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Annotating PDFs using Adobe Acrobat Reader DC

Version 1.7 June 27, 2016

1. Update to Adobe Acrobat Reader DC

The screen images in this document were captured on a Windows PC running Adobe Acrobat Reader DC. Upgrading to the newest version is not always necessary, but it is preferable, and these instructions apply *only* to Adobe Acrobat Reader DC. You can also create annotations using any version of Adobe Acrobat. Adobe Acrobat Reader DC can be downloaded at no cost from http://get.adobe.com/reader/

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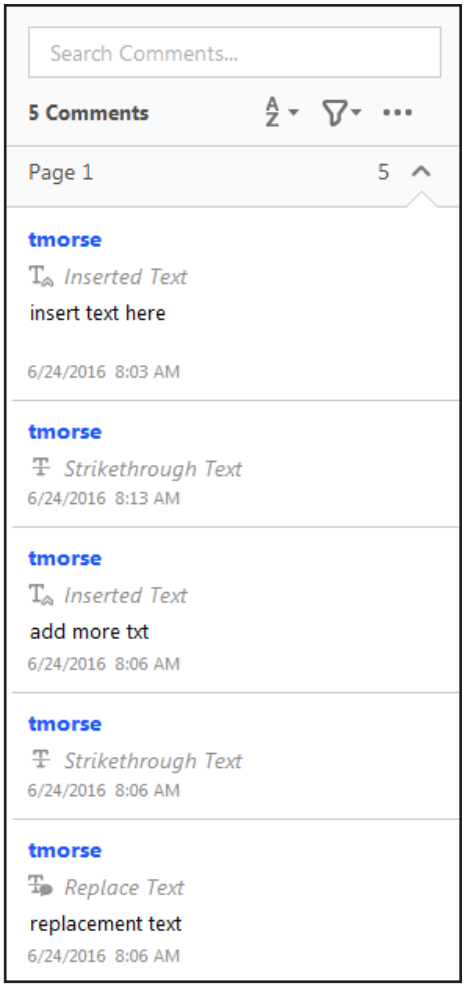

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An insert symbol feature is not available for annotations, and copying and pasting symbols or non-keyboard characters from Microsoft Word does not always work. Use angle brackets < > to indicate these special characters (e.g., <alpha>, <beta>).

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Refer to Page 2 for annotation examples.

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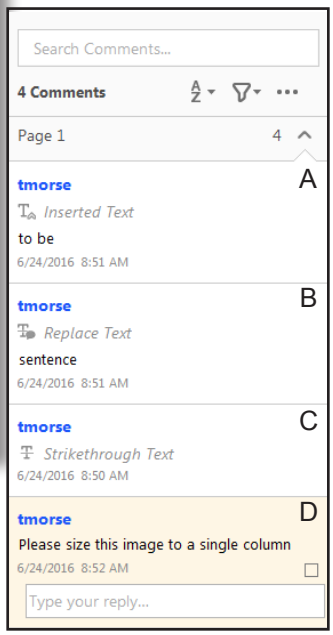

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AU1: The authors name and affiliations was updated. Please check.

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A Preliminary Analysis of Compassion Fatigue in a Surgeon Population: Are Female Surgeons at Heightened Risk?

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Compassion fatigue (CF), a state of physical/emotional distress caused by repeatedly caring for those experiencing traumatic episodes, is a prevalent issue for today's healthcare provider. We sought to characterize levels of CF within a surgeon population, particularly comparing trauma surgery with other surgical specialties. A survey containing the Professional Quality of Life Scale (ProQOL), a validated tool assessing compassion satisfaction (CS), CF, and burnout (BO) was distributed via electronic newsletter to members of the American College of Surgeons. Demographic data and Professional Quality of Life Scale scores for CS, BO, and CF were collected and compared within specialty and gender subgroups. A total of 178 surgeons completed surveys. Respondents were predominantly male, general surgeons, >55 years old. Trauma surgeons composed the second largest subgroup. Levels of CS were significantly lower in the trauma surgeon subgroup compared to other surgical specialties (trauma: 37.1 ± 5.28, other: 39.5 ± 6.30; $P = 0.044$). Female surgeons from all specialties exhibited significantly higher levels of BO (female: 26.7 ± 6.10, male: 24.6 ± 6.79; $P = 0.035$) and CF (female: 24.2 ± 6.29, male: 21.9 ± 6.11; $P = 0.021$) compared with male surgeons. Subanalyses comparing female trauma surgeons to female surgeons in other specialties found female trauma surgeons exhibited significantly lower levels of CS (trauma: 34.8 ± 4.63, other: 38.8 ± 5.99; $P = 0.038$) and higher levels of BO (trauma: 29.1 ± 3.14, other: 25.3 ± 6.41; $P = 0.049$). Trauma surgeons, particularly female trauma surgeons, may be at a heightened risk for developing a poorer overall professional quality of life compared with surgeons of other specialties. In addition, female surgeons may be at greater risk for developing CF compared with male counterparts.

Despite the intrinsic sense of satisfaction that coincides with a career in medicine, repeatedly coping with the devastation of caring for the critically ill can be taxing, inducing a state of physical and emotional distress, known as compassion fatigue (CF), in the care provider.[1–3] This cost of caring for others not only negatively impacts the personal/professional quality of life of the physician,[1, 2] but can also compromise patient care as providers may become desensitized toward future patient suffering.[3] As low morale, insomnia, physical exhaustion, deteriorating job performance, personal problems, and decline in quality of medical care have been associated with a poor professional quality of life,[4, 5] characterizing and addressing CF needs to be a priority for healthcare providers to ensure patients are receiving optimal care.

Although several studies have investigated burnout (BO) and career satisfaction in physicians,[5, 6, 7] few studies have directly evaluated overall professional quality of life and the totality of CF in surgeon populations.[5, 8] Among American surgeons, BO (the end result of suffering multiple episodes of CF without self-help or therapy) has been found to be highly prevalent, ranging from 28 to 40 per cent.[8–10] In addition, emotional exhaustion and depersonalization have been found to be widespread,[11] suggesting this population may be at a heightened risk for developing CF. As CF, also known as secondary traumatic stress disorder[12] and vicarious

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traumatization,[13] results, in part, from exposure to the traumatic experiences of others,[1] this condition may particularly affect trauma surgeons who treat patients with significant mental and physical pain on a regular basis. Despite this corollary, professional quality of life measures characterizing CF in this surgical specialty remain understudied.

The Professional Quality of Life Scale (ProQOL) developed by Stamm et al.[1] in 1995 is a common assessment tool for measuring levels of compassion satisfaction (CS), BO, and CF. This 30-item self-report assessing the positive and negative aspects of caring for others is the most widely used, validated measure of professional quality of life. The purpose of this study was to use the ProQOL survey assessment tool to characterize professional quality of life scores, in a surgeon population composed of varying specialties including traumatology. Professional quality of life measures (CS, BO, and CF) of the entire study population were evaluated followed by a comparison between trauma surgeons and other surgical specialties. It was hypothesized that trauma surgeons would exhibit higher levels of BO and CF, and lower levels of CS compared with physicians in other surgical specialties.

Methods

After review and approval by the Institutional Review Board of Lancaster General Health, this study was submitted to the Surgical Research Committee (SRC), a standing committee of the American College of Surgeons, for secondary approval. The SRC is concerned with and represents the organization in matters addressing the progress of academic surgery and patient care. After study approval was granted by the SRC, a link to a three-part, anonymous survey was distributed via electronic newsletter to members of the American College of Surgeons by the SRC. Part I of the survey provided potential participants with background information on the study, a description of the ProQOL[1] survey tool, and a consent statement. Surgeons interested in participating in the study were prompted for consent before participation. Part II collected demographic information including age, gender, primary specialty, years in surgical practice, and institution type (academic, community, or independent medical center). Part III of the survey administered the 30-item, validated ProQOL survey (Version 5)[1] to measure levels of CS, BO, and CF. Participants were instructed to respond based on how frequently they experienced each component in the past 30 days. The survey remained accessible to potential participants for one month after administration by the SRC before the collection period was closed.

Data Collection & Statistical Analysis

Study data were collected and managed using Research Electronic Data Capture an electronic data capture tool hosted at Penn Medicine Lancaster General Health.[14] After the 1-month participant recruitment/data collection period, participant responses were extracted from Research Electronic Data Capture and analyzed using statistical analysis software. Respondents who submitted incomplete surveys, missing one or more required fields, were excluded from analysis. Continuous variables were summarized as means and standard deviations and categorical variables as counts and percentages. Raw measures of CS, BO, and CF were calculated in accordance with the 2010 Concise ProQOL Manual guidelines.[1] Scoring for each of the three measures ranged from 10 to 50, and the measures were categorized into low ($\leq$22), average (23–41), and high ($\geq$42) group ranges (ranges established by ProQOL manual). Low levels of CS and high levels of BO and CF are associated with poor professional quality of life, whereas high levels of CS and low levels of BO and CF are associated with a positive professional quality of life. After the preliminary population evaluation, subanalyses comparing ProQOL scores within demographic subgroups and specialty subgroups (trauma surgeon *versus* other surgical specialty) were performed. Analysis of variance (ANOVA), two sample *t* tests, chi-squared analysis, and Fisher's exact tests were used as appropriate. Statistical significance was defined as $P < 0.05$.

Results

A total of 202 surgeons participated in this investigation, of which 178 (88.1%) submitted completed surveys able to be analyzed. Respondents (n = 24) who submitted incomplete surveys, (missing one or more fields required for ProQOL score calculation), were excluded from analysis. A summary of demographic characteristics as well as raw ProQOL scoring ranges is displayed in Table 1. T1
The study population was predominantly male (66.3%), general surgeons (59.6%), >55 years old (46.4%). Those who self-identified as trauma surgeons accounted for the second largest subpopulation at 14.0 per cent (n = 25). The average time in surgical practice was 19.3 ± 10.8 years [median: 20 (9–28)]. The majority of respondents hailed from community-based medical centers (62.9%).

A breakdown of the individual components of the ProQOL scale scores for the total population characterized 109 (61.2%) respondents as exhibiting average levels (raw score 23–41), and 69 (38.8%) high levels (raw score > 42) of CS. No respondents reported low (raw score < 22) levels of CS. The mean CS score for the total population was 39.2 ± 6.22 (Median 39.5; interquartile range (IQR): 36–44). A subanalysis (found

in Table 2) comparing the trauma surgeon specialty to the remaining study population found trauma surgeons exhibited significantly lower levels of CS compared with other surgical specialties (Trauma: 37.1 ± 5.28, Other: 39.5 ± 6.30; $P = 0.044$). Although no significant differences in CS were found between male and female surgeons (Table 3), a further subanalysis comparing female trauma surgeons with female surgeons in other specialties found female trauma surgeons reported a potential trend toward lower levels of CS ($P = 0.038$) (Table 4). Time in surgical practice was found to be positively associated with CS. As time in practice increased, levels of CS significantly increased in ANOVA for evenly distributed timeframes ($P = 0.030$) (Table 5).

An analysis of BO for the total study population revealed 65 (36.5%) participants had low levels, 112 (62.9%) average levels, and 1 (0.56%) high levels of BO. The mean BO score for the total population was 25.3 ± 6.63 (Median 25.0; IQR: 20–30). Trauma surgeons were found to exhibit higher (albeit nonsignificant) levels of BO compared with other surgical specialties ($P = 0.366$). Statistically significant differences were found between male and female surgeons however, with female surgeons reporting higher levels of BO (Female: 26.7 ± 6.10, Male: 24.6 ± 6.79; $P = 0.035$). In addition, when compared with other female surgeons in the study population, female trauma surgeons exhibited a possible trend toward higher levels of BO (trauma: 29.1 ± 3.14, other: 25.3 ± 6.41; $P = 0.049$). Time in surgical practice was negatively associated with BO. As time in practice increased, levels of BO significantly decreased ($P = 0.006$).

Characterizing the final component of the ProQOL scale survey, 95 (53.4%) respondents were found to have low levels of CF, and 83 (46.6%) average levels. No participants had high levels of CF. The mean CF score for the study population was 22.6 ± 6.26 (Median 21.0; IQR: 18–27). Similar to trends found in BO levels, trauma surgeons were found to have higher, yet nonsignificant, levels of CF compared with the remaining surgical specialties. In addition, female surgeons exhibited significantly higher levels of CF compared with their male counterparts ($P = 0.021$). No significant differences were found between female trauma surgeons *versus* female surgeons in other specialties in terms of CF ($P = 0.578$). No association was found between time in surgical practice and CF in ANOVA ($P = 0.192$).

TABLE 1. *Surgeon Population Demographics and Breakdown of Professional Quality of Life (ProQOL) Scale Scores*

n = 178	Number (%)
Age	
Mean: 52.8 ± 10.6	
<45	49 (27.5)
45–55	46 (25.8)
>55	83 (46.6)
Gender	
Female	60 (33.7)
Male	118 (66.3)
Specialty	
Burn surgery	1 (0.56)
Cardiac surgery	7 (3.93)
Colorectal surgery	5 (2.81)
General surgery	106 (59.6)
Ophthalmology	1 (0.56)
Orthopedic surgery	4 (2.25)
Otolaryngology	5 (2.81)
Pediatric surgery	12 (6.74)
Plastic surgery	4 (2.25)
Trauma surgery	25 (14.0)
Urology	2 (1.12)
Vascular surgery	6 (3.37)
Compassion satisfaction score	
Mean: 39.2 ± 6.22	
Median: 39.5 (36–44)	
Low (≤22)	0 (0.00)
Average (23–41)	109 (61.2)
High (≥42)	69 (38.8)
Burnout score	
Mean: 25.3 ± 6.63	
Median: 25.0 (20–30)	
Low (≤22)	65 (36.5)
Average (23–41)	112 (62.9)
High (≥42)	1 (0.56)
Compassion fatigue score	
Mean: 22.6 ± 6.26	
Median: 21.0 (18–27)	
Low (≤22)	95 (53.4)
Average (23–41)	83 (46.6)
High (≥42)	0 (0.00)

Discussion

As high levels of CF in healthcare provider populations have been associated with a decline in patient care,[4, 5] there has been an increased interest in

TABLE 2. *Comparison of ProQOL Scores in Trauma vs Other Surgical Specialty Subgroups*

n = 178	Trauma Surgeon Mean ± SD (Median; Range)	Other Surgical Specialty Mean ± SD (Median; Range)	*P*
n (%)	25 (14.0%)	153 (86.0%)	
Compassion satisfaction (CS)	37.1 ± 5.28 (37.0; 34.5–40.5)	39.5 ± 6.30 (40.0; 36.0–44.0)	0.044
Burnout (BO)	26.2 ± 5.15 (27.0; 24.0–29.0)	25.1 ± 6.84 (25.0; 20.0–30.0)	0.366
Compassion fatigue (CF)	23.0 ± 6.68 (21.0; 17.5–28.0)	22.6 ± 6.20 (22.0; 18.0–27.0)	0.743

TABLE 3. *Subanalysis of ProQOL Scores in Male vs Female Surgeon Subgroups*

n = 178	Male Surgeon Mean ± SD (Median; Range)	Female Surgeon Mean ± SD (Median; Range)	*P*
n (%)	118 (66.3%)	60 (33.7%)	
Compassion satisfaction (CS)	39.8 ± 6.32 (40.5; 36.0–44.0)	38.2 ± 5.95 (38.0; 35.0–43.0)	0.132
Burnout (BO)	24.6 ± 6.79 (24.5; 20.0–29.0)	26.7 ± 6.10 (28.0; 21.3–31.0)	0.035
Compassion fatigue (CF)	21.9 ± 6.11 (21.0; 18.0–25.3)	24.2 ± 6.29 (23.5; 20.0–28.0)	0.021

TABLE 4. *Subanalysis of ProQOL Scores in Female Trauma Surgeon vs Other Female Surgeon Subgroups*

n = 60	Female Trauma Mean ± SD (Median; Range)	Female Other Mean ± SD (Median; Range)	*P*
n (%)	9 (15.0%)	51 (85.0%)	
Compassion satisfaction (CS)	34.8 ± 4.63 (36.0; 30.0–38.0)	38.8 ± 5.99 (39.0; 35.0–43.0)	0.038
Burnout (BO)	29.1 ± 3.14 (29.0; 26.5–31.5)	25.3 ± 6.41 (26.0; 20.0–30.0)	0.049
Compassion fatigue (CF)	25.4 ± 7.40 (27.0; 18.5–30.5)	23.9 ± 6.13 (23.0; 20.0–28.0)	0.578

TABLE 5. *ProQOL Scores Based on Time in Practice (ANOVA Analysis)*

n = 178	Total Population Mean ± SD	*P*
Time in practice		
Mean ± SD: 19.3 ± 10.8		
Median (IQR): 20.0 (9.00–28.00)		
Compassion satisfaction (CS)		0.030
Years in practice		
<15 years (n = 63)	37.8 ± 5.25	
15–25 years (n = 56)	39.0 ± 6.58	
>25 years (n = 59)	40.8 ± 6.54	
Burnout (BO)		0.006
Years in practice		
<15 years	26.3 ± 5.77	
15–25 years	26.5 ± 6.51	
>25 years	23.0 ± 7.10	
Compassion fatigue (CF)		0.192
Years in practice		
<15 years	23.6 ± 5.94	
15–25 years	22.7 ± 5.75	
>25 years	21.6 ± 6.91	

characterizing and combating this detrimental phenomenon. This study sought to preliminarily evaluate levels of CF in the understudied surgeon population, with considerations for the trauma surgeon specialty. Although previous studies have compared ProQOL[1] scores in physicians with surgical *versus* nonsurgical specialties,[7] and other studies have evaluated levels of BO in surgical populations,[5, 8] this is the first study, to the authors' knowledge, that has analyzed levels of ProQOL-defined CF strictly within a surgeon cohort.

Using the standards set forth by the ProQOL scale guidelines,[1] this investigation found that the majority of surgeon respondents experienced average levels of CS (61.2%), average levels of BO (62.9%), and low levels of CF (53.4%). Compared with previous literature detailing these measures, particularly BO, in physician populations,[8–10] these findings may seem mild; however, it is important to note that many of these previous works used differing survey tools to analyze this problem, which defined these measures in different ways. Of the literature that used the ProQOL tool, a study by Bellolio et al.[7] analyzing ProQOL measures in surgical and nonsurgical resident populations found similar categorizations to our study, with most of their study population exhibiting average levels of CS and low CF. In addition, levels of BO were found to predominantly range from low to high in most respondents for Bellolio et al., similarly to the average levels of BO found in this investigation for most respondents. Although the same categorizations were found for levels of CS and CF between the two studies, the total percentage of respondents comprising these ranges differed. Whereas Bellolio et al.[7] found 59 per cent of respondents reporting average levels and 41 per cent high levels of CS, we found a larger percentage of our population in the average (61.2%), rather than high

(38.8%) range. Similarly, Bellolio et al.[7] found a larger percentage of participants demonstrating low levels of CF (77%), whereas this investigation found only 53.4 per cent of respondents fitting this categorization. It is possible that the presence of a strictly surgeon population, rather than a combination of surgical and nonsurgical physicians, could account for the differences seen between these studies, although a subanalysis of the findings of Bellolio et al.[7] would be necessary to support this conjecture.

Throughout this investigation, the study population was separated into a variety of subgroups to compare ProQOL scores. Initially, the study population was divided into two groups, trauma surgeons *versus* other surgical specialties, which revealed both expected and unexpected findings. Whereas levels of CS were found to be significantly lower in the trauma surgeon population compared with other surgical specialties, levels of BO and CF were similar. Although the trauma surgeon population reported higher mean BO and CF levels compared with other surgical specialties, these differences were not significant ($P = 0.366$ and $P = 0.743$, respectively). It was hypothesized that significant differences would be present within all three of these components. These results suggest that although similarities exist between surgical groups in terms of their professional quality of life, differences are also present. Because of the nature of the surgical profession, it is possible daily demands and stressors could be comparable among different specialties, leading to similar levels of BO and CF; however, a follow-up study to this preliminary investigation would be required to test this hypothesis.

After this initial subanalysis, levels of CF and CS were compared within two separate gender groupings. The first analysis, dividing the total study population into male and female surgical groups, found female surgeons exhibited significantly higher levels of BO and CF compared with male surgeons ($P = 0.035$ and $P = 0.021$, respectively), but no differences in CS. These results differ from previous literature, which found no significant differences between CS and CF levels in male *versus* female physicians.[7]

To gain a more encompassing view of the effect of female gender on CF levels in surgical specialties, a second subanalysis comparing female trauma surgeons with female surgeons in other specialties was performed. Although the sample size was likely too small to draw significant conclusions, compared with female surgeons in other specialties, female trauma surgeons exhibited significantly lower levels of CS and higher levels of BO ($P = 0.038$; $P = 0.049$). Viewing these findings in composite suggests that female surgeons, particularly female trauma surgeons, may be at heightened risk for developing poorer professional quality of life compared with their male counterparts, although a more in-depth analysis recruiting a larger sample would be necessary to support this claim. At the very most, we can only suggest a trend pertaining to these results until further research is able to delineate this question.

Analyzing the impact of time in practice on ProQOL measures revealed some surprising findings. Surgeons with more years in practice reported significantly lower levels of BO and significantly higher levels of CS, compared with surgeons with less experience. Whereas this trend may seem counterintuitive, previous research has produced far from congruent findings on this matter when detailing over healthcare professions. In an examination of a nursing population, Burtson et al.[15] found a similar negative correlation between CF and nursing experience, with the most experienced nurses reporting the lowest levels of CF. Conversely, Potter et al.[3] and Young et al.[16] report increased CF with years of experience, directly refuting our findings.

Although some similarities in trends were found between this study and previous investigations, the presence of a host of differences suggests more research is necessary to appropriately characterize professional quality of life in surgeon populations. Future research should aim to disentangle conflicting findings relating to the effects of gender, experience, and surgical specialty (particularly the trauma specialty) on CS and CF.

As the nature of this investigation was survey based, a number of limitations are present. First, nonresponse bias could have impacted the results. As participation in this study was optional, it is possible that those who chose to respond were at the extremes of the ProQOL scale. That is, participants were experiencing either exceptionally high or exceedingly low levels of CF and CS. Despite the results not reflecting such a trend, it is still a limitation the authors feel should be noted. In addition, the use of the ProQOL survey tool is a limitation in itself as it asks participants to only consider the past 30 days prior to taking the assessment. As physicians cycle through periods of low to high stress, it is possible only considering such a brief timeframe could have impacted the results. Another limitation relates to the fact that few demographic variables were analyzed in this study. It is possible external personal/social factors could have contributed to the results. Finally, the relatively small sample size, particularly those used in subanalyses pertaining to the female surgeon/female trauma surgeon subgroups, is a major limitation of this investigation. In addition, the low number of trauma surgeons responding could have introduced a Type II error into this analysis.

Conclusion

CF is a relevant, problematic issue facing today's healthcare providers. Trauma surgeons, particularly female trauma surgeons, may be at heightened risk for developing an overall poorer professional quality of life, as measured by the validated ProQOL assessment tool, although additional research is necessary to more appropriately detail this proposed trend. In addition, female surgeons from all specialties may be more prone to experiencing CF compared with their male counterparts. As a poor professional quality of life has been negatively associated with patient care, efforts to evaluate and reduce CF and raise CS within healthcare providers should be a priority to ensure both patients and physicians are receiving optimal care.

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