Original Article

QUALITY INDICATORS APPLIED IN A NURSING CONTINUING EDUCATION PROGRAM OF A HIGH COMPLEXITY UNIVERSITY HOSPITAL FROM BRAZIL: IV – TRAINING INDICATOR VERSUS SIZING AND WORKLOAD

INDICADORES DE QUALIDADE APLICADOS A UM PROGRAMA DE EDUCAÇÃO CONTINUADA DE UM HOSPITAL UNIVERSITÁRIO DE ALTA COMPLEXIDADE DO BRASIL: IV – INDICADOR DE TREINAMENTO VERSUS DIMENSIONAMENTO E CARGA DE TRABALHO

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ABSTRACT: Despite the fact that lacks of personnel and excessive workload have been previously reported as limiting factors to participation in continuing education activities, there is an absence of studies which assess directly this association. In this scenario, the aim of this study was to analyze the relationship of workload and personnel sizing with the training indicator, mean hours of training per professional per unit of the one Continuing Education Program focused on nursing staff in a Brazilian University Hospital. For this, we used a sizing based on Patient Classification Systems (Adult, Pediatric and Psychiatric) or on Functional Site System methodologies proposed by the Federal Council of Nursing and then we associated the mean value of these sizing indicators with the mean number of hours of training per professional from each unit of the Hospital. While with inpatient services the increased workload is related to an increase in the training indicator, outpatient units and support services show the contrary, where an increase in workload decreases participation in the Continuing Education Program. The number of professionals in the unit or the percentage of adequacy of sizing, which represents the appropriateness or not of the sizing, were not associated with the number of hours of training per professional. We concluded that the complexity of the patient is one of the most important factors in the demand for training compared to sizing. Apparently the workload itself is not the limiting factor, at least for inpatient units. The workload affected the outpatients negatively, probably because the focus of the Continuing Education Program is more related to direct assistance to the patient. We concluded that the complexity of the patient was a relevant factor in the participation in the program, showing that professionals who deal with these more complex patients seek improvement.

KEYWORDS: Professional category. Inservice training. Public health policy. Nursing. Workload. Personnel sizing

INTRODUCTION

The factors reported to justify the low adherence to continuing education programs have been the most diverse, as labor activities, time constraints, and cost of courses (BREWER; NAUENBERG, 2003; NI et. al., 2014; HAMZEHGARDESHI; SHAHHOSSEINI, 2014; CHONG et. al., 2011). The sizing or lack of personnel has been reported as an important criterion, but there are no quantitative studies that evaluate the impact of sizing on continuing education programs indicators.

In this scenario, another little explored factor in these studies is the relationship between the nursing workload with the demand for training. The nursing workload is defined here as the number of working hours per day required for patient care by a Nursing professional. There are numerous instruments for workload measurement (e.g. SANTOS et al., 2007; MARTINS; FORCELLA, 2006; DINI, 2007; DINI; GUIRARDELLO, 2013; NOGUEIRA et al., 2014), but their relationship has been predominantly used for sizing (e.g. ANTUNES; COSTA, 2003) or associated with the quality of service or the survival predictors of patients (e.g. NOGUEIRA et al., 2014). Hospitals with highly qualified and trained staff have shown better quality indicators of healthcare (CHO et al., 2015). The association between workload and training demand could subsidize continuing education policies and offer a better view of this

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scenario and this relationship, aspects which are still little explored in the literature. There is a remarkable need in institutions to offer opportunities to nursing continuing education access (COVENTRY et al., 2015), but it is also necessary to know the factors that can limit the access to continuing education programs.

The university or tertiary hospitals offer a wide range of services from primary care clinics to specialized intensive care units. This variety of services has shown differences both in sizing as in the workload per unit, including the institution studied here (ANTUNES; COSTA, 2003; CHENSO et al., 2004; ANTUNES et al., 2013; MENDES-RODRIGUES et al., 2017 a), which could reflect in differential necessities and access to continuing education programs. Associated with this, the training and quality indicators applied to continuing education programs in university hospitals showed dependence of type of unit (MENDES-RODRIGUES et al., 2018 a and b). A comparison of healthcare versus administrative units or a comparison of outpatient departments, inpatient units, emergency room and intensive care units also showed differences (MENDES-RODRIGUES et al., 2018 a and b; PEREIRA et al., 2018).

The aim of this study was to evaluate the relationship of workload and sizing with the training indicator (mean hours of training per professional) of a Continuing Education Program focused on Nursing staff in a Brazilian University Hospital.

MATERIAL AND METHODS

Research Field and Training Cycle description

The study was conducted at the Clinical Hospital of Uberlandia - CHU - ("Hospital de Clínicas de Uberlândia – HCU") of the Federal University of Uberlândia ("Universidade Federal de Uberlândia – UFU"), state of Minas Gerais, Brazil. This study is a sequential study of quality indicators applied to the Training Cycle of the Clinical Hospital of Uberlândia (TCCHU) that is a continuing education strategy of the CHU. The Nursing Department proposed the TCCHU as a monthly activity with three to four lectures, which are offered in the morning, afternoon and evening shifts for three days, which gives the professional nine possibilities to participate in each course during the work time in a system of compulsory participation. This Program in 2013 and 2014 offered 72 hours of training for the nursing professionals. Additional details of the TCCHU can be viewed in Mendes-Rodrigues et al. (2018 a, b) and Pereira et al. (2018).

The study has a management and administrative nature. Data were collected and analyzed to be part of the evaluation of management activities and control of the CHU Nursing Department. The study was approved internally by the CHU.

Training Indicator

The training indicator used here was the mean number of hours of training per professional calculated for each unit of the CHU. This indicator was obtained from Mendes-Rodrigues et al. (2018, b), where additional details from it can be observed. This indicator represents the mean value of hours that professionals from each unit participated in the TCCHU and was used to reflect the demand for continuing education from each unit from the Hospital. The indicator refers to 2013 and 2014.

Workload and Sizing Data

To relate the nursing workload and sizing with the participation in TCCHU, we used data on the measurement of nursing workload and sizing available for the year 2013 from the CHU (ANTUNES et al., 2013). The workload in the CHU was measured based on two methodologies. One was the Functional Site System and another was the Patient Classification System (COFEN, 2004), here treated as Score System.

Functional Site System

For sectors where there are no inpatients, the nursing workload was measured by the Functional Site System, based on the resolution COFEN 293/04 (COFEN, 2004). The Functional Site is defined as a unit of measure that has three-dimensional meaning, an activity(s), a location and a period of time (COFEN, 2004). Here each Functional Site was considered as a nursing professional allocated for six hours to a workstation (or activity). All workstations in the unit are recorded and quantified (ANTUNES et al., 2013), and, from there, the sizing is performed according to the specific methodology (COFEN, 2004).

From the number of functional sites obtained by this method, the presence or absence of excessive workload in units was calculated by dividing the number of functional sites obtained per unit by the number of professional per unit. The results above 4.27 functional sites per professional indicate excessive workload, since for each 4.27 functional sites is necessary a professional working 36 hours per week. These measurements were based on the CHU personnel sizing and on a security index of 40,43% adopted in CHU (ANTUNES et.

al., 2013). All units evaluated by Functional Site System show excessive workload in 2013.

Score System

In the inpatient units we used the Score System. For this, we used some patient classification systems. For adult patients we used an adaption of the classification system proposed of Santos et al. (2007). The patients evaluated were 13 years or older. The system provides a score that ranges from 12 to 48 (12 items with an individual scale of 1 to 4). Based on the score the patients could be classified into four types of nursing care: minimal care (scores 12 to 20), intermediate care (scores 21 to 30), semi-intensive care (scores 31 to 39) and intensive care (scores 40 to 48). This instrument did not show good adaptation in Surgical Unit 5 (a sector with day hospital characteristics mixed with inpatient unit) and the Burns Sector (differential complexity of burn patients not addressed in the instrument). Thus, these two sectors were also classified with the Functional Site System.

For adult psychiatric patients in the Psychiatry Sector, we adapted the patient classification systems proposed by Martins and Forcella (2006). This system provides a score that ranges from 11 to 33 (11 items with an individual scale of 1 to 3). Based on the score, the patients could be classified into four kinds of nursing care: minimal care (scores 11 to 16), intermediate care (scores 17 to 22), semi-intensive care (scores 23 to 28) and intensive care (scores 29 to 33). The instrument did not show good adaptation to the unit (excessive increase in workforce and low experience of the unit professionals with the instrument). Thus, the sector was also sized with the Functional Site System.

For pediatric patients (younger than 13 years) admitted at the Pediatric Unit, we adapted the patient classification system proposed by Dini (DINI, 2007; DINI; GUIRARDELLO, 2013). This system provides a score that ranges from 11 to 44 (11 items with an individual scale of 1 to 4). Based on the score the patients could be classified into four types of nursing care: minimal care (scores 11 to 18), intermediate care (scores 19 to 27), semi-intensive care (scores 28 to 36) and intensive care (scores 37 to 44).

In the study, we used the value of the mean score for the each system obtained in the respective sectors in 2013 to indicate the mean nursing workload from each unit. The number of hours of nursing care that a patient needs for minimal care is 3.8 hours per day, for intermediate care it is 5.6 hours per day, for semi-intensive care it is 9.4 hours per day and for intensive care it is 17.9 hours per day (COFEN, 2004).

For the Score system, we performed two analyses, one with the Scores of Santos, excluding all units where it was not appropriate (Surgical Unit 5 and the Burn Unit), and one with Mixed scores, which included all units evaluated by the score of Santos (Adult) regardless of the setting, and the adjusted scores of Dini (Pediatric) and Forcella (Psychiatric), here treated as Mixed Scores. For the use of Mixed Scores, since the scores of Dini and Forcella have different amplitudes, the two scores were adjusted to the extent of the score of Santos. For this, we used the correction AS= MS*48/44 for the score of Dini, and AS= MS*48/33 for the score of Forcella, where AS is the Adjusted Score and MS corresponds to the obtained Mean Score of each unit for each instrument.

For the Functional Site System we also performed two analyses. The first one included all outpatient units, support and administrative units, where the workload was measured by Functional Site System. For the second analysis, we additionally included the inpatient units, where this metric was also used and well adjusted (Surgical 5, Psychiatry and Burn units) justified by the low adjustment from the Score System in these units.

In the Emergency Room, the methodology used in the Clinic Emergency Room and in the Cardiac Emergency Room to measure the workload was the Santos Score, which was well adjusted. In the other units, we used a mix of the Score System and the Functional Site System only for sizing. The sizing in Emergency Room was calculated from all units together once each unit present services with different complexities. In the Maternity unit we also used a mix of the Score System and the Functional Site System only for sizing. In the Intensive Care Units were used the Nursing Activities Score only for sizing (QUEIJO; PADILHA, 2009; ANTUNES et al., 2013). Units with less than four professionals were grouped with another unit with a similar profile. See Antunes et al. (2013) for details.

Nursing Sizing Adequacy Percentage

From the two methodologies we obtained the Nursing Sizing Adequacy Percentage (NSAP), calculated as NSAP = ((NPS - NPA)/ NPA) * 100, where the NPS is the Number of Professionals Sized to each unit and NPA corresponds to the Number of Professionals Allocated in each unit. Positive values indicate excessive workload, while negative numbers indicate relief (more professionals sized than allocated), and zero indicate adequate

workload. This index allows the comparison of all units of the CHU, regardless of the method used for sizing. This metric not was calculated for each subunit from the Emergency Room. In 2013, this metric ranged from -19% to 300% (ANTUNES et al., 2013; Table 1 and 2).

Statistical Analysis

The relation of workload with the mean number of training hours per professional was tested fitting the data to linear regression models by ordinary least squares method. The data from the Scores Systems (pure or mixed) and the Functional Site System were adopted as independent variables and the mean hours per professional per unit as a dependent variable. The significance of the model was tested with ANOVA and the intercept and slope of the model were tested with Student's *t*-test. We also performed the analysis to compare the relationships of the number of professionals in 2013 in the CHU with the number of professionals included in the calculation of mean hours per professional. All analyses were performed using SPSS 20.0 package and a 5% significance level was adopted for all analyses.

RESULTS

In the hospital we allocated from four to 153 professionals to each unit, which represents the workforce from each unit. The number of professionals per unit that participated of the TCCHU from the Continuing Education Program oscillating from 4 to 229 professionals per unit. The Nursing Sizing Adequacy Percentage (NSAP) in 2013 oscillated from -19.23% to 250.00%. The mean values from the Santos Score oscillated from 18.98 to 35.84, and the number of functional sites per professional oscillated from 4.55 to 8.73. These values were a reflection of the complexity of the administrative and healthcare structure of the institution. The mean Dini Score for Pediatrics was 19.17 and the Mixed Score was 21.94. For the Psychiatry unit, the mean Forcella Score was 18.67 and the Mixed Score was 27.16. The mean Santos Score for the Burn Unit was 25.25. The data from sizing, number of professionals allocated in 2013 and included in this study are presented in Table 1 and 2.

Table 1. Nursing workload evaluated by the Score of Santos System, staff allocated for 2013, sizing and mean number of training hours per professional of each inpatient unit of the Clinical Hospital of Uberlândia, a tertiary university hospital from Brazil.

Unit	A2013	N2014	NSAP	Santos	h.p^{-1}
Adult Intensive Care	97	99	28.86		28.92
Emergency Room (ER):	153	229	51.63		39.82
Medical Clinic ER		36			38.47
Surgical ER		56			40.04
Clinic ER		18		35.84	42.61
Cardiac ER		17		26.15	39.41
Pediatric ER		16			39.29
Gynecologic ER		16			39.94
Infectious Diseases	22	19	-18.18	18.98	29.74
Maternity	35	39	34.29		29.13
Medical Clinic	64	60	4.69	22.02	37.50
Neonatal Intensive Care	80	87	78.75		39.83
Oncology	33	40	15.15	21.83	26.43
Pediatric	52	56	-19.23		29.29
Pediatric Intensive Care	32	36	25.00		39.80
Surgical 1	66	70	28.79	24.23	28.30
Surgical 2	49	46	-2.04	24.09	35.47
Surgical 3	33	32	3.03	21.00	25.91
Transplant Service	24	26	33.33	21.42	37.27

Legend: A2013: number of professionals allocated to each unit in the year of 2013, h.p^{-1}: mean hours of training per professional of each unit, N2014: number of professionals included in the calculation of h.p^{-1}, Santos: Mean Score of Santos per unit, NSAP: Nursing Sizing Adequacy Percentage (NSAP) in 2013. (Adapted from Antunes et al. 2013)

Table 2. Nursing workload evaluated by Functional Site per Professional, staff sizing for 2013, sizing and mean number of training hours per professional of each outpatient and some inpatient units of the Clinical Hospital of Uberlândia, a tertiary university hospital from Brazil.

Unit	A2013	N2014	NSAP	FS.p^{-1}	h.p^{-1}
Ambulatory Central	26	25	80.77	7.42	19.85
Ambulatory Dermatology	11	13	45.00	5.91	47.77
Ambulatory Gynecology	9	10	44.44	5.67	40.60
Ambulatory Jaraguá	17	15	41.18	5.41	35.93
Ambulatory Pediatric	11	12	27.27	4.55	38.17
Ambulatory Quimioterapy	20	14	45.00	5.38	21.06
Ambulatory Radiotherapy	9	15	66.67	6.67	16.73
Ambulatory Traumatology	8	8	37.50	5.63	48.25
Burn (inpatient unit)	15	14	46.67	5.93	42.00
Continuing Education	4	5	250.00	6.00	42.00
Hemodialysis	15	21	40.00	5.60	32.95
Hemodynamic	11	10	109.09	8.73	31.60
Home hospitalization service	7	6	28.57	4.86	29.80
Homecare service	8	8	37.50	5.50	32.63
Infection Committee	4	4	100.00	5.25	45.67
Nursing Board	21	23	100.00	8.00	22.92
Obstetric Center	28	29	89.29	7.79	33.41
Propaedeutics	41	29	39.02	5.78	23.14
Psychiatry (inpatient unit)	27	29	59.26	6.48	35.17
Sterilization Center	45	41	84.44	7.80	14.93
Surgical Center	81	89	58.02	6.53	15.54
Surgical 5 (inpatient unit)	17	16	47.06	5.82	38.63

Legend: A2013: number of professionals allocated to each unit in the year of 2013, h.p^{-1}: mean hours of training per professional for each unit, N2014: number of professionals included in the calculation of h.p^{-1}, FS.p^{-1}: Functional Sites per Professional in 2013, NSAP: Nursing Sizing Adequacy Percentage (NSAP) in 2013. (Adapted from Antunes et al. 2013)

When the training indicator mean hours per professionals was related to the Mixed Score, no linear relationship between both was detected (Figure 1A, $F_{1,16} = 2.51$, $P = 0.133$, $R^2 = 0.1357$). On the other hand, when only the Score of Santos was applied, in the units where this metric was well adjusted the linear relationship with the mean number of training hours was significant (Figure 1B, $F_{1, 8} = 5.737$, $P = 0.044$, $R^2 = 0.3966$; t for β_0 =-1.292, $P = 0.233$, t for β_1 =2.395, $P = 0.044$), showing that the training indicator increases with the increase of the Score of Santos. For this analysis, it was necessary to perform a transformation with $\log_{10}$ for the Score of Santos data, as the model was marginally significant with the original data ($P = 0.051$), model with transformation: $y = -40.456 + 54.480*\log_{10}x$.

We compared the workload measured by Functional Site per Professional in the Departments of Support and Ambulatory with the training indicator and no linear relation with the mean hours of training per professional was detected (Figure 2A, $F_{1, 17} = 2.51$, $P = 0.133$, $R^2 = 0.1917$). When the data from the two inpatient units were included in the analyses using the Functional Site per Professional, the relation of Functional Site per Professional and the mean hours of training per professional was significant (Figure 2B, $F_{1, 20} = 4.785$, $P = 0.041$, $R^2 = 0.1931$; t for β_0 =4.818, $P < 0.001$, t for β_1 =-2.188, $P < 0.041$). This demonstrated that in the outpatient or support units the taining indicator decreases with the increase of the Functional Site per Professional.

The number of professionals allocated in each unit in 2013 was not linearly related to the mean number of hours of training per professional for the analyzed units ($F_{1, 33} = 0.699$, $P = 0.409$, $R^2 = 0.0208$) (Figure 3A). The number of professionals allocated in 2013 was linearly related to the number of professionals that participated in the TCCHU and were used to calculate the mean number of hours of training per professional ($F_{1, 33} = 552.87$, $P < 0.001$, $R^2 = 0.9437$; t for β_0 =3.952, $P < 0.001$, t for β_1 =23.513, $P < 0.001$; $y = 1.2835x - 6.6588$). The number of professionals that participated in the TCCHU and were used to calculate the mean number of hours of training per professional was not linearly related to the mean number of hours of

training per professional for the analyzed units ($F_{1, 38}$ = 3.72, P = 0.0583, R^2 = 0.0891, y = -0,1079x + 36.6541).

The deficit or surplus percentage of dimensioning, evaluated by the Nursing Sizing Adequacy Percentage (NSAP), was also not linearly related to the mean number of hours of training per professionals for the units (Figure 3B, $F_{1, 33}$ = 0.204, P = 0.655, R^2 = 0.006; t for β_0 = 14.246, P < 0.001, t for β_1 = 0.451, P = 0.655; y = 0.014x + 31.726). This was perhaps caused by the high range in this percentage (-19.23 to 250%), raised by the low number of professionals in some units (five units had less than 10 professionals and 15 units had less than 20 professionals), which may overestimate the percentages. But after exclusion of units with values of NSAP higher than 99% of surplus in sizing, we also did not find a linear tendency in these data (results not showed). The percentage of increase or decrease in sizing in 2013 for the subunits of the Emergency Room could not be calculated and included in the analysis mainly because of the presence of inpatient and outpatient services in the same units, so this measure was calculated for the Emergency Room as a whole.

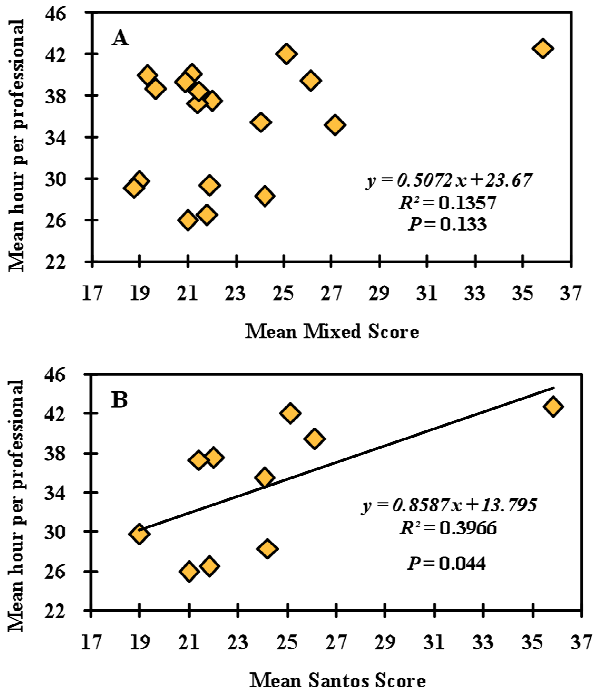

Figure 1. Relation between mean hour of training per professional in a Continuing Education Program with the Nursing workload measured by the Score of Santos or Mixed Score in a tertiary university hospital from Brazil. (A) Mixed Score of all inpatient units. (B) Santos Score restricted to units where this score was well adjusted.

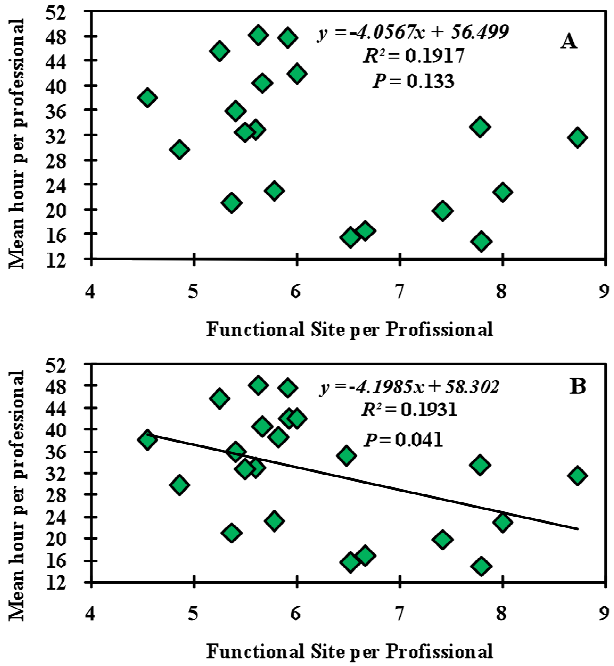

Figure 2. Relation between mean hour of training per professional in a Continuing Education Program with functional sites per professional, a Nursing workload measured by Functional Site System in a tertiary university hospital from Brazil. (A) Analyses performed for the outpatient units. (B) Analyses performed with all units where the Functional Site System was applied.

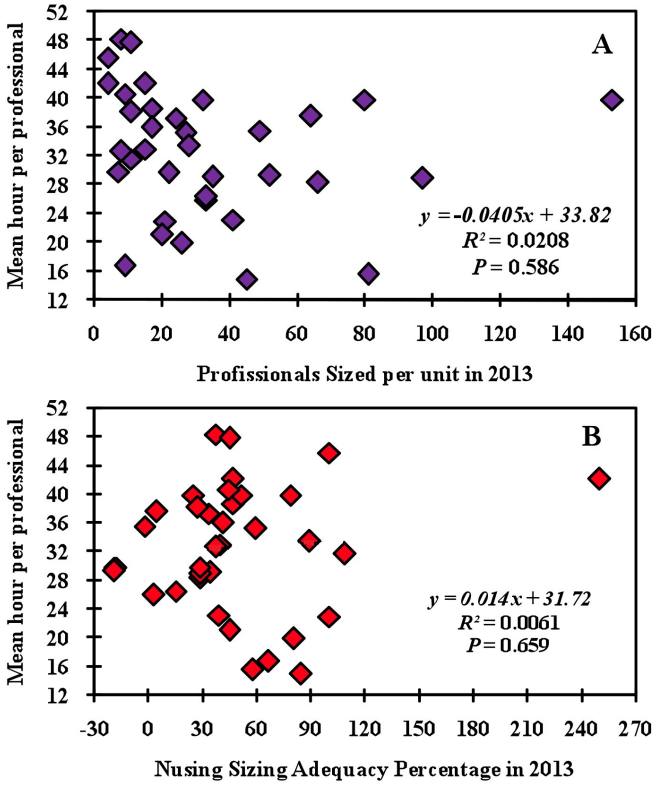

Figure 3. Relation between mean hours of training per professional in a Continuing Education Program with the number of professionals sized per unit or the Nursing Sizing Adequacy Percentage of a tertiary university hospital from Brazil. (A) Number of professionals allocated per unit in the year 2013. (B) Nursing Sizing Adequacy Percentage in 2013.

DISCUSSION

We demonstrate the impact of nursing workload on training indicators. While with inpatient services the increased workload was related to an increase in the training indicator (mean hours of training per professional), outpatient units (or support services) show the contrary, where the increased workload was related to a decrease in the training indicator, behavior also observed in the decrease in participation in the Continuing Education Program (MENDES-RODRIGUES et al., 2018 b). Probably the focus of the training program has led to a more positive perception of inpatient services; while outpatient units see the topics or contents of the courses with less applicability since these units are devoted to primary or less complex healthcare. With this, it would be necessary to create a specific program to take into account the characteristics of each one of the departments or units, or even that the services themselves propose these methodologies or courses to their professionals. The association between workload and training indicator is really important, once studies have clearly associated the excessive nursing workload with higher patient mortality rates and higher healthcare associated infections rates (SAMAN et al., 2013; DAUD-GALLOTTI et al., 2014; NOGUEIRA et al., 2014).

The inverse relationship of workload with the participation in the Continuing Education Program observed in outpatient units could be a reflection of the focus of the Program, which is more focused on nursing direct assistance to the patient in inpatient units with little focus on administration or activities related to units without patients. This focus reflected in other indicators of the same institution and program, as the attendance indicator, where inpatient units showed higher attendance rates (MENDES-RODRIGUES et al., 2018 a) and a higher training indicator (MENDES-RODRIGUES et al., 2018 b). Even satisfaction with the Program appears to be dependent on the professional and the unit profile (PEREIRA et al., 2018). The topics of the program also could restrict the participation of some units as happened in outpatient units (MENDES-RODRIGUES et al., 2018 a and b) and explain the inverse relationships.

Other studies have indirectly shown that a high workload, an inadequate number of professionals on the job, and an incorrect patient nurse ratio, are barriers to participation in continuing education programs (BARRIBALL, 2002; PENZ et al., 2007; COVENTRY et al., 2015), and other studies report the interruption of the educational activity or non-participation due to excessive workload in service (YFANTIS; TINIAKOU; YFANTI, 2010). However, our study showed clearly the effect of the workload on training indicators. No other study conducted a direct and quantitative comparison with workload indicators. Our study is one of the few, or perhaps the only one, to measure the effect of the workload on adherence or participation in training, especially in high organizational complexity hospitals, as university and tertiary hospitals.

The use of the Functional Site System to measure nursing workload is greatly influenced by the perception of the nurse. Personnel sizing is better when it is based on the experience of the unit managers, and not on the functional site methodology. The Patient Classification System is more objective than Functional Site System. The methodologies and information available and required for an optimal sizing for these services is limited and may vary among units with different profiles, as in different ambulatories services (SWAN; GRIFFIN, 2005). This reality is also present in administrative departments, which require specific sizing methods, many of which are not yet available and validated in literature. In the case of Intensive Care Units from the same hospital evaluated here, where were applied the Nursing Activities Score (ANTUNES et al., 2013), the comparison and relation with the training indicator was not possible because the services inside the subunits from Adult, Pediatric and Neonatal ICUs are not segmented and include other services than intensive care, making the comparison inadequate.

Nursing staff training is an alternative to improve knowledge of the professionals. However, inadequate personnel sizing seems to be a limiting factor for the participation of professionals. Training and participation in Continuing Education Programs during the work hours and out of patient care units is one of the most appropriate arrangements for this purpose. Therefore, it is necessary to address the problem of personnel sizing.

Despite this, our data showed that the sizing or the number of professionals per unit is not associated to training indicators. Apparently, the profile or complexity of the unit measured by workload is more important than sizing in deciding to participate or not in Continuing Education Programs. Another factor that can explain this apparent contradiction is that the institution evaluated here corrects the inadequate personnel-sizing problem with overtime or remunerated extra shifts. Unfortunately, it was not possible to measure the impact of this factor on our data. The policy of

training during work time was a strategy adopted by the nursing director of the institution in this period. Nevertheless, Brazilian health institutions have had a very low financial contribution in hospital training programs compared to the rest of the world (JERICÓ; CASTILHO, 2004), in spite of their importance or direct effect in service quality.

The methodology used by the Continuing Education Program in the institution evaluated here may have been a factor that favored the participation of many of the units. Participation during work time allowed for many units to program themselves in advance, favoring the increment in the training indicator. However, it appears that this participation and programming is not homogeneous in the institution, being too dependent on the profile of the unit (MENDES-RODRIGUES et al., 2018 b). Many units do not release or schedule the participation of their professionals, independently of the compulsory character of the training courses. This compulsory methodology was effective to improve the attendance rates in some courses (SOUSA NETO; MENDES-RODRIGUES, 2017). It also showed positive results related to patient safety courses, being effective in transferring knowledge to participants, in spite of low increment rates (PEREIRA et al., 2017).

The encouragement and improvement of indicators of continuing education should be a mandatory part of the evaluation of health services, primarily by positive results on the quality of health services provided and patient health indicators (CHO et al., 2015). The training offering and the continuing education program has reflected in the improvement of quality indicators associated with health care in the institution evaluated here (e.g. MENDES RODRIGUES et al., 2017 b)

CONCLUSION

We were able to establish that in direct assistance units (inpatient units) the increase in participation in the Continuing Education Program is related to the increase in workload (an indicator of patient complexity), while in the outpatient units (administrative and support sectors), the workload increase leads to a decrease in participation in the Continuing Education Program. The sizing or the number of professionals in each unit no affects the training indicator. These data show that the professional that cares for more complex patients could depend on updates and technological advancement or that the managers of these services promote better participation in the Program.

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RESUMO: Apesar da falta de pessoal e a sobrecarga de trabalho terem sido relatadas como fatores limitantes à participação em atividades de educação continuada, há uma ausência de estudos que avaliem diretamente essa associação. Diante disto, o objetivo do estudo foi analisar a relação entre a carga de trabalho e o dimensionamento com o indicador número médio de horas de treinamento por profissional por unidade em um Programa de Educação Continuada em Enfermagem de um Hospital Universitário Brasileiro. Para isto usamos um dimensionamento fundamentado em sistemas de classificação de paciente (Adulto, Pediátrico e Psiquiátrico) ou na metodologia de sitio funcional proposta pelo Conselho Federal de Enfermagem e associamos o valor médio destes parâmetros com o número médio de horas de treinamento por profissional por unidade do Hospital. Enquanto nos serviços de internação a maior carga de trabalho está relacionada ao aumento do indicador de treinamento, nos serviços de apoio ou unidades administrativas mostram o contrário, onde com o aumento da carga de trabalho ocorre a diminuição da participação no Programa de Educação Continuada. O número de profissionais na unidade ou o percentual de adequação do dimensionamento, que representa a adequação ou não do dimensionamento, não foram associados ao número de horas de treinamento. Observamos que a complexidade do paciente é um fator mais preponderante na demanda por capacitação e que a carga de trabalho em si não é o principal fator limitante pelo menos em unidades de pacientes. A carga de trabalho afetou as unidades sem pacientes provavelmente pelo foco do Programa de Educação Continuada ser voltado mais a assistência direta ao paciente. Concluímos que a complexidade do paciente foi um fator relevante na participação do programa, mostrando que os profissionais que lidam com estes pacientes buscam por mais aperfeiçoamento.

PALAVRAS-CHAVE: Categoria Profissional. Treinamento em serviço. Políticas públicas de saúde. Enfermagem. Carga de trabalho. Dimensionamento de pessoal.

REFERENCES

ANTUNES, A. V.; COSTA, M. N. Dimensionamento de pessoal de enfermagem em um hospital universitário. **Revista Latino-americana Enfermagem**, Ribeirão Preto, v. 11, n. 3, p. 832-839, 2003. http://dx.doi.org/10.1590/S0104-11692003000600019

ANTUNES, A. V.; MENDES-RODRIGUES, C.; GOMES, F. A.; REZENDE, G. J.; BRAGA, I. A.; TEIXEIRA, L. M. R.; MONTEIRO, A. B. C. **Dimensionamento de Pessoal de Enfermagem (Technical Report)**. Uberlândia: Universidade Federal de Uberlândia – Hospital de Clínicas de Uberlândia, 2013. 93 p.

BARRIBALL, K. L. **An exploratory study of nurses views and experiences of continuing professional education**. [PhD thesis]. England, University of London, King's College (United Kingdom); 2002.

BREWER, C. S.; NAUENBERG, E.. Future intentions of registered nurses employed in the western New York labor market: Relationships among demographic, economic, and attitudinal factors. **Applied Nursing Research**, Philadelphia, v. 16, n. 3, p. 144-155, 2003. http://dx.doi.org/10.1016/S0897-1897(03)00046-6

CHENSO, M. Z. B.; HADDAD, M. C. L.; SÊCCO, I. A. O.; DORIGÃO, A. M.; NISHIYAMA, M. N.. Estimate of Nursing personnel in a University Hospital of the state of Paraná: a proposal for adequacy. **Semina Ciências Biológicas e da Saúde**, Londrina, v. 25, p. 81-92, jan./dez. 2004. http://dx.doi.org/10.5433/1679-0367.2004v25n1p81

CHO, E.; SLOANE, D. M.; KIM, E.; CHOI, M.; YOO, I. Y.; LEE, H. S.; AIKEN, L. H.. Effects of nurse staffing, work environments, and education on patient mortality: An observational study. **International Journal of Nursing Studies**, Philadelphia, v. 52, n. 2, p. 535-542, 2015. http://dx.doi.org/10.1016/j.ijnurstu.2014.08.006

CHONG, M. C.; SELLICK, K.; FRANCIS, K.; ABDULLAH, K. L. What influences Malaysian nurses to participate in continuing professional education activities?. **Asian Nursing Research**, Philadelphia, v. 5, n. 1, p. 38-47, 2011. http://dx.doi.org/10.1016/S1976-1317(11)60012-1

COFEN - Conselho Federal de Enfermagem. **Resolução COFEN 293/2004**. Dispõe sobre o dimensionamento de pessoal de enfermagem. Available: http://www.cofen.gov.br/resoluo-cofen-2932004_4329.html. Accessed 9 mar 2017.

COVENTRY, T. H.; MASLIN-PROTHERO, S. E.; SMITH, G. Organizational impact of nurse supply and workload on nurses continuing professional development opportunities: an integrative review. **Journal Advanced Nursing**, Malden, v. 71, n. 12, p. 2715-27, 2015. http://dx.doi.org/10.1111/jan.12724. http://dx.doi.org/10.1111/jan.12724

DAUD-GALLOTTI, R. M.; COSTA, S. F.; GUIMARÃES, T.; PADILHA, K. G.; INOUE, E. N.; VASCONCELOS, T. N.; RODRIGUES, F. S. C.; BARBOSA, E. V.; FIGUEIREDO, W. B.; LEVIN, A. S.. Nursing workload as a risk factor for healthcare associated infections in ICU: A prospective study. **PLOS ONE**, São Francisco, v. 7, n. 12, p. e52342, 2012. http://dx.doi.org/10.1371/journal.pone.0052342.

DINI, A. P. **Sistema de classificação de pacientes pediátricos, construção e validação de instrumento.** [Dissertation]. Campinas: Universidade Estadual de Campinas, Faculdade de Ciências Médicas. 2007.

DINI, A. P.; GUIRARDELLO, E. B. Construction and validation of an instrument for classification of pediatric patients. **Acta Paulista Enfermagem**, São Paulo, v. 26, n. 2, p. 144-9, 2013. http://dx.doi.org/10.1590/S0103-21002013000200007

HAMZEHGARDESHI, Z.; SHAHHOSSEINI, Z. A cross-sectional study of facilitators and barriers of Iranian nurses' participation in continuing education programs. **Global Journal of Health Science**, Toronto, v. 6, n. 2, 2014. http://dx.doi.org/10.5539/gjhs.v6n2p183

JERICÓ, M. C.; CASTILHO, V. Análise de alguns indicadores relacionados aos recursos humanos de uma organização hospitalar. **Nursing**, São Paulo, v. 7, n. 74, p. 23-27, 2004.

MARTINS, P. A. S. F.; FORCELLA, H. T. Patient system classification in psychiatric nursing. **Acta Paulista Enfermagem**, São Paulo, v. 19, n. 1, p. 92-99, 2006. http://dx.doi.org/10.1590/S0103-21002006000100010

MENDES-RODRIGUES, C.; COSTA, K. E. S.; ANTUNES, A. V.; GERALDO JÚNIOR, G.; GOMES, F. A.; SILVA, D. V. Carga de trabalho e dimensionamento de pessoal de enfermagem em unidades de terapia intensiva. **Revista de Atenção a Saúde,** São Caetano do Sul, v. 15, n. 15, p. 5-13, 2017. http://dx.doi.org/10.13037/ras.vol15n53.4159

MENDES-RODRIGUES, C.; PEREIRA, E. B. S.; SOUSA NETO, R. L.; RESENDE, J.; FONTES, A. M. S. Could legal requirements in nursing practice trigger actions that would change the rates of urinary tract infections? A case study in Brazil. **American Journal of Infection Control**, St. Louis, v. 45, n. 5, p. 536-538, 2017. http://dx.doi.org/10.1016/j.ajic.2017.01.036.

MENDES-RODRIGUES, C.; PEREIRA, E. B. S.; SOUSA NETO, R. L.; GOMES, F. A.; SILVA, D. V.; ANTUNES, A. V.; FELICE, R. O.; MENDONÇA, G. S.; WOLKERS, P. C. B.; ALVES, T. C. F.; SOUZA, R. C.; FÉLIX, D. A. C. Quality Indicators applied in a Nursing Continuing Education Program of a High Complexity University Hospital from Brazil: I - Attendance Indicators. **Bioscience Journal**, Uberlândia, v. 34, n. 1, p. 231-242, 2018. http://dx.doi.org/10.14393/BJ-v34n1a2018-36155

MENDES-RODRIGUES, C.; PEREIRA, E. B. S.; SOUSA NETO, R. L.; GOMES, F. A.; SILVA, D. V.; ANTUNES, A. V.; FELICE, R. O.; MENDONÇA, G. S.; WOLKERS, P. C. B.; ALVES, T. C. F.; SOUZA, R. C.; FÉLIX, D. A. C. Quality Indicators applied in a Nursing Continuing Education Program of a high complexity University Hospital of Brazil: III – Training Indicators. **Bioscience Journal**, Uberlândia, v. 34, n. 2, p. 000-000, 2018.

NETO, R. L. S.; MENDES-RODRIGUES, C. Continuing Education Program: a comparative study between voluntary and mandatory regimes applied to a patient safety course. **Journal of Patient Safety and Infection Control**, New Delhi, v. 5, n. 1, p. 45-46, 2017. http://dx.doi.org/10.4103/jpsic.jpsic_10_17

NI, C.; HUA, Y.; SHAO, P.; WALLEN, G. R.; XU, S.; LI, L. Continuing education among Chinese nurses: A general hospital-based study. **Nurse Education Today**, Philadelphia, v. 34, n. 4, p. 592-7, 2014. http://dx.doi.org/10.1016/j.nedt.2013.07.013

NOGUEIRA, L. D. S.; DOMINGUES, C. D. A.; POGGETTI, R. S.; SOUSA, R. M. C. D. Nursing workload in intensive care unit trauma patients: Analysis of associated factors. **PLOS ONE**, São Francisco, v. 9, n. 11, p. e112125, 2014. http://dx.doi.org/ 10.1371/journal.pone.0112125

PENZ, K.; D'ARCY, C.; STEWART, N.; KOSTENIUK, J.; MORGAN, D.; SMITH, B. Barriers to participation in continuing education activities among rural and remote nurses. **Journal of Continuing Education Nursing**, Thorofare, v. 38, n. 2, p. 58-68, 2007. 10.3 http://dx.doi.org/928/00220124-20070301-03

PEREIRA, E. B. S.; MENDES-RODRIGUES, C.; SOUSA NETO, R. L.; GOMES, F. A.; SILVA, D. V.; ANTUNES, A. V.; FELICE, R. O.; MENDONÇA, G. S.; WOLKERS, P. C. B.; ALVES, T. C. F.; SOUZA, R. C.; FÉLIX, D. A. C. Quality Indicators applied in a Nursing Continuing Education Program of a high complexity University Hospital of Brazil: II - Satisfaction Indicators. **Bioscience Journal**, Uberlândia, v. 34, n. 1, p. 243-250, 2018. http://dx.doi.org/10.14393/BJ-v34n1a2018-36514

PEREIRA, E. B. S.; SOUZA, R. C.; MENDES-RODRIGUES, C.; SOUSA NETO, R. L.; BATISTA, E. S.; RODRIGUES, V. S.; LIMA JUNIOR, A. J.; SILVA, D. V. Low increment in the knowledge concerning patient safety in a nursing continuing education program. **IOSR Journal of Nursing and Health Science**, v. 6, p. 55-61, 2017. http://dx.doi.org/doi:10.9790/1959 - 0601015561

QUEIJO, A. F.; PADILHA, K. G. Nursing Activities Score (NAS): adaptação transcultural e validação para a língua portuguesa. **Revista da Escola Enfermagem USP**, São Paulo, v. 43, n. spe, p. 1018-1025, 2009. http://dx.doi.org/10.1590/S0080-62342009000500004.

SAMAN, D. M.; KAVANAGH, K. T.; JOHNSON, B.; LUTFIYYA, M. N. Can inpatient hospital experiences predict central line-associated bloodstream infections? **PLOS ONE**, São Francisco, v. 8, n. 4, p. e61097, 2013. http://dx.doi.org/10.1371/journal.pone.0061097

SANTOS, F.; ROGENSKI, N. M. B.; BAPTISTA, C. M. C.; FUGULIN, F. M. T. Patient classification system: a proposal to complement the instrument by Fugulin et al. **Revista Latino-americana Enfermagem**, Ribeirão Preto, v. 15, n. 5, p. 980-985, 2007. http://dx.doi.org/10.1590/S0104-11692007000500015

SWAN, B.; GRIFFIN, K. F. **Measuring nurse workload in ambulatory care**. School of Nursing Faculty Papers & Presentations. Paper 6. Available: http://jdc.jefferson.edu/nursfp/6. 2005.

YFANTIS, A.; TINIAKOU, I.; YFANTI, A. Nurses' attitudes regarding continuing professional development in a district hospital of Greece. **Health Science Journal**, Wilmington, v. 4, n. 3, p. 193-200, 2010.