INTENSIVE CARE UNIT PROFESSIONALS' KNOWLEDGE AND BEHAVIOR RELATED TO THE ADOPTION OF CONTACT PRECAUTIONS

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This study aimed to assess the knowledge and behavior of professionals working in Intensive Care Units (ICU) related to the adoption of contact precautions for the control of hospital infections (HI). This cross-sectional study used a semi-structured questionnaire to collect data. Descriptive and multivariate analyses were carried out, including logistic regression and decision tree using CHAID algorithm. A total of 102 professionals participated in the study, of whom 36.3% presented appropriate knowledge and 51% appropriate behavior in relation to HI control measures. Nursing professionals had almost four times more chance (OR = 3.58, CI 1.48-8.68) of presenting appropriate behavior than the remaining professionals. The multivariate analysis did not reveal variables associated with knowledge. No statistically significant association was found between knowledge and behavior (p = 0.196). These results suggest the need to implement educational activities so as to permit a balance between theory and professionals' practice concerning HI preventive measures, aiming to improve knowledge and behavior.

DESCRIPTORS: intensive care units; cross infection; risk factors

CONOCIMIENTO Y COMPORTAMIENTO DE LOS PROFESIONALES DE UN CENTRO DE TERAPIA INTENSIVA EN RELACIÓN A LA ADOPCIÓN DE LAS PRECAUCIONES DE CONTACTO

El objetivo fue evaluar el conocimiento y comportamiento de los profesionales de un CTI en relación a la adopción de precauciones de contacto para el control de las infecciones hospitalarias (IH). Se realizó estudio transversal, utilizando un cuestionario semiestructurado para recolección de datos. Fue realizado análisis descriptivo y multivariado (regresión logística y algoritmo CHAID). Participaron del estudio 102 profesionales, 36,3% presentaron conocimiento adecuado y 51% comportamiento adecuado para las medidas de control de IH. Los profesionales de enfermería presentaron casi cuatro veces más probabilidad (OR=3,58; IC; 1,48–8,68) de tener comportamiento adecuado que los demás profesionales. Ninguna variable fue asociada al conocimiento. No hubo asociación estadísticamente significativa entre conocimiento y comportamiento (p=0,196). Se evidenció la necesidad de implementar actividades de orientación capaces de permitir el equilibrio entre la teoría y la práctica de los profesionales en lo que se refiere a medidas de prevención de IH, con el objetivo de perfeccionar el conocimiento y el comportamiento.

DESCRIPTORES: unidades de terapia intensiva; infección hospitalaria; factores de riesgo

CONHECIMENTO E COMPORTAMENTO DOS PROFISSIONAIS DE UM CENTRO DE TERAPIA INTENSIVA EM RELAÇÃO À ADOÇÃO DAS PRECAUÇÕES DE CONTATO

Objetivou-se avaliar o conhecimento e comportamento dos profissionais de um CTI em relação à adoção das precauções de contato para o controle das infecções hospitalares (IH). Realizou-se estudo transversal, utilizando-se questionário semiestruturado para coleta de dados. Foi realizada análise descritiva e multivariada (regressão logística e algoritmo CHAID). Participaram do estudo 102 profissionais, 36,3% apresentaram conhecimento adequado e 51% comportamento adequado para as medidas de controle de IH. Profissionais de enfermagem apresentaram quase quatro vezes mais chance (OR=3,58; IC 1,48–8,68) de ter comportamento adequado que os demais profissionais. Nenhuma variável foi associada ao conhecimento. Não houve associação estatisticamente significativa entre conhecimento e comportamento (p=0,196). Evidencia-se a necessidade de implementar atividades de orientação capazes de permitir equilíbrio entre teoria e prática dos profissionais no tocante às medidas de prevenção de IH, visando aprimorar o conhecimento e o comportamento.

DESCRITORES: unidades de terapia intensiva; infecção hospitalar; fatores de risco

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INTRODUCTION

There are reports concerning high mortality rates and dissemination of epidemic diseases since ancient times. Only recently, however, hospital infections became an important focus of attention of government agencies[1-3].

The occurrence of HI can be favored by the dissemination of microorganisms, whether through professionals' hands or through equipment and/or used solutions. Based on the exposed, appropriate and updated knowledge about recommendations to prevent and control hospital infections, mode of transmission and ways to prevent dissemination of microorganisms among health professionals should be imperative. We stress that as important as knowledge itself is its implementation in practice through correct behavior concerning isolation precautions[2-6].

Among the several care units, the Intensive Care Unit (ICU) stands out as the sector that poses the highest risk of hospital infection and dissemination of bacterial resistance, considering the type of patients, high frequency of antibiotics, professional/patient contact and the rupture of the tissue barrier in patients submitted to invasive procedures[2-5].

Thus, considering the ICU as the sector with the highest risk for the occurrence of hospital infection and a center for the emergence and dissemination of microorganisms, this study aimed to assess the knowledge and behavior of professionals from an ICU in relation to the adoption of contact precautions for the control of hospital infections.

MATERIAL AND METHODS

This is a cross-sectional study, carried out between May and October 2007 in a large philanthropic general hospital with capacity for 180 beds located in Belo Horizonte, MG, Brazil. It delivers care to patients with private health insurance and those covered by the public health insurance. It has state-of-the-art technology, highly specialized services and an intensive care unit and is characterized as a complex medical center, based on the use of new technology and its personnel's level of education. The unit of study was the intensive adult medical-surgery care unit, composed of 20 beds with an average permanence of five days and 1,156 admissions/year. It takes cares of severely ill clinical patients and patients with surgical pathologies of several specialties, in addition to solid organ transplantations, including pancreas, kidneys and liver.

The study's target population included all members of the intensive care team. The following inclusion criteria were used: belonging to the ICU team and being actively involved in care delivery at the time of data collection. Professionals on vacation and/or medical leave during data collection were excluded.

All professionals working in the ICU were individually invited to participate in the study. The first contact with professionals was verbal, followed by a free and informed consent agreement, explaining the study's objectives and purpose. Participation was voluntary with no financial gratification.

A semi-structured questionnaire, divided in three parts, was developed for data collection: I – demographic characteristics; II – knowledge of professionals about contact precautions; III – professionals' behavior regarding the adoption of contact precautions. The inclusion of these three parts in the questionnaire aimed to survey how the multi-professional team expressed behaviors and knowledge in relation to the adoption of contact precautions.

Knowledge and behavior were treated as dichotomous variables, that is, appropriate or inappropriate: a rate of correct answers above 75% for each questionnaire was considered appropriate[5]. Data were analyzed through descriptive statistics with presentation of frequency distribution. Pearson's Chi-square or Fischer's exact test was used when appropriate, with a 95% confidence interval, in addition to the Kappa test for analysis of agreement.

To evaluate association between knowledge and behavior on the one hand and sociodemographic characteristics on the other, multivariate analysis was used with the decision tree algorithm through the Chi-square Automatic Interaction Detector (CHAID)[7]. Binary logistic regression was carried out to validate the results of the classification tree, whereas variables with p values $p \leq 0.25$ in the bivariate analysis were included in the multivariate model. Collected data were analyzed using *Statistical Package for the Social Sciences* (SPSS) software (version 13.0).

The project followed the guidelines for research involving human subjects according to Resolution 196/96 of the National Health Council[8] and was submitted to and approved by the Research Ethics Committee (No. ETIC 14/07).

RESULTS

Of the 120 professionals working in the ICU, 102 (85%) were eligible and agreed to participate in the study. They were allotted in the following categories: nursing technicians (549%), nurses (12,7%), preceptor physicians (10.8%), student physiotherapist (8.8%), preceptor physiotherapist (7.8%) and resident physician (4.9%).

The female gender prevailed (73.5%), the majority was between 22 and 27 years old and ages varied from 22 to 57 years (median 31.5). With regard to time of graduation, there was a greater percentage of professionals with 5 and 11 years (30.7%).

As to professional experience, the majority (51%) had up to three years of experience in the hospital and ICU (56.9%). Forty percent of the participants worked during the day shift, followed by 42.2% who worked in the night shift and a smaller number (8.8%) of professionals (physicians) who worked both shifts (day and night). Half of professionals had only one job, 39.2% had two and 10% had more than two jobs.

Knowledge of professionals about hospital infection control measures

This study's results revealed that only 36.3% of interviewees obtained a rate of correct answers superior to 75%, which was considered the minimum level of appropriate knowledge[5].

Comparison between groups of professionals, taking into account their knowledge, showed only one difference for the variable "work shift" (p=0.049), though with borderline statistical significance. The night shift presented a smaller percentage of professionals with appropriate knowledge.

Less than half of professionals scored appropriate knowledge levels (preceptor physician, nurse, nursing technician and student physiotherapist). We also verified that the level of knowledge was different among the several professional categories and that not all professionals from any of the categories presented appropriate knowledge.

According to the results of the multivariate analysis through the classification tree, no variable was kept in the final model associated to knowledge; results from the logistic regression were similar.

Results on the percentage of correct answers related to the evaluated topics on knowledge and professional category are presented in Table 1. We observe that a smaller percentage of correct answers was found among student physiotherapists.

All professional categories obtained a small percentage of correct answers with regard to the contact precaution recommendations and the use of Individual Protection Equipment (IPE), except preceptor physiotherapists. Knowledge about the objectives of contact precautions was ≤50% for all evaluated professionals.

Table 1 – Distribution of correct answers by professional category in relation to topics evaluating knowledge - Belo Horizonte, 2007

Evaluate topics	Nursef n = 13%	Nurs Tech* n = 56%	Prec phys* n = 11%	Res phys* n = 5%	Prec physio* n = 8%	Stu Physio* n = 9%
Hand washing	100	96.4	100	100	100	100
Discarding of procedure gloves after care delivery to each patient or procedure	100	96.4	100	100	100	100
Procedure gloves and hand washing	100	96.4	81.8	100	87.5	100
Transmission of infection	76.9	75	90.9	100	100	88.9
Prevention of microorganism transmission	92.3	80.4	100	80	62.5	55.6
Recommendation of contact precautions	69.2	66	63.6	60	87.5	33.3
Individual protection equipment recommended for patient use in contact precaution	61.5	43	54.6	60	75	44.4
Objective of Contact precautions	38.5	41	45.5	40	50	22.2

*Nurs Tech – nursing technician; Prec phys – preceptor physician; Res phys - resident physician; Prec physio – preceptor physiotherapist; Stu physio – student physiotherapist.

Behavior of professionals concerning measures to control hospital infection

According to professionals' answers, only 51% showed appropriate behavior in relation to precaution measures according to Table 2.

The comparison between groups of professionals with appropriate and inappropriate behavior reveals significant differences for the variables gender (female), professional category (nursing) and work shift (day), p≤0.05. And, for inappropriate behavior, a difference was found between professionals working two work shifts: day and night (89%).

Table 2 – Distribution of demographic variables according to professionals' behavior (appropriate x inappropriate) and statistical significance (n=102). Belo Horizonte, 2007

Demographic variable	Appropriate behavior n (%)	Inappropriate behavior n (%)	P value*	Demographic variable	Appropriate behavior n (%)	Inappropriate behavior n (%)	P value*
Gender				Time of work at the hospital			
Female	43 (57.3)	32 (42.7)	0.031	≤ 1 year	13 (50)	13 (50)	0.621
Male	9 (33.3)	18 (66.7)		> 1 to ≤3 years	16 (61.5)	10 (38.5)	
Age range				>3 to ≤10 years	13 (48.1)	14 (51.9)	
22 to 27 years old	14 (50)	14 (50)	0.704	>10 to ≤25 years	10 (43.5)	13 (56.5)	
28 to 31 years old	14 (60.9)	9 (39.1)		Time of work at the ICU			
32 to 38 years old	13 (50)	13 (50)		≤1 year	12 (48)	13 (52)	0.270
39 to 57 years old	11 (44)	14 (56)		>1 to ≤3 years	20 (60.6)	13 (39.4)	
	14 (50)	14 (50)		>3 to ≤8 years	11 (57.9)	8 (42.1)	
Professional category				>8 to ≤25 years	9 (36)	16 (64)	
Nursing technician	32 (57.1)	24 (42.9)	0.019	Work shift			
Nurse	10 (76.9)	3 (23.1)		Day	28 (56)	22 (44)	0.042
Preceptor physician	3 (27.3)	8 (72.7)		Night	23 (53.5)	20 (46.5)	
Stu Physiotherapist[a]	3 (33.3)	6 (66.7)		Day and Night	1 (11,1)	8 (88.9)	
Precept Physiotherapist[b]	4 (50)	4 (50)		Number of jobs			
Resident Physician	0 (0)	5 (100)		1 job	25 (49)	26 (51)	0.183
Time since graduation				2 jobs	24 (60)	16 (40)	
<2.5 years	10 (40)	15 (60)	0.373	3 jobs	2 (22.2)	7 (77.8)	
≥2.5 to <5 years	11 (57.9)	8 (42.1)		4 jobs	1 (50)	1 (50)	
≥5 to <11 years	19 (61.3)	12 (38.7)					
≥11 to ≤ 27 years	12 (46.2)	14 (53.8)					

*Chi-square
a- student physiotherapist b- preceptor physiotherapist

The multivariate model (decision tree by the CHAID algorithm) used to investigate the factors associated to behavior in relation to precaution measures revealed that the variable that best discriminated behavior was professional category (p=0.003). Nursing professionals presented a greater percentage of appropriate behavior (60.87%) when compared to other professionals (30.30%). Similar results were found in the logistic regression, in which nursing professionals presented almost four times more chance of having appropriate behavior compared to the remaining professionals OR=3.58 (CI95%:1.48 – 8.68).

The distribution of behavior according to professional category is presented in Table 3. Preceptor and resident physicians presented the highest number of topics with low levels of correct answers. All professional categories obtained a small percentage of correct answers for contact precautions, when indicated, and use of gown.

Glove use behavior was more appropriate as opposed to the low adherence to hand washing.

Knowledge and behavior

No statistically significant association between knowledge and behavior was found in this study, which presented a low level of agreement between variables (Kappa 0.436).

Table 3 – Percentage of correct answers in relation to topics evaluating behavior by professional category. Belo Horizonte, 2007

Evaluated Subjects	Nurses n = 13%	Nurs tech* n = 56%	Prec Phys Pre* n = 11%	Res phys* n = 5%	Prec physio Pre* n = 8%	Impr physio* n = 9%
Hand washing after caring for all patients	69.2	73.2	36.4	80	100	66.7
Hand washing before and after contact with patients	76.9	91	36.4	60	87.5	100
Hand washing before using procedure gloves	84.6	78.6	63.6	60	62.5	66.7
Hand washing after using procedure gloves	84.6	87.5	63.6	60	100	77.8
Hand washing to prevent the transmission of microorganisms	100	67.9	100	40	37.5	22.2
Hand washing in the absence of apparent dirt on hands	69.2	64.3	81.8	80	37.5	55.6
Discarding gloves after care delivery to each patient or each procedure	100	96.4	90.9	100	100	88.9
IPE to manipulate patients colonized/infected with resistant microorganisms	100	89.3	81.8	80	100	100
Contact precaution when indicated	61.5	50	54.6	20	75	33
Use gowns when adopt contact precaution	53.8	69.6	27.3	20	62.5	77.8
Use procedure gloves when adopt contact precaution	100	98.2	81.8	80	100	100

*Nurs Tech – nursing technician; Prec phys – preceptor physician; Res phys - resident physician; Prec physio – preceptor physiotherapist; Stu physio – student physiotherapist.

DISCUSSION

Only 36.3% of professionals presented appropriate knowledge in relation to hospital infection control measures. No variable was associated to knowledge about HI control measures. Appropriate behavior was found in 50% of the participants, revealing significant association with nursing professionals. However, no association was found between knowledge and behavior in relation to contact precautions.

This study's results appoint to a considerable divergence of knowledge between professional categories, a fact that can be explained by the different approaches in the education and training of these professionals[9]. Additionally, some professionals voluntarily seek to improve knowledge acquired in undergraduate programs and training. For example, a physician, whether a resident or preceptor, seeks to deepen his/er knowledge about etiology, ways of transmission, dissemination and prevention of diseases. On the other hand, nursing professionals focus on the care process.

A small percentage of newly graduate professionals and even professionals with more time since graduation with appropriate knowledge were observed, which indicates lack of updated knowledge about precaution measures for the control of HI. This finding is somewhat intriguing if we consider that lack of knowledge in the analyzed sample was independent of time since graduation. It suggests a behavior contradictory to the laws of the job market, since heavy competitiveness (due to the exponential increase in the number of schools, especially in nursing) and lack of stability at work (since it is a private institution, as opposed to professional stability in public institutions) should encourage professionals to constantly attempt to update and improve their professional performance, which was not verified.

In addition, despite "easy" access to higher education, a study carried out with senior students in nursing programs appointed a lack of knowledge in relation to precaution measures related to diseases with high levels of transmissibility by contact, droplets or aerosols. This fact entails important implications when one evaluates specific knowledge of a team in relation to the adoption of contact precautions and reveals that quality of education is a deficient factor[9].

The low number of professionals with appropriate knowledge about contact precautions is worrying, since bacterial resistance has increased all over the world and is prevalent in intensive care units[10]. However, research carried out among nurses in a public hospital in Goiania, Brazil revealed that the implementation of standard precautions in the practice of these professionals is directed related to their knowledge and understanding about the subject[11].

Only 51% of professionals obtained appropriate behavior in relation to precaution measures in this study. In this perspective, important studies showed health professionals' low adherence to precaution measures, which may be related to

several aspects of human behavior, including the false perception of no risk and underestimation of individual responsibility in the increased rates of hospital infection[4-5,12-13].

The nursing professional category was associated to appropriate behavior in relation to HI control measures in the multivariate analyses, tree of classification and logistic regression. This finding might be related to the fact that nursing professionals spend more time with patients, repeatedly perform their activities and are required to attend more educational programs as opposed to other professionals. In addition, nurses' appropriate behavior can be explained by the fact that their education includes more information about standard precautions. Professionals who work in both shifts probably presented inappropriate behavior due to physical exhaustion justified by the heavy workload.

Although 100% of preceptor physicians reported adherence to hand washing to prevent transmission of microorganisms, we observed that this category presented the lowest adherence to hand washing, before and after contact with patients and after care delivery to all patients, regardless of their diagnoses.

Another interesting finding was the low adherence to hand washing by preceptor physicians before and after using gloves, despite the fact that a large number of these professionals presented correct knowledge about that behavior. This finding might suggest that knowledge is not being used in daily practice.

We also verified high adherence of professionals to the use of gloves, as opposed to the low adherence to hand washing. This practice might indicate greater concern with oneself, ignoring that gloves do not represent effective protection due to the potential presence of micro holes, transmission of microorganisms and also that its use does not replace the need for hand washing.

CONCLUSION

The results of this study revealed the low number of professionals with appropriate knowledge and behavior concerning contact precautions. It is noteworthy that none of the professional categories presented sufficient knowledge about the objectives of contact precautions.

Another important result is that knowledge is not necessarily translated in appropriate behavior. This finding can be attributed to a gap between theory and practice, which leads to the conclusion that professionals are prepared to mechanically repeat and perform procedures without critical thinking[13-14].

These results also appoint the need for educative activities in multidisciplinary teams, including periodical presentations about rates of infection and resistant microorganisms.

We suggest trainings, thematic seminars and clinical meetings that can be held during the professionals' shifts and include their participation in the definition of topics and effective participation in campaigns, such as hand washing, adoption of individual protection equipment, among others. Moreover, all professionals need to be encouraged to participate, promoting their acknowledgment and valuation.

One limitation of this study is that a cross–sectional design does not permit to establish a relation of cause and effect. It did allow the researchers to better understand the phenomenon and favored improved knowledge of its characteristics and occurrence. Hence, the results can support other studies on this subject, preferably with a longitudinal design, seeking to evaluate the relation of causality between behavior and knowledge of multiprofessional teams for adherence to contact precautions. This study's results also contribute to the advancement of knowledge, considering the lack of studies addressing knowledge and behavior of multiprofessional teams in relation to contact precautions.

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