Original Article

Professional Burn out among physicians and nurses in ICUs of Bangladesh: a multi-center study

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Abstract:

Background: *Burn out is a common syndrome observed among health care workers in highly stressed environment of ICU. We investigated prevalence of burn out and its associated risk factors among doctors and nurses working in ICUs of Bangladesh.*

Methods: *We conducted a cross sectional survey on 93 physicians and 247 nurses working in 12 ICUs of Bangladesh. Maslach Burn out Inventory-Human services Survey was used to measure Burn out outcome. Univariate and multivariate random effects logistic regression analysis of predictors for burnout as outcome measure among physicians and nurses were performed.*

Results: *21.3 % of all study physicians and nurses suffer moderate to high burn out. 51% of all study doctors and 87 % of all study nurses suffer from low burn out.*

For doctors working in ICU having a religious back ground, imbalance between professional working time and time for personal life, monthly salary, hours of sleep per day, years of working experience, percentage of work time spent in ICU and number of ICU patients cared for per day, no of stay-at-home night calls or night shifts per month at work appeared significantly associated with high burn out.

For nurses having a religious back ground or belief, having child more than two, higher educational qualification (bachelor degree), low monthly salary; less hours per week engaged in charity work, low level of personal control over work, imbalanced work-life, more than 26 work days per month, more frequent shifts in work, conflicts with colleagues all were associated with high burn out.

Conclusion: *Among all interventions, promoting reduction of work load and improving work-life balance need to be addressed as a priority in order to reduce burn out.*

Key words: *Burn out, Burn out Syndrome, ICU, Doctors, Nurses.*

Introduction.

Stress is a feeling of strain and pressure, whereas burnout is a multidimensional syndrome comprising emotional exhaustion, depersonalization (establishment of detached, distant, and cynical relationships with patients and colleagues) and a diminished sense of personal accomplishment[1]. People who experience all the above three symptoms have the greatest degree of burnout, although emotional exhaustion has been identified as the hallmark of burnout [1,2]

Burnout Syndrome (BOS) was identified in the early 1970s in human service professional most notably health care workers.[3] Maslach and Leiter identified six domains which can be responsible for burnout such as workload, control, reward, community, fairness, and values [4] .Chronic stress can lead to burnout, whereas burnout can also be due to other causes such as lack of job support and appreciation[5]

Clinical symptoms of BOS are nonspecific and include tiredness, headache, eating problems, insomnia, irritability, emotional instability, and rigid in relationship with other. For medical professionals, the negative implications of burnout are wide ranging and include decreased quality of patient care, anxiety, depression, divorce, increased anxiolytic use, medical illness, and increased suicidality[4,6-9] It has also been associated with depressive symptoms among healthcare staff, absenteeism, increased staff turnover, early retirement, substance abuse, decreased professionalism, medical errors and poor adherence to safety standards.[10,11]

Different studies reveal information regarding stress and burnout among the physicians and nurses of western countries and it is estimated to be around 33-70%[12-15].

However there is paucity of literature among Asian countries regarding prevalence of burn out among heath care workers in ICU settings. Most notable multinational and multicenter study involving Asian countries was done in 2015-2016 (**S**tress **A**nd **B**urn out in **A**sian ICUS otherwise called SABA study) and it included doctors and nurses of 16 countries involving 193 ICUs [16]. From south Asia Bangladesh India and Nepal participated in that study. Out of three south Asian countries, Bangladesh contributed data of 93 physicians(9.3%) and 247 nurses (8%) from 12 ICUs (7.5 %) in the Asian study in which total 992 physicians and 3100 nurses from 159 ICUs respectively of 16 countries participated. There were 177 doctors and nurses from India who participated in that study. Contribution of data from

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Nepal was insignificant.

South Asian countries have several publications based mostly on single center studies on BOS and work related stress. Study subjects in most of the studies involved doctors, nurses, medical students, post graduate students, medical technicians, minor staff etc. belonging to critical areas and non-critical areas of hospitals. Among them there are some noteworthy publications from India [17-20], Sri Lanka [21-24], Pakistan [25-29],Nepal [30,31] and Bangladesh.[32,33] However till now there has not been any publication on multicenter studies involving medical personnel working in critical care units of any of South Asian countries.

In one single center study done in 2017 from Bangladesh [33] 96.7% study subjects (N 93) comprising doctors, nurses and ward attendants, suffered from moderate to high EE (Emotional Exhaustion) and 61.3% had been suffering from moderate to high DP (Depersonalization) and 81.7% scored high on PA (Personal Achievement) subscale.

One single center Indian study [18] done in 2016 showed that out of 204 healthcare professionals the prevalence of high burnout was 80% which included 6% (n = 12) of doctors and 69% (n = 140) of nurses. This study showed statistically significant correlation between level of job satisfaction and the level of burnout.

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One single center study published in 2016 from Sri Lanka[21] on 100 medical professionals showed that proportion of the BOS was 53%. Of the study sample, 30% individuals scored positive on EE dimension, 24% scored positive on DP dimension and 24% scored positive on PA dimension.

One multicenter study published in 2017 from Pakistan[28] involving 256 general physicians reported 65% EE, 45%DP and 51% PA subscales of burnout.

One single center study done in 2018-19 from Nepal [30] involving 651 medical students and residents, showed that 48.3%, 45.3% and 31% subjects had Burn out, Anxiety and Depression respectively. The study also showed that Burn out and Depression were more present in residents than medical students (Burn out: 64.5% vs 33.7%, Depression: 37.6% vs 29.1%).

Our study is the first published multicenter study on BOS on ICU doctors and nurses from south Asia. This study was derived from the filled data sheets presented to the SABA study[16] on behalf of Bangladesh and later on all the domestic study materials were independently analyzed. It aims primarily to assess the prevalence & variations and secondarily to examine organizational and individual risk factors for burnout among Bangladeshi physicians and nurses working in ICUs with aim to develop strategies for future interventions.

Materials and Methods:

This was a cross-sectional survey on the Stress and Burnout of the physicians and nurses working in 12 ICUs of city of Dhaka in Bangladesh and was conducted from October 2015 to March 2016 using a snowball method of sampling via research coordinators of ICUs. The coordinators of ICUs were invited by national coordinator from Bangladesh who happens to be the principal author of this study. The ICU coordinators provided basic information about their ICUs, and invited their staff to participate. The research protocol (outlined in SABA study) was approved by the relevant institutional review boards or chief administrators of hospital as available.

All survey questions (paper based) were set as compulsory fields to ensure survey completion, and only completed surveys were analyzed. The survey was voluntary and consent was implied if participants responded to our request to participate. Participants self-completed an anonymized survey.

We defined intensive care units (ICUs) as units capable of providing invasive mechanical ventilation. All intensive care physicians and nurses who have worked in an ICU within six months of the survey date (i.e. physicians or nurses who are currently or recently practicing in an ICU) were eligible for our study. An intensive care physician or nurse was defined as one who fulfilled at least one of the following criteria: (a) passed intensive care certification examinations; (b) completed training in an accredited intensive care fellowship; c) treated patients with multi organ failure and was recognized by his/her institution as an intensivist or intensive care nurse[34]. We excluded predominantly pediatric and neonatal ICUs.

For the participant survey, we employed the following psychometric instruments: Maslach Burnout Inventory-Human Services Survey (MBI HSS) (22-questions) [35-36]; Cohen Perceived Stress Scale (10-question version) [37-39]; Patient Health Questionnaire for depression screening (2-question version) [40]. The Maslach Burnout Inventory (MBI) is the reference standard for determining burnout, and has three subscales that describe emotional exhaustion (EE), depersonalization (DP) and personal accomplishment. (PA)[1].

According to MBI HSS, BOS is classified as follows. On EE subscale low, moderate and high burnout are indicated by <18, 19-26, ≥27 scores respectively. On PA subscale low, moderate and high burnout are indicated by ≥40, 34-39, ≤33 scores respectively. On DP subscale low, moderate and high burnout are indicated by ≤5, 6-9, ≥ 10 scores respectively.

Overall burnout in our study was defined according to the emotional exhaustion and depersonalization subscales, in line with a prior large-scale Italian study[37]. High stress was determined by dichotomizing the score range of the Cohen Perceived Stress Scale[41]. Possible depression used a cut-off score of 3 or more on the Patient Health Questionnaire, which had a sensitivity of 83% and a specificity of 92% for major depression[40].

In addition, for the participant survey, several questions directed at uncovering risk factors for burnout were asked. Potential demographic risk factors included gender, age, religious background or beliefs, marital status, number of children, number of young children under 12 years old, educational qualification, and income. Potential lifestyle factors included smoking status, sleep duration, exercise duration, teaching duration, and charity work duration, research work duration, being a member of an ICU research group, control over work, and control over life outside of work, vacation days, and perception of work-life balance. Satisfaction with work-life balance was assessed on a Likert scale, using the item "my work schedule leaves me enough time for my personal/family life"[36]. Potential work-related factors included primary specialty, years since graduation from medical or nursing school, intensive care working experience, duration of work in current institution, duration of work in current department, work days per month, work hours per day, percentage of work time spent in ICU, average length of each ICU rotation, performance of shift work, frequency of stay-in night calls, frequency of stay-home night calls, number of ICU patients cared for per day, and conflicts with colleagues. Personal control over work and life outside work life were tested on a Likert scale using the survey questions "How much do you agree with personal control during work?" and "personal control over life outside work hour".

Parallel analyses were performed for ICU physicians and nurses. The sample size calculation used a dichotomous burnout outcome as the primary outcome of concern. Assuming a burnout proportion of 31% [41], 10 risk factors which would be significant on univariate analysis, and 10 participants with burnout for every significant risk factor, the study required 323 physicians and 323 nurses to avoid over-fitting the logistic regression model. As per availability of sample we have collected 340 samples among them 93 Physicians and 247 Nurses

Data were analyzed for Mean, Interquartile range, Percentage, Standard deviation, Chi square test, multiple correlation and multivariate analysis, by using SPSS-20 version for Windows. The Fisher exact test was applied to study quantitative and qualitative data, respectively. Univariate and multivariate logistic regression analyses were performed as mixed effects analyses using high burnout as the outcome variables. Univariate analysis was done to detect the significant factors and followed this with a multivariate analysis featuring the statistically significant variables from the univariate analysis. Statistical significance was taken as $P < 0.05$.

Results

The total 12 ICUs of city of Dhaka (capital of Bangladesh) were included in the study and all of them agreed to contribute participant data. Of 131 physicians approached, 93 (80%) completed the survey and of 366 nurses approached, 247 (67.5%) completed the survey.

Among the participants, significant differences existed between physicians and nurses in terms of demographics, lifestyle factors and work related factors.

Table 1 shows socio demographic characteristics of the study subjects.

Characteristics	All (N = 340)	Physicians (N = 93)	Nurses (N = 247)	P-value
Gender				<0.001
Female (%)	229 (67.4)	20 (21.5)	209 (84.6)	
Male (%)	111 (32.6)	73 (78.5)	38 (15.9)	
Age in years[1], median (IQR)	27 (25-32)	32 (28-37)	26 (24-30)	0.123
Religious background or beliefs				<0.001
No specific religious belief (%)	1 (.3)	1 (1.1)	00	
Buddhist (%)	5 (1.5)	2 (2.2)	3 (1.2)	
Catholic	7(2.1)	00	7(2.8)	

Christian (non-Catholic)	16(4.7)	00	16(6.5)	
Hindu (%)	57 (16.8)	12 (12.9)	45(18.2)	
Muslim (%)	251 (73.8)	77 (82.8)	174 (70.4)	
Others (%)	2 (0.6)	1 (1.1)	1 (0.4)	
Marital status				<0.001
Single (%)	127 (37.4)	26 (28.0)	101 (40.9)	
Married (%)	209 (61.5)	66 (71.0)	143 (57.9)	
Separated or widowed (%)	3 (.9)	1 (1.0)	2 (.8)	
Number of children, median (IQR)	0 (0-1)	1 (0-2)	0 (0-1)	<0.001
Number of children under 12 years old, median (IQR)	0 (0-1)	1 (0-1)	0 (0-0)	0.563
Highest educational qualification				0.003
Non-degree/diploma qualification (%)	160 (47.1)	1 (1.1)	159 (64.4)	
Bachelor's degree (%)	159 (46.8)	78 (83.9)	81 (32.8)	
Advanced degree (%)	21 (6.2)	14 (15.1)	7 (2.8)	
Monthly salary in USD[2], median (IQR)	1500 (500-3,000)	1100 (500-1700)	700 (200-900)	<0.001

IQR: Interquartile range
SD: Standard deviation
USD: United States Dollar
[1]Age is taken as median value
[2]Monthly salary is taken as median value

Table 2 shows lifestyle characteristics of the study subjects

Characteristics	All (N = 240)	Physicians (N = 93)	Nurses (N = 247)	P-value
Smoking status				0.413
Smoker (%)	12 (3.5)	10 (10.8)	2 (.8)	
Ex-smoker (%)	24 (7.1)	15 (16.1)	9 (3.6)	
Never smoker (%)	303 (89.1)	68 (73.1)	235 (95.1)	
Hours of sleep per day, mean (SD)	6.96±1.31	6.52±1.10	7.13±1.35	<0.001
Hours per week engaged in exercise1, median (IQR)	2 (0-7)	2 (0-4)	2 (0-4)	<0.0013
Hours per week engaged in teaching, median (IQR)	2 (0-2)	3 (1-6)	1 (0-4)	<0.001
Hours per week engaged in charity work, median (IQR)	0 (0-3)	0 (0-1)	0 (0-1)	0.496
Hours per week engaged in research, median (IQR)	2 (0-2)	0 (0-1)	0 (0-0)	<0.001
Member of an ICU research group				<0.001
Yes (%)	31 (9.1)	15 (16.1)	16 (6.5)	
No (%)	307 (90.3)	78 (83.9)	229 (92.7)	
Personal control over work (Likert scale 0-10), mean (SD)[2]	8.19±2.82	8.53±2.19	8.07±3.02	0.251
Personal control over life outside of work (Likert scale 0-10), mean (SD)[2]	8.21±3.11	8.30±2.44	8.17±3.33	0.327
Vacation times taken per year[3], median (IQR)	2 (2-3)	2 (1-3)	2 (2-3)	<0.001
Work-life balance (Likert scale 0-4), mean (SD)[4]	2.51±.99	3.10±1.1	2.29± .84	0.331

IQR: Interquartile range

SD: Standard deviation

[1]Difference is due to fewer nurses than doctors (19.6% vs. 22.6%) having >4 hours of exercise per week.

[2] Likert scale 0-10 (1=Terrible, 2=Very bad, 3=Bad, 4=Quite bad, 5=Mediocre, 6=Okay, 7=Good, 8=Very Good, 9=Excellent, 10=Perfect; (https://images.app.goo.gl/RUwFTgGhqxZMcqA77)

[3]Vacation times taken per year means no of times taken vacation in a year. Like taken Vacation once in a year or twice a year etc.

[4]Agreement with this statement: "My work schedule leaves me enough time for my personal/family life" (Likert scale 0-4, 0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, 4 = strongly agree).

Table 3 shows work-related factors among all and in between groups

Characteristics	All (N = 340)	Physicians (N = 93)	Nurses (N = 247)	P-value
Primary specialty				<0.001 [1]
Anesthesiology	12(3.5)	12(12.9)	0	
Cardiology	38(11.2)	9(9.7)	29(11.7)	
Emergency medicine	14(4.1)	1(1.1)	13(5.3)	
Intensive care medicine (critical care medicine)	195(57.4)	32(34.4)	163(66.0)	
Internal medicine	32(9.4)	32(34.4)	0	
Neurology	1(.3)	1(1.1)	0	
Neurosurgeon	1(.3)	1(1.1)	0	
Other	47(13.8)	5(5.4)	42(17.0)	
Number of years since graduation from medical or nursing school[2], median (IQR)	3 (2-8)	7 (3-12)	3 (3-7)	0.341
Intensive care working experience (months), median (IQR)	48 (24-72)	48 (15-84)	48 (24-73)	<0.001
Duration of work in current institution (months), median (IQR)	35 (12-60)	36 (12-60)	5 (2-10)	0.564
Duration of work in current department (years), median (IQR)	24 (12-60)	36 (12-60)	27 (27-70)	0.199
Work days per month, average (SD)	22.15±6.10	17.76±7.51	23.80±4.48	<0.001
Work hours per day, average (SD)	10.24±4.53	11.60±6.12	9.73±3.64	0.002
Percentage of work time spent in ICU (%), median (IQR)	100 (60-100)	75 (50-100)	87.5 (50-100)	<0.001
Average length of each ICU rotation (weeks)[3], median (IQR)	3 (1-6)	2 (1-6)	3 (0.5-5)	0.0321
Shift work				<0.001
Yes (%)	296 (87.1)	69 (74.2)	227 (91.9)	
No (%)	43 (12.6)	24 (25.8)	19 (7.7)	
Stay-in night calls per month, median (IQR)	8 (7-8)	8 (5-8.5)	8 (4-9)	<0.001
Stay-home night calls per month, median (IQR)	0 (0-3)	2 (2-8)	0 (0-2)	0.004
Number of ICU patients cared for per day, median (IQR)	2 (2-5)	6 (6-10)	2 (2-3)	<0.001
Conflicts with colleagues in past one month				0.003
Yes (%)	45 (13.2)	7 (7.5)	38 (15.4)	
No (%)	293 (86.2)	86 (92.5)	207 (84.5)	

IQR: Interquartile range; SD: Standard deviation

[1]Fisher exact test done for the following 4 specialty groups: (1) Anesthesiology/intensive care medicine; (2) Internal medicine and related specialty; (3) Surgery and related specialty; (4) Miscellaneous.

[2]Number of years since graduation taken as 0 for <1, 43 for >40, and the middle number of the other ranges.

[3]Average length of each ICU rotation taken as 0.5 if <1 week and 5 if >4 weeks.

Table 4 shows Sheldon Cohen Perceived Stress Scale (PSS) among the study subjects

Perceived Stress Scale	All (N = 340)	Physicians (N = 93)	Nurses (N = 247)	P-value
Low stress [a]	268(78.82)	67(19.7)	201(59.11)	<0.001
Moderate stress [b]	51(15)	17(5)	34(10)	.004
High perceived stress [c]	21(6.18)	9(2.64)	12(3.52)	.003

Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress. (% of total doctors plus nurses expressed within bracket).

a. Scores ranging from 0-13 would be considered low stress.

b. Scores ranging from 14-26 would be considered moderate stress.

c. Scores ranging from 27-40 would be considered high perceived stress.

Table 5 shows burnout Self-Test - Maslach Burnout Inventory (MBI) among physicians and nurses

Section	Physicians (N = 93)	Nurses (N = 247)	All (N = 340)
Emotional exhaustion (or depressive anxiety syndrome) (EE)			
Low Level Burnout	72 (77.41%)	201(81.37%)	273(80.29%)
Moderate Level Burnout	12(12.90%)	42(17.00%)	54(15.88%)
High Level Burnout	9(9.67%)	4(1.61%)	13(3.82%)
Depersonalization" (or loss of empathy) (DP)			
Low Level Burnout	68(73.11%)	222(89.87%)	290(85.29%)
Moderate Level Burnout	24(25.80%)	23(9.31%)	47(13.82%)
High Level Burnout	1(1.07%)	2(0.80%)	3(0.88%)
The reduction of personal achievement(PA)			
Low Level Burnout	3(3.22%)	224(90.68%)	227(66.76%)
Moderate Level Burnout	13(13.97%)	20(8.09%)	33(9.70%)
High Level Burnout	77(82.79%)	3(1.21%)	80(23.52)

Table 6 shows mean and standard deviation (SD) of level of burnout of Doctors and Nurses.

Burnout	Doctors (Mean ± SD)	Nurse (Mean ± SD)	P Value
Emotional exhaustion	10.54±7.26	27.99±15.61	.0001
Depersonalization	7.54±5.38	20.02±11.56	.002
Personal achievement	45.25±6.26	120.18±13.46	.0001

Table 7 shows analysis of predictors for burnout among physicians (N = 93)

Characteristics	Univariate [c]OR	(95% CI)	U *P* value	Multivariate	(95% CI) [c]OR	M *P* value
Gender						
Male	Reference					
Female	0.71	(0.51–1.01)	0.101	0.78	(0.59–1.01)	0.193
Age in years[a]	0.99	(0.91–1.03)	0.697			
Having a religious background or belief	0.63	(0.44–0.85)	0.007*	0.69	(0.43–0.89)	0.025*
Marital status						
Single, Separated or Divorced or Widowed	Reference					
With partner or married	1.05	(0.69–1.31)	0.782			
Number of children	0.57	(0.44–0.97)	0.113	0.99	(0.84–1.17)	0.831
Highest educational qualification						
Non-degree qualification	Reference					
Bachelor's degree	0.91	(0.47–1.70)	0.817			
Advanced degree	1.13	(0.61–2.17)	0.566			
Monthly salary in thousands of USD[b]	0.57	(0.41–0.89)	0.003*	0.61	(0.45–0.91)	0.002*
Smoking status						
Smoker	Reference					
Ex-smoker	1.39	(0.79–2.45)	0.259			
Never smoker	1.23	(0.75–1.99)	0.411			
Hours of sleep per day	0.66	(0.48–0.90)	0.009*	0.71	(0.51–0.89)	0.003*
Hours per week engaged in exercise	1.03	(1.01–1.05)	0.210			
Hours per week engaged in teaching	1.02	(0.98–1.06)	0.814			
Hours per week engaged in charity work	1.01	(0.99–1.03)	0.553			
Personal control over work	0.95	(0.89–1.01)	0.227			
Personal control over life outside of work	1.01	(0.93–1.06)	0.851			
Work-life balanced[c]	0.91	(0.80–1.05)	0.001*	0.92	(0.81–1.03)	0.021*
Primary specialty						
Non-intensive care medicine	Reference					
Intensive care medicine	1.08	(0.81–1.46)	0.517			
Number of years since graduation from medical school[d]	1.00	(0.98–1.02)	0.233			
Years of intensive care working experience	0.61	(0.59–0.63)	0.047*	0.63	(0.61–0.65)	0.041*
Percentage of work time spent in ICU	0.66	(0.61–0.71)	0.029*	0.65	(0.60–0.70)	0.021*
Average of each ICU rotation						
0–2 weeks	Reference	0.892				
> 2 weeks	1.03	(0.81–1.09)				
Shift work						
No	Reference					
Yes	1.04	(0.81–1.41)	0.633			
Stay-in night calls per month	1.00	(0.99–1.01)	0.444			
Stay-home night calls per month	0.95	(0.91-1.00)	0.002*			
Number of ICU patients cared for per day	0.97	(0.95-1.00)	0.039	0.97	(0.94–1.01)	0.031*
Conflicts with colleagues in past one month						
No	Reference					
Yes	1.09	(0.74–1.53)	0.525			

(Explanation for Table 7 & 8)

CI Confidence interval,

OR Odds Ratio,

USD United States Dollar (BDT has been converted by current currency conversion rate 1US$=84.40 BDT)

* Statistically significant

[a] Age is taken as 26 years for the age range < 30 years, 33 years for the age range > 30 years, and the middle number for the other age ranges

[b] Monthly salary is taken as USD 11,000 if > USD10,000, and the middle number for the other salary ranges

[c] Agreement with this statement: "My work schedule leaves me enough time for my personal/family life" (Likert scale: 1=Terrible, 2=Very bad, 3=Bad, 4=Quite bad, 5=Mediocre, 6=Okay, 7=Good, 8=Very Good, 9=Excellent, 10=Perfect; https://images.app.goo.gl/RUwFTgGhqxZMcqA77)

[d] Number of years since graduation taken as 1 for < 3, 7 for > 5, and the middle number of the other ranges

[e] Mixed effects logistic regression with high burnout as the outcome variable

Table 8 shows analysis of predictors for burnout among nurses (N = 247).

Characteristics	Univariate [e] OR	(95% CI)	U P value	Multivariat [e] OR	(95% CI)	M P value
Gender						
Male	Reference					
Female	1.09	(0.83–1.37)	0.564			
Age in years [a]	1.00	(0.99–1.01)	0.487			
Having a religious background or belief	0.71	(0.58–0.88)	0.004*	0.76	(0.62–0.93)	0.021*
Marital status						
Single, Separated or Divorced or Widowed	Reference					
With partner or married	0.96	(0.82–1.11)–	0.567			
Number of children	0.66	(0.54–1.00)	0.004*	0.63	(0.51–0.97)	0.001*
Highest educational qualification						
Non-degree qualification	Reference					
Bachelor's degree	1.18	(1.01–1.49)	0.005*	1.29	(1.02–1.55)	0.003*
Advanced degree	1.09	(0.77–1.68)	0.069			
Monthly salary in thousands of USD[b]	0.51	(0.39–0.81)	0.003*	0.58	(0.41–0.84)	0.002*
Hours of sleep per day	1.00	(0.95–1.06)	0.891			
Hours per week engaged in exercise	1.01	(0.98–1.03)	0.310			
Hours per week engaged in charity work	1.00	(0.99–1.01)	0.002*	1.01	(1.00–1.02)	<0.001*
Personal control over work (Likert scale 0–10)	0.85	(0.78–0.91)	<0.001*	0.86	(0.80–0.94)	0.001*
Personal control over life outside of work (Likert scale 0–10)	0.97	(0.93–0.99)	0.322			
Work-life balanced[c]	0.91	(0.88–1.02)	0.031*	0.94	(0.91–0.97)	0.255
Primary specialty						
Non-intensive care medicine	Reference					
Intensive care medicine	1.01	(0.82–1.19)	0.522			
Number of years since graduation from medical school[d]	1.02	(0.01–1.03)	0.912			
Years of intensive care working experience	1.00	(0.99–1.01)	0.588			

Work days per month	0.71	(0.67–0.75)	0.074	0.67	(0.63–0.71)	0.025*
Work hours per day	0.99	(0.98–1.01)	0.46			
Percentage of work time spent in ICU	1.03	(1.00–1.05)	0.53			
Average of each ICU rotation						
0–2 weeks	Reference					
> 2 weeks	0.99	(0.81–1.10)	.877			
Shift work						
No	Reference					
Yes	1.04	(0.81–1.31)	0.023*	1.05	(0.79–1.29)	0.003*
Stay-in night calls per month	1.01	(0.99–1.02)	0.46			
Stay-home night calls per month	0.99	(0.98-1.01)	0.51			
Number of ICU patients cared for per day	1.03	(1.02–1.04)	0.46			
Conflicts with colleagues in past one month						
No	Reference					
Yes	0.56	(0.41–1.01)	0.032*	0.51	(0.39–0.94)	0.002*

Thematic analysis of the free text comments converged on six common themes, with high work demand and low salary being the predominant themes. Several comments revealed suggestions for both individual-level and organization-level interventions.

Discussion

In Table 1 it is shown that in case of nurses, females significantly out number males whereas opposite is true for doctors (p <.001) when males out number females. There is no statistical difference in age between doctors and nurses. Majority of doctors and nurses are Muslims (80.8% and 70.4% respectively) (p <001). Majority of doctors and nurses are married (71.0% and 57.9% respectively (p<.001). In the same way number of children in median (IQR) is statistically significant (p=0.001). In contrast number of children under 12 years old in median (IQR) showed there is no significant difference (p=0.563) in between the doctor and nurse group working in ICU. Majority of doctors hold bachelor's degree (83.9 %)) and majority of nurses hold diploma qualification (64.4%) (p0.003). Monthly salary in USD median (IQR) also significantly higher among the doctors (p<0.001).

Table 2 revealed that there is no significant difference among the groups denying smoking habit. 73.1% among doctors and 95.1% among nurses never smoked. The mean (SD) value of hours of sleep per day among doctors and nurses were 6.52±1.10 vs. 7.13±1.35 (p<0.001). In the issue of hours per week engaged in exercise, nurses spend more time than doctors. Difference is due to fewer nurses than doctors (19.6% vs. 22.6%) having >4 hours of exercise per week. (p<.001). Hours per week engaged in teaching and hours per week engaged in research were significantly more among doctors than those of nurses (<0.001). 83.9% doctors and 92.7% nurses do not belong to any research group (p <.001). No significant difference were found in between the groups when compared in terms of personal control over work, work-life balance and personal control over life outside of work. Vacation times taken per year was prominently high among nurses than doctors (p<0.001).

Table 3 showed that the primary specialty in Intensive care medicine (critical care medicine) are more common among nurses (66% vs 34.4%for doctors) followed by Cardiology and Emergency medicine (11.7% and 5.3% respectively). There is no statistical significant difference among the groups in regards of number of years since graduation from medical or nursing school, duration of work in current institution (months) and duration of work in current department (years). Intensive care work experience is equally distributed among doctors and nurses (p <.001). Nurses spend more work days per month than doctors (p<.001). Doctors spend more work hours per day than nurses (p 0.002). Nurses spend more time in weeks than doctors during rotation (p 0.0321) and they spend more time in ICU than doctors (87.5% as opposed to 75%) (p <.001). 74.2 % doctors and 91.9 % nurses do shift duties (p <.001). Doctors do more stay in night calls per month (p <.001) than nurses and do more stay home night calls per month than nurses (p 0.004). Nurses take care of less number of patients per day (2 vs 6 patients) than doctors (p <.001). Only 7.5% doctors and 15.4% nurses have conflicts with colleagues in last one month prior to the study (p 0.003).

Table 4 shows that among high, moderate and low categories of perceived stress scale, nurses significantly out number doctors in all categories (p value 0.003, 0.004, < 0.001 respectively)

Table 5 shows that on EE and DP subscales of burn out there are low level burn out on majority of doctors and nurses. However on PA subscale there is high level burn out on majority of doctors but low level burn out on majority of nurses.

Table 6 indicates that average study doctors show lower burn out score in EE subscale compared to average nurse who shows low to moderate burn out (p- 0.0001). Whereas average

nurse shows moderate burn out score in DP subscale compared to doctors who scores low burn out (p- 0.002). In terms of PA subscale average doctor scores moderate burn out compared to nurses who score low burn out (p- 0.0001).

In Table 7 multivariate random effects logistic regression analysis of predictors for burnout as a outcome measure among physicians showed having a religious background or belief was significantly associated with high burn out tested both in Univariate analysis {OR=0.63; CI= (0.44–0.85) and p=0.007} and multivariate analysis {OR=0.69; CI= (0.43–0.89) and p=0.025}. In the same way monthly salary; hours of sleep per day; balance in professional working time and time for personal life; years of working experience in intensive care; percentage of work time spent in ICU and number of ICU patients cared for per day appeared significantly associated with high burn out. No of stay-at-home night calls (or night shifts having per month in the ICU) was the only factor which was found to be significantly associated when tested in univariate analysis but not in multivariate.

Multivariate random effects logistic regression analysis of predictors for burnout as a outcome measure among nurses (Table 8) showed having a religious background or belief was significantly associated with high burn out tested both in Univariate analysis {OR=0.71; CI= (0.58–0.88) and p=0.004} and multivariate analysis {OR=0.76; CI= (0.62–0.93) and p=0.021}. In the same way having child more than two, higher educational qualification (bachelor degree) but low monthly salary; less hours per week engaged in charity work, low level of personal control over work, work-life imbalanced, more than 26 work days per month, more likely frequent shift in work, conflicts with colleagues in past one month remained significant factors and showed a relationship with high burn out. Work days per month was the only factor which was found to be significantly associated when tested in multivariate but not in univariate analysis.

Our study have certain agreements and disagreements with the concluding remarks of Asian (SABA) study[16] (in which Bangladesh contributed its data) regarding risk factors and predictors of burn out. According to the Asian study, among physicians, religiosity, years of working in the current department, shift work and stay-home night calls were associated with decreased burnout, while work days per month was associated with increased burnout. Same study claims that among nurses, religiosity and better work-life balance were associated with decreased burnout, while having a bachelor's degree (versus a vocational certification) was associated with increased burnout. Multivariate random effects logistic regression analysis of predictors for burnout among physicians in the Asian study showed a protective effect (negative association) of religiosity (i.e. having a religious background or belief), years of working in the current department, shift work (versus no shift work) and number of stay-home night calls, and a harmful effect (positive association) of work days per month. The same analysis among nurses showed a protective effect of religiosity and better work-life balance, and a harmful effect of having a bachelor's degree (compared to having a non-degree qualification).

Few multicenter studies from developed countries are worth mentioning for comparison with our study. In one multicenter study from several critical care units of two hospitals from USA[42], nurses considered religion to have no importance in the process of burn out. In our study strong religious belief or back ground was significantly associated with high burn out. In a multicenter study on five ICUs from Austria[43] shows that age, gender, years of employment had no relationship with prevalence of full development of burn out or burn out risk among care givers. In our study gender and years of employment were associated with risk of high burn out. In another multicenter study on nurses of ICUs of three teaching hospitals in Turkey[44] showed that undergraduate education, working in shifts and worked <4 years are associated factors for high burnout. Whereas in our study undergraduate education, working in shifts are associated factors for high burnout but worked <4 years is not associated.

Conclusion

In conclusion this study identified important components of burn out among ICU doctors and nurses of Bangladesh by using MBI HSS. Our study showed that 28% physicians and approx. 19% nurses experience moderate to severe stress at work. 21.3 % of all study physicians and nurses suffer moderate to high burn out. 51% of all study doctors and 87 % of all study nurses suffer from low burn out. Majority of doctors and nurses experience low level of EE and DP subscale burn out. Compared to nurses doctors experience high level of PA subscale burnout. ICU Nurses experience more stress than the doctors.

Our study also shows that in Bangladesh in case of doctors working in ICUs males out number females and in case of nurses females outnumber males. Doctors make more salary than nurses. Nurses sleep longer hours than doctors during an average day. Doctors spend more time in teaching and research than nurses. Nurses takes vacation more often than doctors. Doctors spend more hours per day while on duty than nurses. Nurses do more shift duties than doctors. Doctors do more stay home night calls and more stay on night calls than nurses. Nurses take less number of patients than doctors in the ICUs.

For doctors working in ICU having a religious back ground, imbalance between professional working time and time for personal life, monthly salary, hours of sleep per day, years of working experience, percentage of work time spent in ICU and number of ICU patients cared for per day, no of stay-at-home night calls (or night shifts per month) at work appeared significantly associated with high burn out.

For nurses having a religious back ground or belief, having child more than two, higher educational qualification (bachelor degree), low monthly salary; less hours per week engaged in charity work, low level of personal control over work, imbalanced work-life, more than 26 work days per month, more frequent shifts in work, conflicts with colleagues all were associated with high burn out.

Bangladesh, a south Asian country differ from many participating countries of Asian study in terms of individual income, religious belief, cultural expectation, values, organizational structure, life style etc. These features could explain the uniqueness of our findings on risk factors and predictors of burn out compared to those of Asian countries combined [16].

It appears from our study that for physicians and nurses working in Bangladeshi ICUs, work demand and work-life imbalance are the predominant risk factors for burn out. As such among significant individual and organizational interventions, it is of paramount importance that promoting reduction of work load and improving work-life balance need to be addressed as a priority in order to reduce burn out among care givers of our ICUs.

Limitations

Our study have certain limitations. Firstly we used a snow ball method to approach ICU coordinators of only 12 hospitals (about one fourth of number of ICUs of Dhaka city). And peripheral hospitals of Bangladesh were not approached and as such our study does not represent the whole country. Secondly we could not involve ICUs of large Government run hospitals where there are certain distinctive differences in job description compared to privately run hospitals and semi govt. hospital. Thirdly data on all participating consultant physicians and junior doctors were analyzed together and not as two separate groups. Analyzing their data under two separate headings could have produced different findings.

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References

1. Maslach C, Schaufeli WB, Leiter MP. Job burnout. Annu Rev Psychol. 2001; 52:397–422. [PubMed: 11148311]
2. Maslach C, Jackson S, Leiter M. Maslach Burnout Inventory Manual. 2nd ed. Palo Alto: Consulting Psychologists Press 1986.
3. Goldberg R, Boss RW, Chan L, Goldberg J, Mallon WK, Moradzadeh D, et al. Burnout and its correlates in emergency physicians: four years' experience with a wellness booth. Acad Emerg Med 1996; 3:1156-64.
4. Maslach C and Leiter MP. "Understanding the burnout experience: recent research and its implications for psychiatry". World Psychiatry 15.2 (2016): 103-111.
5. Bakker AB, Le Blanc PM, Schaufeli WB. Burnout contagion among intensive care nurses. J Adv Nurs. 2005; 51:276–87. [PubMed: 16033595]\
6. Parr JM., *et al*. "Medical Graduates, Tertiary Hospitals, and Burnout: A Longitudinal Cohort Study". Ochsner Journal 16.1 (2016): 22-26.
7. Ishak WW., *et al*. "Burnout during residency training: a literature review". Journal of Graduate Medical Education 1.2 (2009): 236-242.
8. Jalili M., *et al*. "Burnout and associated factors among iranian emergency medicine practitioners". Iranian Journal of Public Health 42.9 (2013): 1034-1042.
9. Doolittle BR., *et al*. "Burnout, Coping, and Spirituality among Internal Medicine Resident Physicians". Journal of Graduate Medical Education 5.2 (2013): 257-261.
10. Dyrbye LN, Massie FS Jr, Eacker A, Harper W, Power D, Durning SJ, Thomas MR, Moutier C, Satele D, Sloan J, Shanafelt TD (2010) Relationship between burnout and professional conduct and attitudes among US medical students. JAMA 304:1173–1180
11. Moss M, Good VS, Gozal D, Kleinpell R, Sessler CN (2016) an official critical care societies' collaborative statement-burnout syndrome in critical care health-care professionals: a call for action. Chest 150:17–26
12. Embriaco N, Azoulay E, Barrau K, Kentish N, Pochard F, Loundou A, et al. High level of burnout in intensivists: Prevalence and associated factors. Am J Respir Crit Care Med 2007; 175:686-92?
13. Poncet MC, Toullic P, Papazian L, Kentish-Barnes N, Timsit JF, Pochard F, Chevret S, Schlemmer B, Azoulay E (2007) Burnout syndrome in critical care nursing staff. Am J Respir Crit Care Med 175:698–704
14. Merlani P, Verdon M, Businger A, Domenighetti G, Pargger H, Ricou B (2011) Burnout in ICU caregivers: a multicenter study of factors associated to centers. Am J Respir Crit Care Med 184:1140–1146
15. Guntupalli KK, Fromm RE Jr (1996) Burnout in the internist-intensivist. Intensive Care Med 22:625–630
16. See KC, Zhao MY, Nakataki E, Chittawatanarat K, Fang WF, Faruq MO, Wahjuprajitno B, Arabi YM, Wong WT, Divatia JV, Palo JE, Shrestha BR, Nafees KMK, Binh NG, Al Rahma HN, Detleuxay K, Ong V, Phua J; SABA Study Investigators and the Asian Critical Care Clinical Trials Group . Professional burnout among physicians and nurses in Asian intensive care units: a multinational survey Intensive Care Med. 2018 Dec;44(12):2079-2090. doi: 10.1007/s00134-018-5432-1. Epub 2018 Nov 16
17. Divatia JV. "Burn out in ICU: Playing with fire?" Indian J Crit CareMed 2014 Mar. 18(3)127-8.
18. Saravanabavan L, Sivakumar MN, and Hisham M. Stress and Burnout among Intensive Care Unit Healthcare Professionals in an Indian Tertiary Care Hospital. Indian J Crit Care Med. 2019 Oct; 23(10): 462–466
19. Grover S, Sahoo S, Bhalla A, Avasthi A. Psychological problems and burnout among medical professionals of a tertiary care hospital of North India: A cross-sectional study. Indian J Psychiat 2018 .60(2):175-88.
20. Dhusia AH, Dhaimade PA, Jain AA, Shemna SS, Dubey PN· Prevalence of occupational burnout among resident doctors working in public sector hospitals in Mumbai. Indian J Com Med. 2019. 44(4): 352-356.
21. Kathriarachchi M, Rowntree G. A Pilot Study on Burnout Syndrome: Its existence, causes and coping strategies practiced by medical professionals in Colombo South Teaching Hospital, Sri Lanka. Sri Lankan Journal of Human Resource Management 2016 Vol.6 (1):13- 36.

22. Fernando BMS, Samaranayake DL. Burnout among postgraduate doctors in Colombo: prevalence, associated factors and association with self-reported patientcare. BMC Medical Education volume **19**, Article number: 373 (2019). DOI: 10.1186/s12909-019-1810

23. Muraleeeswaran R, Thenuka M. A Study of Work Stress and Health Promoting Lifestyles among Health Care Workers at Base Hospital Kalmunai (North). Sri Lanka International Journal of Science and Research. April 2016 Volume 5 (4): 194-8.

24. Regidor 111 PD, Janoof M, Thivyasuthan A. Work related stress among SriLankan Nurses in critical care settings-a cross sectional study. American Research Journal of Emergency and Intensive critical Care. 1(1): 1-9.

25. Zubairi AJ, Noordin S. Factors associated with burnout among residents in a developing country. Annals of Medicine and Surgery .2016. 6: 60-63.

26. Malik AA, Bhatti S, Shafiq A Khan RS, Butt UI, BilalSM, KhanHS, Kashif M, Malik, Ayyaz M.. Burnout among surgical residents in a lower-middle income country – Are we any different? Annals of Medicine and Surgery . Aug 2016. 9: 28-32.

27. Naz S, Hashmi AM, Asif A. Burnout and quality of life in nurses of a tertiary care hospital in Pakistan.. Journal of Pak Medical Assn. May2016. 66(5):532-6

28. Laila U, Hanif R, Rehna T. Burn out among Medical Doctors: Examining the role of optimism and pessimism. J of Pak Psych Society. April-June 2017. 14(2): 16-9.

29. Mufarrih SH, Naseer A,Qureshi NQ, **Anwar** Z, Zahid N, Lakdawala RH and Noordin S. Burn out, Job Dissatisfaction, and Mental Health Outcomes among Medical Students and Health Care Professionals at a Tertiary Care Hospital in Pakistan: Protocol for a Multi-Center Cross-Sectional Study. Front. Psychol., 26 November 2019 |https://doi.org/10.3389/fpsyg.2019.02552.

30. Pokhrel NB, Khadayat R, Tulachan P. Depression, anxiety and burn out among medical students and residents of a medical school in Nepal: a cross sectional study. BMC Psychiatry. DOI: 10.21203/rs.2.15556/v1.

31. Mehta RK, Singh IK. Stress among nurses working in critical care areas at a tertiary care teaching hospital Nepal. J of Chitwan Med Coll. 2014; 4(10): 42-48.

32. Kibria MG. Prevalence of stress and coping mechanism among staff nurses of intensive care unit in a selected hospital. Int J of Nero Surg. 2018; 2(1): 8-12.

33. Saha DK, Razzak MA, Saha M, Ahsan ASM, Fatema K, Ahmed F, Naznin S, Sultana R. Frequency of burn out syndrome in an Intensive care Unit of a tertiary care hospital in Dhaka, Bangladesh. Birdem Med J.2019; 9(1): 30-4.

34. Michie S. Causes and Management of Stress at Work. Occup Environ Med. 2002; 59(1):67–72. doi: 10.1136/oem.59.1.67.

35. Lheureux F, Trichet D, Borteyrou X, Rascle N. The Maslach Burnout Inventory – Human Services Survey (MBI-HSS): factor structure, wording effect and psychometric qualities of known problematic items. Le Travail Humain [Human Work]· April 2017 DOI: 10.3917/th.802.0161. (http://www.cairn-int.info/journal-le-travail-humain.htm).

36. Loera B, Converso D, Viotti S Evaluating the Psychometric Properties of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) among Italian Nurses: How Many Factors Must a Researcher Consider? PLoS One. 2014; 9(12): e114987.. doi: 10.1371/journal.pone.0114987

37. Mimura C, Griffiths P. A Japanese version of the Perceived Stress Scale: cross cultural translation and equivalence assessment. BMC Psychiatry. 2008;8(1):85–91. doi: 10.1186/1471-244X-8-85.

38. Cohen S, Kamarck T, Mermelstein R. A Global Measure of Perceived Stress. J Health Soc Behav. 1983; 24(4):385–396. doi: 10.2307/2136404.

39. Cohen S, Williamson G. Perceived stress in a probability sample of the United States. In: Spacapan S, Oskamp S, editors. The Social Psychology of Health: Claremont symposium on applied social psychology. Newbury Park (CA): Sage Publications; 1988. pp. 31–67.

40. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. Medical Care 2003; (41): 1284-1294.

41. Wongpakaran N, Wongpakaran T. The Thai version of the PSS-10: An investigation of its psychemetric properties. Bio Psycho Social Medicine. 2010; 4:6–11. doi: 10.1186/1751-0759-4-6.

42. Meltzer LS,Huckabay LM. Critical care nurses' perceptions of futile care and its effect on burnout. Am J Crit Care 2004; 13:202–8.

43. Lederer W, Kinzl J, Traweger C,Dosch J, Sumann G. Fully developed burnout and burnout risk in intensive care personnel at a university hospital. Anaesth Intensive Care 2008; 36:208.

44. Özden D1, Karagözoğlu Ş, Yildirim G. Intensive care nurses' perception of futility: job satisfaction and burnout dimensions. Nurs Ethics. 2013 Jun; 20(4):436-47. doi: 10.1177/0969733012466002. Epub 2013 Feb 14.