could be viewed as additional work, the majority of nurses participating in this survey (230/242) answered all survey questions.”

Reviewer 1 comment 10. Not sure why some of your sub headings are underlined. I am not sure if this is consistent with the journal requirements?! Also, please look into the journal requirement re reporting university ethics approval # in the body of the study.

The format of the manuscript now aligns with the format specified by CMAJ Open.

Reviewer 1 comment 11. When did you use Chi square versus Kruskal Wallis? Clarify. What about assumptions? Did you test the data for their pertinent assumptions and were they met?

Kruskal-Wallis tests are an alternative to t-tests where data normality assumptions are not required. This non-parametric test is standard for comparing continuous factors to one another. Chi square and Fisher’s exact tests were conducted for categorical responses; their use is also standard for analysis of cross-sectional categorical data. We used Chi square tests when expected counts were ≥ 5 , and used Fisher’s exact tests when expected counts were < 5 .

The following sentence has been added to the methods section of the manuscript:

“We carried out standard univariate statistical comparisons using Chi-square tests when expected counts were ≥ 5 , Fisher’s exact tests when expected counts were < 5 , or Kruskal-Wallis tests for non-parametric continuous variables to perform univariate comparisons in this sample of nurses in the PMCC.”

Reviewer 1 comment 12. It seems like you collected demographics information and workplace characteristics as well. Move this up with other measurement information. This information should not be reported in the result. You need to identify how categorical variables (e.g., employment status) were coded. This information is required for the reader to make sense of the results.

Demographic and workplace characteristic data are reported in Table 1.

Employment status is listed as either full time, part time or casual.

Reviewer 1 comment 13. Table 2 description is not accurate. You are showing between group difference tests in WBI scores. In this table, you need to identify where Chi square versus Kruskal-Wallis test was conducted.

The results previously presented in Table 2 now appear in Appendix 4. All of these comparisons were made using either Chi square tests (when expected counts were ≥ 5) or Fisher's exact tests (when expected counts were < 5).

Reviewer 1 comment 14. Table 2. For several of your variables you have empty cells. This violates the assumption for Chi square analysis.

We used Fisher's exact tests when expected counts were less than 5.

Reviewer 1 comment 15. Given the number of between group tests, it makes me wonder if you should apply the Bonferroni correction?

This study was an exploratory analysis of the prevalence of burnout and distress among nurses in the Peter Munk Cardiac Centre. Therefore, we did not develop or test any specific hypotheses a priori. As such, corrections to account for the family-wise error rate (such as Bonferroni's correction) are likely to be too conservative, and we are not aware of any acceptable alternatives.

Reviewer 1 comment 16. Overall, Table 2 is really long and hard to read, can you revise the table so it is easier to follow?

Table 2 now appears as Appendix 4 in the manuscript. The most relevant observations in Appendix 4 are described in the Results section of the manuscript, as follows:

"Response to individual questions in the WBI survey. Seventy-eight percent (188/242) of nurses responded "yes" to the question "have you felt burned out from your work", 79% (191/242) responded that they have "been bothered by emotional problems", and 74% (179/242) responded that "work was hardening them emotionally". Thirty-six percent of nurses (87/242) agreed or strongly agreed with the statement "work schedule leaves enough time for personal life", and 71% (172/242) agreed or strongly agreed that the work they do is meaningful to them (score of 6 or 7 on the 7-point Likert scale). Responses to the remaining WBI survey questions appear in Appendix 4."

Reviewer 1 comment 17. Predictors of high physician (???) WBI scores

This was a typographical error, and was meant to say "nurses". Thank you for identifying this error.

Reviewer 1 comment 18. Table 4, consider adding table footnotes to describe variable codes. Also, now sure what happened to your table borders.

With apologies, we are unclear what is meant by the term "variable codes". If the manuscript is accepted, we will work with the Journal editorial staff to ensure this table is presented in accordance with Journal standards.

Reviewer 1 comment 19. The validity of the WBI survey is really questionable to me. You did not demonstrate any evidence of the instrument validity among the

study data. I am really concerned that the tool does not differentiate between burnout and distress (as these are different phenomena). Unless the instrument is bi-dimensional!? With this, I would not start the Discussion/interpretation section with “we used a validated survey instrument”...Also WBI survey and not WBI score.

The WBI survey is a rigorously validated instrument developed by academic staff at the Mayo Clinic that has been tested in thousands of healthcare workers and non-physician employees in the general US population. In addition to burnout, the WBI survey measures other clinically relevant dimensions of distress, which include meaning in work, severe fatigue, work-life integration, quality of life, and suicidal ideation. We know from previous research that those who score above certain thresholds have multiple-fold higher odds of burnout, suicidal ideation, depression, lack of resilience, and career regret.

The approach used to validate the ability of the WBI Survey to measure dimensions of distress, including burnout, is described in detail in reference #7 (Dyrbye LN, Satele D, Shanafelt T. Ability of a 9-Item Well-Being Index to Identify Distress and Stratify Quality of Life in US Workers. J Occup Environ Med. 2016;58(8):810-7) and reference #13 (Dyrbye LN et al. Efficacy of the Well-Being Index to Identify Distress and Well-Being in U.S. Nurses. Nurs Res. 2018;67(6):447-55) of our manuscript.

As described in the methods section of reference #7, “we evaluated the ability of the WBI to detect distress in a variety of dimensions, including its ability to:

- 1. identify individuals with low overall QOL as defined by a score 1/2 standard deviation (SD) below the mean for the general population norm (a clinically meaningful effect size),**
- 2. identify individuals who had high fatigue (i.e., an unfavorable level of fatigue) as defined by a score 1/2 standard deviation (SD) worse than the mean for general population norm (lower scores indicate higher fatigue),**
- 3. identify individuals who had high levels of burnout in either the emotional exhaustion and/or depersonalization domains as defined by endorsing symptoms of burnout weekly or more often on either of the single item Maslach Burnout Index measures,**
- 4. identify individuals who reported suicidal ideation within the last 12 months, a clinically relevant outcome that warrants individualized counseling.**

The ability of the 9-item eWBI survey to stratify risk across these outcomes (low QOL, high fatigue, burnout, suicidal ideation) was also determined. In addition, to evaluate the ability of the 7-item WBI and the 9-item eWBI Survey to identify individuals who were thriving, we also assessed the ability of WBI and eWBI score to identify those with high overall QOL as defined by an overall QOL score 1/2 standard deviation (SD) above the mean for the general population norm (a clinically meaningful effect size).”

In addition, as noted in the Methods section of reference #7:

“Burnout was measured using two single-item measures from the Maslach Burnout Inventory (MBI): “I feel burned out from my work” and “I have become more callous toward people since I took this job”. These two items correlate strongly with the emotional exhaustion and depersonalization domains of burnout, as measured by the full MBI in a sample of over 10,000

	<p>individuals. The area under the receiver operating characteristic (ROC) curve for these single items relative to the full MBI is 0.94 and 0.93 for emotional exhaustion and depersonalization, respectively. Individuals endorsing either symptom as occurring weekly or more often were considered to have symptoms of burnout. This approach to measuring burnout has also been used in prior large scale national studies. Recent suicidal ideation was evaluated by asking, “During the past 12 months, have you had thoughts of taking your own life?” The item is similar to questions used in large US epidemiologic studies.”</p> <p>These methodologic descriptions demonstrate how the WBI Survey was validated through comparison with responses to national-level data in the United States that measured burnout, fatigue, quality of life and suicidal ideation.</p>
Reviewer 2	Carla Ginn
Institution	Faculty of Nursing, University of Calgary, Calgary, Alta.
General comments (author response in bold)	<p>Reviewer 2 comment 1. Our first question is whether a mixed method approach would have been ideal, including interviewing nurses regarding their perspectives surrounding burnout. {Editorial Note: we understand that the study design does not need to be changed.}</p> <p>In the next phase of this research, we plan on conducting focus groups with nurses to explore the drivers of distress, which include the perception of inadequate staffing levels and unfair treatment in the workplace. The following text now appears in the Conclusion section of the manuscript: “The perception of adequate staffing levels and fair treatment in the workplace independently predicted lower levels of distress among nurses in the PMCC. Initiatives that focus on addressing these institutional factors could lower distress levels among PMCC nurses and improve their work experience and patient outcomes.”</p> <p>The aim of this initial study was to measure the prevalence of burnout and distress among nurses that practice in the Peter Munk Cardiac Centre.</p> <p>Reviewer 2 comment 2. Second, results may have been different for registered nurses, nurse practitioners, and licensed practical nurses. Were some of the nurses advanced practice nurses? Years since graduation from nursing school is too broad a demographic.</p> <p>We could not find a clear research question, but the statistical approaches are appropriate for the type of data collected.</p> <p>We did not ask nurses to identify themselves as registered nurses, nurse practitioners or registered practical nurses because the number of nurse practitioners would be too small to enable statistical analysis of the results of the WBI Survey. In addition, the WBI Survey did not ask respondents in the United States to identify as registered nurses, nurse practitioners or licensed practical nurses, so comparison of our results with these individual nurse professional groupings would not have been possible. We will ask nurses to identify as registered nurses, nurse practitioners or registered practical nurses in the next iteration of this survey, which we plan on deploying across all 11 Programs at University Health Network, which includes the Peter Munk Cardiac Centre.</p> <p>Reviewer 2 comment 3. In the tables, please be consistent with number of decimal</p>

places, as they range throughout between 2 and 4.

The tables have been modified to ensure consistency of the numerical presentation of results.

Reviewer 2 comment 4. Demographics Table page 17. This table needs a title/heading and is difficult to read. If variable were transposed to be displayed vertically instead of horizontally it would be easier to read.

We will review the style of this (and the other) tables in this manuscript with the Editorial staff of CMAJ Open, and ensure that tables are presented in a style consistent with CMAJ Open standards.

Reviewer 2 comment 5. Table 2 is quite full/busy. Is there a way to simplify or put into more than one table?

We agree that Table 2, which now appears as Appendix 4 in the manuscript contains a significant amount of information. To simplify interpretation of this Appendix, we now include the following text in the Results section of the manuscript:

“Response to individual questions in the WBI survey. Seventy-eight percent (188/242) of nurses responded “yes” to the question “have you felt burned out from your work”, 79% (191/242) responded that they have “been bothered by emotional problems”, and 74% (179/242) responded that “work was hardening them emotionally”. Thirty-six percent of nurses (87/242) agreed or strongly agreed with the statement “work schedule leaves enough time for personal life”, and 71% (172/242) agreed or strongly agreed that the work they do is meaningful to them (score of 6 or 7 on the 7-point Likert scale). Responses to the remaining WBI survey questions appear in Appendix 4.”

Reviewer 2 comment 6. Table 3 includes associations of each IV (demographic group) to the WBI score, so may be named more fittingly, perhaps “Comparison of WBI scores among demographic groups.” Please add footnotes to describe which statistical tests were used for each variable.

The title for Table 3 has been changed to state: “Multivariable model for factors associated with a WBI score for nurses ≥ 2 . Comparison of WBI scores among demographic groups.” Statistical tests used are described in the Methods section of the manuscript.

Reviewer 2 comment 7. Table 4 is about predicting the likelihood of burnout or high WBI scores, so a suggested title would be: “Factors affecting the likelihood of burnout” In line 10 please add the heading “Age”; similarly, indicate “Working at UHN” before 0-5 years at UHN.

Table 4 is now titled “Multivariable model for factors associated with a WBI score for nurses ≥ 2 . Comparison of WBI scores among demographic groups.” Please note that the WBI Survey measures multiple elements of distress, one of which is burnout (the others being fatigue, depression, anxiety/stress, mental/physical quality of life, work-life integration and meaning in work).

We modified the variable “0-5 years working at UHN (vs. 6+)” as suggested. We are unsure what the comment “ In line 10 please add the heading “Age” “refers to.

Reviewer 2 comment 8. Table 5 is titled “Comparison of WBI scores between nurses in practice at the PMCC and at Academic Health Science Centres in the United States,” therefore, we were expecting this to be an extension of Table 3 which listed the high WBI scores (≥ 2) for each PMCC and US nurses’ scores. It would also be helpful to clarify types of nurses/years of education/advanced nursing practice qualifications between the groups. However, Table 5 seems to compare the number of nurses in each sample. We do not see the WBI scores. Looking at the gender group, the numbers don’t appear to match the “Yes = high WBI score” column in Table 3.

On further examination, we see the WBI scores at the bottom of Table 5. Could Table 5 be divided into 2 tables, one for comparison of nurses in each sample, and another for comparing WBI scores between PMCC and US groups. Please add footnotes to describe which statistical tests were used for each variable.

Table 2 “Predictors of high nurse WBI scores” (which was Table 3 in the previous version of the manuscript) and Table 5 “Comparison of WBI scores between nurses in practice at the PMCC and at Academic Health Science Centres in the United States” both report that 189 /242 nurses in the Peter Munk Cardiac Centre endorsed WBI Survey scores ≥ 2 .

CWS, the company that hosts the WBI Survey, did not identify nurses that responded to the WBI survey as registered nurses, nurse practitioners or licensed practical nurses. In addition, CWS did not provide us with information related to the number of years of education of nurses, or the advanced nursing practice qualifications among the cohort of nurses that responded to the WBI Survey in the United States.

The description of the statistical tests used appears in the Methods section of the manuscript, and is reproduced below:

“We carried out standard univariate statistical comparisons using Chi-square tests when expected counts were ≥ 5 , Fisher’s exact Fisher’s exact tests when expected counts were < 5 , or Kruskal-Wallis tests as appropriate to perform univariate comparisons in this sample of nurses in the PMCC.”

Reviewer 2 comment 9. Figure 1, page 10. It would be helpful to report on the distribution of not only the WBI for PMCC nurses, but also how the scores compare to their US nurses. It could be reported as a side-by-side bar chart.

The comparison of responses to the WBI Survey endorsed by nurses in practice at the Peter Munk Cardiac Centre and at Academic Health Science Centres in the United States is presented in Table 5 of the manuscript.

The distribution of WBI survey scores endorsed by 637 nurses in practice in the United States is presented in Figure 1 of reference 13 in the manuscript (Dyrbye LN, Johnson PO, Johnson LM, Satele DV, Shanafelt TD. Efficacy of the Well-Being Index to Identify Distress and Well-Being in U.S. Nurses. Nurs Res. 2018;67(6):447-55), and is reproduced below.

Reviewer 2 comment 10. Figure 2, page 11. Similar to figure 1, could report the WBI for US nurses, in a side-by-side bar.

CWS, the company that hosts the WBI Survey, did not provide us with information related to the number of times nurses in the cohort from the United States that accessed online resources that help manage each element of distress, so it is not possible report comparison of this data with

the cohort of nurses from the Peter Munk Cardiac Centre that responded to this survey.

Reviewer 2 comment 11. How will this research improve patient outcomes? More of a discussion regarding effects on patient outcomes is essential, however this would need to be in the context of varying types of nursing practice and care provided by advanced practice nurses, RN's NP's, and/or LPN's.

At the time of the initial survey, PMCC primarily employed Registered Nurses (RNs) and Advanced Practice Nurses (APNs). APNs included both Nurse Practitioners and Clinical Nurse Specialists. PMCC has recently recruited higher numbers of Registered Practice Nurses (RPNs).

In the next phase of this research, we plan on conducting focus groups with RNs, RPNs and APNs to explore the impact of the various dimensions of distress, including burnout, on patient outcomes and patient experiences, with particular focus on perceptions of fairness and the adequacy of staffing levels. Possible areas to explore for RNs and RPNs may include staff to patient ratios, assignments, and impact to practice such as medication administration. Possible areas to explore for Nurse Practitioners and Clinical Nurse Specialists may include discussion of the number of new referrals and caseload, as well as the status and nature of their relationships with physician peers.