

Perceptions of a Group of Surgical and Non-Surgical Residents at a Hispanic Academic Medical Center of the Impact of the Night-Float System

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Objective: In 2003 the ACGME implemented mandatory work-hour limitations to address concerns about the negative effects of sleep deprivation on resident well-being and patient safety. The night-float system (NFS) is an attempt to promote a balance between optimal patient care and well-rested residents. The aim of this study was to assess and compare the perceptions of surgical and non-surgical residents with regard to the impact of the NFS on their education, their well-being, and aspects related to patient care.

Methods: After the approval from the Institutional Review Board was received, residents (241) from the UPR School of Medicine residency programs were invited to participate. Those residents who chose to take part in the study (149) completed a questionnaire with demographic questions and items related to individual perceptions of the impact of the NFS. The questionnaires, collected from April 2010 through September 2010, were categorized as having come from a surgical or non-surgical resident. Data were analyzed.

Results: The response rate was almost sixty-two percent (61.8%). Of the residents who answered the questionnaire, 63% were in non-surgical programs, 51% were female, and 58% were single. Seventy-three percent of the residents had participated in an NFS. Sixty-two percent disagreed that their participation in the NFS improved their sense of well-being. Seventy-six percent agreed that their participation improved the continuity of care for the emergency room patients under their responsibility. A higher percentage of the non-surgical residents than surgical residents agreed that during their participation in the NFS, their relationships with their spouses/significant others and children (if applicable), sleep patterns and hours, peer support, and work/rest balance were impacted negatively.

Conclusion: This group of residents presented significant differences between the non-surgical and the surgical groups in areas related to well-being, which the majority agreed was negatively impacted during their participation in the NFS. [*PR Health Sci J* 2014;33:45-50]

Key words: Residents' well-being, Perceptions, Night-float

"Is an ignorant doctor really better than a tired one? . . .

Is it better to be cared for by a tired Resident who knows your case or a rested Resident who does not?"

—Sandeep Jauhar, *The Nightmare of Night Float* (1)

The training and practice of medicine has long been acknowledged as being arduous. The literature reports high levels of stress, depression, and burnout among the harmful effects associated with the rigors of medical training and practice (2-4). Nevertheless, for physicians to be able to provide care, comfort, and hope to patients, these physicians need to be stable, healthy, and well equipped for the emotionally and physically demanding tasks that attend their profession

(5, 6). In other words, good mental health is necessary for the development and maintenance of qualities essential to the medical profession, qualities such as compassion and empathy for patients, altruism, and dedication to the rigorous aspects of medicine (7).

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Residents, as trainees, are especially vulnerable to mental health-related issues, and their well-being can be impacted by stressors inherent to their fulfilling the demands of their training programs (8). One such demand is the need to effectively fulfill clinical duties while experiencing sleep deprivation, even though such deprivation is widely known to negatively affect a number of aspects of an individual's personal and professional life. And as the demands increase, many residents discover that they need to make compensatory adjustments in other parts of their lives, which adjustments often affect their relationships with others as well as their abilities to tend to their own needs. These conditions may prompt residents to look for alternatives in order to manage sleep loss and/or improve performance, though these options may include the use of alcoholic beverages or hypnotics (9) and/or, more recently, the consumption of energy drinks (10).

The Accreditation Council of Graduate Medical Education (ACGME) established work-hour limitations for residents in July 2003, recognizing that long hours are counter-productive since sleep deprivation and fatigue increase rates of medical error and can have negative effects on residents' clinical and academic performance as well as on their well-being (11-13). To comply with these regulations, many residency programs have established new coverage schedules, such as the night-float system (NFS), in an attempt to promote a balance between optimal patient care and well-rested residents. The NFS is characterized by a sequence of work days that consist of evening/night shifts without any daytime assignments.

To ensure that future requirements lead to improved performance and learning on the part of residents as well as to improved outcomes for the patients, there is a need for research that would evaluate how these regulations and/or their implementation might impact graduate medical education and patient care (14).

The objectives of this study were to explore the perceptions of surgical and non-surgical residents at an academic medical center with regard to the impact of the NFS on their educations, patient continuity of care, and aspects related to their well-being (sleep patterns, sleep hours, work/rest balance, and relationships with spouse/significant others and children when applicable) and, further, to compare our participants' perceptions of NFS with their perceptions of the in-house call system (IHCS).

This paper presents the most relevant findings related to the impact of NFS on those specific areas. Other findings will be reported in another paper.

Methods

This is a qualitative study with a descriptive design. After obtaining approval from the institutional IRB a 72-item questionnaire prepared for this study was administered (April 2010 through September 2010) to assess residents' perceptions

of the NFS compared to those of the IHCS. The questionnaire included both structured and open-ended questions that were categorized according to whether they pertained to education (8), patient care (5), or well-being (22) and which could be answered "strongly agree," "agree," "disagree," or "strongly disagree." Aspects such as peer support, work/rest balance, relationships with spouse/significant others and children (when applicable), and sleep patterns were included in *well-being*. Surgical and non-surgical residents of the 36 residency programs at the UPR School of Medicine (345 total residents) were identified. Residents who at the moment of the study had participated in an NFS received an information sheet with a brief description of the study and a questionnaire. Participation was voluntary and all responses were kept anonymous and confidential.

The Associate Deanship for Graduate Medical Education identified the programs that participate in the NFS. The questionnaires were distributed to 241 eligible residents at those clinical departments of our institution that had been so identified. Investigators collected the questionnaires and divided them into 2 groups (surgical and non-surgical) without any other specifics. Surgical specialties included anesthesiology, ENT, general surgery, neurosurgery, OB/GYN, urology, and orthopedics. Non-surgical specialties comprised the specialties of internal medicine, pediatrics, and psychiatry. The segregation of forms into these 2 categories (surgical/non-surgical) was done to safeguard the identities of the participants.

Once this process was concluded, the collected data were analyzed using SPSS (Statistical Program for the Social Sciences) version 16 for Windows. Statistical significance was set as $p < 0.05$. For statistical analysis purposes, the answers *strongly agree* and *agree* were grouped into the single category *agree*; *strongly disagree* and *disagree* were grouped into the single category *disagree*. The 2 resulting categories were then compared. The analysis of the data was performed with frequencies and binomial tests using a significance level of $p < 0.05$.

Results: The major findings of our study are as follows: One hundred and forty-nine (149) residents from programs with an NFS participated (response rate of 61.8%). The greatest percentage of respondents was female (51.0%), almost one third (32.0%) were at the PGY3 level of training, and 58.4% were single. (Figures 1 and 2). Sixty-three percent (63.4%) of the participating residents were in non-surgical programs. Seventy-three percent (73.0%) had, prior to our study, participated in the NFS.

Sixty-two percent (62.0%) disagreed that their participation in the NFS improved their sense of well-being. Regarding the IHCS, 61.0% of the participating residents disagreed that their participation in such a system resulted in an improved sense of well-being; however, 39.0% of the residents felt that it did ($p = 0.032$). There was no statistically significant difference between either the non-surgical or the surgical group.

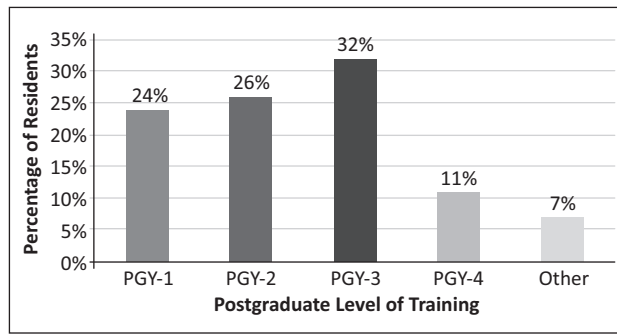


Figure 1. Distribution of residents by level of training percentage of residents

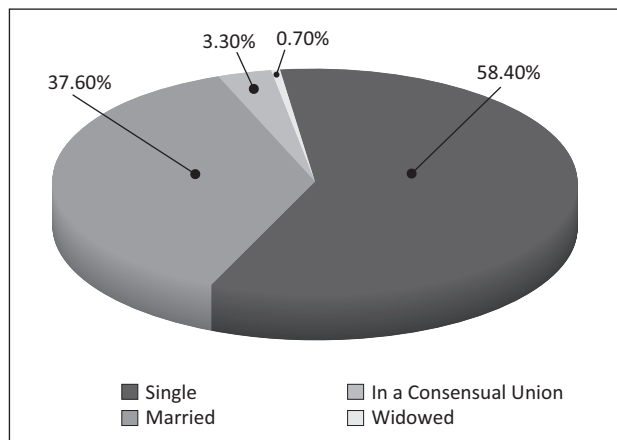


Figure 2. Distribution of residents by marital status

Sixty-seven percent (67.0%) agreed that their participation in the NFS resulted in an improved continuity of care for the in-patients. Almost seventy-six percent (75.9%) agreed that their participation in the NFS improved continuity of care for emergency room patients (Table 1). When asked about participation in IHCS, a higher percentage of the residents agreed than disagreed that the IHCS resulted in an improved continuity of care for inpatients and emergency room patients, but the difference was statistically significant only in terms of the inpatients ($p = 0.002$) and there was no significant difference between the non-surgical and the surgical group of residents on this issue.

Table 1. Well-being Areas Impacted during Resident Participation in Night-float System

Areas	Agree % (n)	Disagree % (n)	Total % (n)	*P<0.05
Improved general sense of well-being (resident)	38.0% (41)	62.0% (67)	100% (108)	0.016
Improved continuity of care for inpatients	67.0% (73)	33.0% (36)	100% (109)	0.001
Improved continuity of care for ER patients	75.9% (82)	24.1% (26)	100% (108)	<0.001

*Binomial test, p-value<0.05

We asked the participating residents which of the 2 systems (NFS or IHCS) they felt to have caused the most difficulties in their educational experiences. Ninety-six (96) residents answered this question. Sixty-five percent (65.0%; $n = 62$) chose NFS, 35.0% ($n = 34$) chose IHCS ($p = 0.006$).

Eighty-one percent (81.0%) of the non-surgical group compared to 19% of the surgical group agreed that their peer support was impacted negatively during their participation in the NFS ($p<0.001$). In addition, a higher percentage of the non-surgical (70.0%) compared to the surgical (30.0%) residents agreed that during their participation in the NFS, their relationships with their spouses/significant others and children (when applicable) were impacted negatively ($p = 0.001$) (Table 2).

More than 70% (72.0%) of the non-surgical group agreed that the work/rest balance was impacted negatively during their participation in the NFS; less than one third of the surgical group agreed to the same (28.0%; $p<0.001$) (Table 2).

A higher percentage of the non-surgical group agreed that their sleep patterns (70.0%) and number of sleep hours (72.0%) were impacted negatively during their participation in the NFS than did the surgical group (30.0% and 28.0%, respectively; $p<0.001$) (Table 2).

Table 2. Well-being Areas negatively impacted during resident participation in Night-Float System (by Specialty)

Well-being-Related Area	Specialty		Total % (n)	*P<0.05
	Non-surgical	Surgical		
Peer support	81.0% (29)	19.0% (7)	100.0% (36)	<0.001
Relationships with spouse/significant other and children (when applicable)	70.0% (56)	30.0% (24)	100.0% (80)	0.001
Work/Rest balance	72.0% (56)	28.0% (22)	100.0% (78)	<0.001
Sleep pattern	70.0% (58)	30.0% (25)	100.0% (83)	<0.001
Number of sleep hours	72.0% (59)	28.0% (23)	100.0% (82)	<0.001

*Binomial test, p-value<0.05

Discussion

The NFS is characterized by a sequence of days consisting of night-time work without any daytime duties (15).

Some studies have found that other health-related staff, such as nurses, preferred the night-float system over the standard resident on-call system, during which latter the resident still participates in daytime duties. They reported that the NFS allows residents to get more rest, reduces their number of mistakes, and makes them easier to work with (16). But what are the perceptions about its impact on other relevant aspects of a resident's education and personal life? Are there differences of opinion between

surgical and non-surgical residents in terms of their perceptions of this system? These questions have been answered in and by different studies, but in general, the perceptions, as they have been reported, are inconsistent (17-24).

A 1996 study by Druss, Pelton, Lyons, and Sludge (25) questioned a group of psychiatric residents about their experiences with an NFS. These residents reported that, compared to the traditional on-call system, the night float system led to their improved sense of well-being, educational experience, and performance of their clinical duties." In our study we asked whether the NFS and IHCS duty systems had improved the residents' general sense of well-being. Thirty-eight percent (38.0%) of the residents agreed that working under the NFS improved their general sense of well-being versus 62.0% who disagreed ($p = 0.016$). This difference was statistically significant (Table 1). A greater percentage of non-surgical (76.0%) than surgical (24.0%) residents agreed on this issue ($p = 0.002$).

Regarding the impact of the NFS on patient care, Jasti et al. (2009) found that house staff felt that the overall quality of patient care was improved when an NFS had been implemented (24). In another study, the perceptions of internal medicine residents, medical faculty, and nurses with regard to the night-float system were assessed. More residents than both attendings and nurses had positive opinions regarding the NFS, particularly in terms of patient care (21). Our study found that 67.0% of the residents agreed that the NFS positively impacted continuity of care for inpatients, and 75.9% agreed that the NFS positively impacted continuity of care for emergency room patients (Table 1). There was no significant difference between the non-surgical and the surgical group of residents with regard to their perceptions of the impact of the NFS on patient continuity of care as it pertains either to inpatients or to emergency room patients.

Regarding the impact of NFS and IHCS on the residents' educational experiences, we asked this group of residents during which of the duty systems (NFS or IHCS) did they have the most difficulties in terms of those experiences. Ninety-six (96) residents answered this question. Sixty-five percent (65.0%; $n = 62$) chose NFS as the more difficult system compared to 35.0% ($n = 34$) who chose IHCS as being the more difficult of the two ($p = 0.006$).

Lefrak et al. (2005) also studied this area. They found that NFS residents reported less conference attendance, operative experience and attending teaching interactions compared to those on traditional daily schedules. Thus, this research team reported that the NFS model has the advantage of fulfilling ACGME requirements but that it also has the potential to limit educational experience (26). Bricker and Markert also studied learning opportunities during NFS assignments in internal medicine residents and faculty. Their response rate was 52.0% (85/164). They reported that residents and faculty generally found that trainees are less likely to experience many of the important elements of clinical education during night rotations

than they are during day rotations (17). In our study, 53.0% of the residents agreed that their participation in the NFS had resulted in their missing classes (perhaps having a detrimental effect on their educations); on the other hand, 47.0% disagreed, claiming that their participation had no such negative impact on their class attendance. This difference was not statistically significant. When we compared the 2 groups of residents, we ascertained that 30.0% of those in the surgical group agreed (that participation had negatively affected attendance), while 70.0% of those in the non-surgical group did not, a difference that was statistically significant ($p = 0.005$).

The impact of NFS on residents' sleep is another area of interest that has been studied (22, 27).

We explored the impact of NFS on the number of sleep hours the members of this group of residents were getting. Seventy-three percent (73.0%) agreed that their participation in the NFS negatively impacted their number of sleep hours compared to 27.0% who disagreed. On this issue, there was a significant difference between the non-surgical and the surgical groups of residents (Table 2).

Reader et al. (2002) studied the effects of NFS on circadian rhythm and clinical judgment in a group of radiology residents after they had completed coverage using the NFS. It took the residents an average of 2.0 days to become acclimated to the night-float system and an average of 2.3 days to return to a normal daily routine after having completed the coverage. The NFS appeared to have no appreciable adverse effects on their clinical judgment (28). In our study, 26.0% of the residents reported that it took them 3 to 4 days to resume their usual sleep times after completing their participation in the NFS, and 14.2% reported that they needed more than 4 days to do so. When we compared the groups, we found that 8.9% of the surgical and 17.4% of the non-surgical residents reported needing more than 4 days.

We asked the participants about the impact of their participation in the NFS in terms of their relationships with their spouses/significant others and children (when applicable). Almost 80% (79.0%) of the participants agreed that their participation in this coverage system negatively impacted those relationships, while 21.0% disagreed. A higher percentage of the non-surgical group of residents (70.0%) agreed regarding the negative impact of the NFS on those relationships compared to the surgical group (30.0%). This difference was found to be significant ($p = 0.001$) (Table 2).

The impact on the residents' work/rest balance was also explored. Seventy percent (70.0%) of the residents who answered the item related to work/rest balance agreed that their participation in the NFS had negatively impacted their work/rest balance. Interestingly, when this finding was analyzed by specialty, 72.0% of those in the non-surgical group compared to only 28.0% of those in the surgical agreed that their work/rest balance had suffered as a result of their

participation in the NFS. This difference was statistically significant ($p < 0.001$) (Table 2).

According to Reed, Fletcher, and Arora (29), as the duration of duty-hours shift is reduced, the experiences with NFS are anticipated to increase, despite a relatively weak evidence base. Therefore we should continue to study the impact of this system on resident well-being, patient care, and educational outcomes, and do so at multiple residency programs.

Conclusions

In summary, the areas that the highest percentage of this group of residents agreed were impacted positively during their participation in the night-float system (NFS) were patient care and safety, feedback from staff, decision making related to patient care, and peer support. The areas that the highest percentage of this group of residents agreed were impacted negatively during their participation in the NFS were work/rest balance, sleep pattern, number of sleep hours, and relationships with spouses/significant others and children, when applicable. A greater percentage of non-surgical residents than surgical residents agreed that work/rest balance, sleep pattern, number of sleep hours, peer support, and relationship with spouse/significant other and children (when applicable) were impacted negatively during their participation in the NFS.

Our findings suggest that there is a need for those institutions and professionals that provide resident education to evaluate the participation of their residents in the night-float system, which participation has the potential to impact patient care as well as resident education, quality of life, and well-being.

Resumen

Objetivos: En el 2003 el ACGME (sus siglas en inglés) estableció límites a las horas de trabajo de los residentes atendiendo preocupaciones sobre el impacto negativo de la privación del sueño en su bienestar y la seguridad de los pacientes. El Sistema "Night-float" (NFS, sus siglas en inglés) intenta promover un balance entre el cuidado óptimo a los pacientes y los residentes descansados. El propósito de este manuscrito es conocer y comparar percepciones de residentes de Programas Quirúrgicos y No-quirúrgicos sobre impacto del NFS en su educación, bienestar y aspectos relacionados al cuidado de pacientes. **Metodología:** Se obtuvo aprobación del IRB. Residentes de Programas de la Escuela de Medicina-UPR fueron invitados a participar voluntariamente. Se entregó cuestionario con preguntas demográficas y percepciones sobre impacto del NFS. Cuestionarios completados de abril 2010 a septiembre 2010 se categorizaron como de residente Quirúrgico o No-quirúrgico. Resultados fueron analizados. Resultados: Índice de Respuesta fue sesenta y dos por ciento, sesenta y tres por ciento Grupo Quirúrgico, cincuenta y uno por ciento

féminas y cincuenta y ocho por ciento solteros. Setenta y tres por ciento habían participado en NFS. Sesenta y dos por ciento no estuvo de acuerdo que la participación en NFS hubiera mejorado su bienestar. Setenta y seis por ciento estuvieron de acuerdo que la participación mejoró continuidad de cuidado a pacientes atendidos en sala de emergencia. Por ciento mayor de No-quirúrgicos versus Quirúrgicos estuvieron de acuerdo que relaciones con esposos(as)/personas significativas/niños, patrón y horas de sueño, apoyo de pares y balance trabajo/descanso fueron impactados negativamente. **Conclusión:** Este grupo de residentes presentó diferencias significativas entre No-quirúrgicos y Quirúrgicos en áreas relacionadas a su bienestar las cuales expresaron fueron impactadas negativamente durante participación en NFS.

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