

Nursing staff knowledge of multi-resistant bacterial infections*

Conhecimento dos profissionais de enfermagem referente à resistência bacteriana a múltiplas drogas

Conocimiento de los profesionales de enfermería referente a la resistencia bacteriana a múltiples drogas

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ABSTRACT

Objective. To assess professional nurses', associate degree prepared nurses', licensed practical nurses', and nursing assistants' knowledge of the causes of multi-resistant bacterial infections, the risks these infections pose to health care providers, the chain of transmission of these infections, and patients' susceptibility to colonization of these multi-resistant bacterial infections. **Methods.** This descriptive study was conducted in a major general hospital in Minas Gerais, Brazil. The sample consisted of 42 nursing staff from a medical clinical unit. Descriptive statistics were used to analyze and present the data. **Results.** Nursing staff had unsatisfactory knowledge of the causes of multi-resistant bacterial infections, the chain of transmission of multi-resistant bacterial infections, and patients' susceptibility to colonization of multi-resistant bacterial infections. However, the majority of participants had some knowledge about the risks that multi-resistant bacterial infections posed to health care providers. **Conclusion.** Lack of knowledge among nursing staff compromise adherence to preventive measures and nursing management of multi-resistant bacterial infections.

Keywords: Nursing; Drug resistance, multiple; bacterial, precaution

RESUMO

Objetivo: Avaliar o conhecimento dos enfermeiros, técnicos e auxiliares de enfermagem de hospital geral de Minas Gerais, quanto às causas da multirresistência bacteriana, os riscos para a equipe de saúde, o modo de transmissão e susceptibilidade dos pacientes à colonização por bactérias resistentes a múltiplas drogas. **Métodos:** Realizado na clínica médica, foram entrevistados 42 profissionais de enfermagem lotados na unidade. Este estudo do tipo quantitativo teve uma análise descritiva de seus dados, para a qual utilizamos estatística descritiva com base no cálculo de porcentagem, sendo os mesmos apresentados em tabelas. **Resultados:** Os profissionais demonstraram conhecimento restrito e limitado sobre a temática, restringindo as causas da resistência à utilização indiscriminada de antibióticos. A maioria estava ciente dos riscos que o portador da bactéria oferecia à equipe de saúde. Evidenciamos falta de informação quanto aos mecanismos de transmissão, principais reservatórios e os mais suscetíveis à colonização. **Conclusões:** A lacuna no conhecimento implica diretamente na percepção de susceptibilidade à contaminação, comprometendo a adesão às medidas preventivas.

Descritores: Enfermagem; Resistência bacteriana a múltiplas drogas; Precaução

RESUMEN

Objetivo: Evaluar el conocimiento de los enfermeros, técnicos y auxiliares de enfermería de un hospital general de Minas Gerais, en cuanto a las causas da multirresistencia bacteriana, los riesgos para el equipo de salud, el modo de transmisión y susceptibilidad de los pacientes a la colonización por bacterias resistentes a múltiples drogas. **Métodos:** Realizado en la clínica médica, fueron entrevistados 42 profesionales de enfermería encontrados en la unidad. En este estudio de tipo cuantitativo se realizó un análisis descriptivo de sus datos, utilizándose la estadística descriptiva con base en el cálculo de porcentaje, los cuales fueron presentados en tablas. **Resultados:** Los profesionales demostraron conocimiento restringido y limitado sobre la temática, restringiendo las causas de la resistencia a la utilización indiscriminada de antibióticos. La mayoría estaba conciente de los riesgos que el portador de la bacteria ofrecía al equipo de salud. Evidenciamos falta de información en cuanto a los mecanismos de transmisión, principales reservorios y los más susceptibles a la colonización. **Conclusiones:** La laguna en el conocimiento implica directamente en la percepción de susceptibilidad a la contaminación, comprometiendo la adhesión a las medidas preventivas.

Descriptores: Enfermería, Resistencia bacteriana a múltiples drogas; Precaución

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INTRODUCTION

With the advent of antimicrobial drug resistance, multiresistant strains emerged, which are extremely difficult to treat. Therefore, in order to avoid their dissemination, health professionals must fully comply with standard precautionary measures to isolate the carriers⁽¹⁻²⁾.

We are living a once-in-a-lifetime experience in which the dissemination of multiple drug resistant bacteria (MDRB) could lead us to the post antibiotic era, or rather, a time when there will be no treatment options available for the carriers of these extremely resistant strains, thus becoming a serious problem for the carriers and institutions that must cover the huge expense of the treatment⁽³⁾.

Therefore, we believe that this study can increase the professionals' perception of this problem, fill in some existing gaps in professional nurses' knowledge about the severity of illnesses caused by these bacteria and consequently increase their awareness of the necessity to carry out strict measures in order to avoid dissemination within the institution.

In order to deal with this threat, doctors and infectologists should address the problem simultaneously in various directions, because, according to Rodrigues⁽²⁾, the dissemination of multiresistant strains should be managed by the rational use of antibiotics and control methods.

In the United States alone, each year, approximately 14,000 individuals are infected and die as a consequence of multiresistant microorganisms contracted within hospitals⁽³⁾.

The steps taken aim to accomplish, together with the community and clients, a reduction in the dissemination speed of MDRB. However, these actions are carried out by professionals with different characteristics and backgrounds, and frequently are not put into practice.

The infection rate is very high among patients in intensive therapy units especially those with upper respiratory tract infections. This suggests that preventive methods are important to reduce the occurrence of such infections in critical patients⁽⁴⁾. The frequent use of invasive actions and multiple therapies expose patients to a higher risk and more elevated prevalence. Hospital infection is associated with a considerable increase in morbidity and mortality of hospitalized patients as well as an increase in hospital costs⁽⁵⁾.

Data from the Study of Effective Nosocomial Infection Control (SENIC) estimates that one third of all hospital infections could be prevented by infection control and vigilance programs⁽⁶⁾.

The appearance and dissemination of microorganisms with antimicrobial multiresistance are occurring in hospitals as well as in the community. Goldstein et.al⁽⁷⁾ in their prospective study of non hospitalized diabetic patients with infected ulcers, isolated in 76% of the cases predominantly *S. aureus* including *S. aureus* strains resistant to Methicillin (SAMR) in 20% of the cases. The authors

call attention to the antimicrobial resistant bacteria in the American population, occurring in hospitals as well as in the community.

In Latin America, antimicrobial resistant bacteria are reaching very high levels and threatening the favorable therapeutic outcome in infectious diseases in community patients as well as in hospitalized patients. The empirical treatment no longer be used and every effort should be made provide clinicians with results of bacterial resistance to antimicrobial drugs⁽⁸⁾.

Investments in the diagnostic etiology of infections and rational strategies on the use of antimicrobial drugs become necessary in the attempt to avoid inadequate treatments and their already known consequences⁽⁹⁾.

The general strategy trend for preventing resistance in hospitals at a more pragmatic level, deals with educating professionals related to hospital assistance about epidemiology, pathogenesis, resistant bacterial transmission mechanisms within hospital environment, as well as about antibiotics' role in the appearance and expansion of bacterial resistance⁽¹⁰⁾. Education is necessary to disseminate the basic information and encourage compliance with the subsequently implemented infection control measures⁽²⁾.

By characterizing the nurses and their knowledge about biosecurity, its relation to personal factors, of professional background and occupational factors, it was found that younger nurses and recently graduated ones demonstrated more biosecurity knowledge. On verifying the degree of knowledge about precautions and isolation, nurses presented a medium percentile of correct answers, inferior when compared to other levels of knowledge regarding biosecurity⁽¹¹⁾. As a result of these questions we decided to carry out this study to evaluate if orientations in daily practice and professional qualifications are sufficient and adequate for the necessities, and if the professionals' knowledge about the theme in question, MDRB or antibiotics, is satisfactory or inadequate, which would make it difficult to comply with control measures. Other variables can also affect individual perception, indirectly affecting the final action, which refer to biographic, psychosocial and structural factors that we tried to identify and are complementary to the presented study.

OBJECTIVES

Evaluate registered, technical, and auxiliary nurses' knowledge about the causes of multiresistant bacteria, the risks for the health team, the means of transmission and susceptibility of patients to colonization by multiple drug resistant bacteria.

METHODS

This study, with a descriptive analysis of data, had its

project approved by the Nursing Research Ethics Committee at the University of São Paulo at Ribeirão Preto College, registered under protocol number 0363/2003.

The research was carried out in the Clinical Medical Unit in a hospital in the interior of Minas Gerais State. Of the total number of 47 nursing professionals in the unit, 42 (89.4%) participated in the study, of which four were registered nurses, two were technical (enrolled) nurses, and 36 auxiliary nurses. Only two professionals refused to participate and three others were on leave during the period stipulated for the research.

For data collection a semi-structured formulary was used, on which the researcher recorded the answers given during the face to face interview. All participants provided written consent and received guarantees of anonymity and information secrecy. The formulary contained identification data and items concerning knowledge about multiple drug resistant bacteria. The data collection occurred in a room within the unit, during the workers' shifts.

A quantitative analysis of the data was used, with descriptive statistics based on percentage calculations arranged and presented in tables.

RESULTS

We analyzed the knowledge about MDRB and aimed at the following findings among professional nurses:

Causes of multiresistant bacteria

The 42 nurses interviewed emitted 55 answers, as shown in Table 1, of which 27 (49.1%) attribute the resistance to indiscriminate use of antibiotics, or by abusive, inadequate or prolonged use. Prolonged hospitalization was also mentioned by (14.5%).

Risks for the health team

When questioned if the patient with MDRB offered any risk to the health team, 41 (97.6%) answered positively and only one (2.4%) professional denied that MDRB could represent a risk. The most mentioned type of risk mentioned was contamination, with 34 (81%) of the answers; only one (2.4%) referred to the spreading of disease and 7 (16.7%) professionals did not know how to reply as to which risks they were exposed.

Patients most susceptible to colonization by MDRB

When asked about the existence of patients more susceptible to colonization by MDRB at hospital level, nursing professionals were unanimous in their agreement. However, when consulted about who these individuals are, 42 (47.2%) referred to the patients with low immunity or immunosuppressed, 18 (20.2%) included HIV carriers in this category; 8 (9.0%), weak and elderly; 7 (7.9%)

among others, which can be seen in Table 2.

Table 1 - Distribution of the answers attributed to the nursing professionals related to the motive of multiple drug resistant bacteria in a Clinical Medical Unit in a General hospital in MG, 2003.

Motive for multiple drug resistant bacteria	N.º	%
Indiscriminate use of antibiotics	27	49,1
Prolonged hospitalization	8	14,5
Antibiotic use	5	9,1
Lack of identification of the etiological agent for allowing treatment (culture)	4	7,3
Lack of hand washing	3	5,5
Low immunity	2	3,6
Incomplete treatment	2	3,6
Self medication	2	3,6
Motive unknown	1	1,8
Colonization of catheters and wounds	1	1,8
Total	55	100,0

Table 2 - Distribution of answers attributed to professional nurses, related to more susceptible patients to colonization by multiple drug resistant bacteria (MDRB) in a Clinical Medical Unit in a General Hospital in MG, 2003.

More susceptible patients to colonization by MDRB	N.º	%
Immunosuppressed patients	42	47,2
Debilited/elderly	18	20,2
Post-operative	8	9,0
Invasive procedures	7	7,9
Patients from critical areas	6	6,7
Prolonged or frequent hospitalization	4	4,5
Antibiotic use	3	3,4
Intravenous drug users	1	1,1
Total	89	100,0

Transmission mode of multiresistant bacteria

The interviewed nursing professionals presented the following answers: 35 (33.3%) replies indicated transmission by direct contact, 31 (29.5%) by indirect contact, 14 (13.3%) by air, 10 (9.5%) by droplet infection, 8 (7.6%) through visitors, 4 (3.8%) through a common contaminated vehicle and 3 (2.9%) through inadequate techniques.

Table 3 - Distribution of answers attributed to nursing professionals regarding the types of transmission of multiple drug resistant bacteria (MDRB) in a Clinical Medical Unit in a General Hospital in MG, 2003.

Types of transmission of MDRB	N.º	%
Direct contact	35	33,3
Indirect contact	31	29,5
Via air	14	13,3
Droplet infection	10	9,5
Visitors	8	7,6
Through common contaminated vehicle (medium) food, water	4	3,8
Inadequate techniques	3	2,9
Total	105	100,0

Principal reservoirs of MDRB

For 30 (28.8%) of the interviewed health professionals, environment was cited as the reservoir for MDRB; 24 (23.1%) the colonized/infected patient and 18 (17.3%), less than half of the professionals cited secretions, blood, and excretions, among others, as seen in table 4.

Table 4 - Distribution of answers attributed to nursing professionals regarding the principle reservoirs of MDRB in a Clinical Medical Unit in a General Hospital in MG, 2003.

Principle reservoirs of MDRB	N.º	%
Hospital surroundings (surfaces)	30	28,8
Colonized/infected patient	24	23,1
Secretions, excretions and blood	18	17,3
Equipment/contaminated material	15	14,4
Health professional	11	10,6
Visitors	3	2,9
Food	3	2,9
Total	104	100,0

DISCUSSION

The study participants' general knowledge about multiple drug resistant bacteria was adequate but limited. This fact is extremely worrying, inasmuch that personal perception of these individuals shows to be endangered by the lack of knowledge of these very important factors.

Some of the interviewed professionals confirmed that they did not know the risks they faced through exposure while caring for the carriers of MDRB. Nevertheless, this could be one of the motives for the lack of preventive measures in patient health care. However, there is an occupational risk of contamination among health professionals, with a real danger of infection by multiresistant strains within the hospital.

For the interviewed professionals, only transmission by direct contact was remembered by all, the other forms being referred to by fewer of them, consequently having less importance in their conception. This lack of knowledge or neglect to mention other forms of transmission, such as through respiratory tract, aerosol or droplet infection, through visitors or by a common contaminated vehicle (water, medication or food)⁽¹³⁾ worries us, pointing to the great risk that the patients and health professionals run in relation to exposure to these factors. We also have as the most frequent form of transmission of diseases the colonized or infected patient, who acts as a reservoir; the colonized patient received from other institutions and also by the less common means of the directly disseminating, colonized or infected health care professional. Environmental surfaces also act as reservoirs as do the surroundings and contaminated material⁽¹⁴⁾. Nursing professionals showed lack of

knowledge about the principle reservoirs for MDRB implicating in the possibility of exposure of professionals to these factors without the proper precautions and consequently, the risk of contamination and dissemination of these MDRB.

The nursing professionals' knowledge about the colonization of more susceptible patients showed to be limited. Participants cited only the immunosuppressed group, HIV carriers and the elderly, but disregarded other groups of susceptible patients, like those that present high rates of colonization, such as: dialysis patients, intravenous drug users, chronic dermatological disease individuals, and insulin-dependent Diabetes Mellitus sufferers; the special groups with increased risk of colonization in burn and intensive treatment units, for presenting specific factors associated to these colonizations, like: long term hospitalization; previous antibiotic therapy; severe base disease; patients more susceptible to the acquisition of hospital infection because of defense disruption; debilitating disease sufferers, cancer, pulmonary and cardiac disease, elderly patients and those that received surgical intervention, catheterization or even those that had already arrived infected and those submitted to risky procedures carried out in the hospital⁽¹⁴⁾.

According to the World Health Organization, the lack of attention in relation to the appropriate techniques for infection control⁽³⁾ contributes to microbial resistance in hospitals. Information, therefore, becomes a great ally for awakening the perception of professionals to the necessity for collaboration and complying with preventive measures, thus avoiding future unprotected exposure. However, we did not find any data for comparison of the results obtained with other specific literature as a result of the absence of publications of this kind. Nevertheless, when related to knowledge of precautions, we found studies that made use of theoretical explicatory models for the following of standard precautions with the aim of identifying the influence of individual factors relative to workers, the results of improved compliance being obtained through undergoing specific training which culminated in one of the directives for solving the problem, or rather, education for awareness⁽¹⁵⁾.

In a study which intended to demonstrate colonization of the hands by bacteria and the influence of hand washing after physical patient examination had as its results a significant number of contaminated professionals after carrying out a physical examination with hand washing prior to execution. None of the participants in the group were carriers of potentially pathogenic bacteria before the examination, but this group showed an increase in the number of bacteria (20.7 UFC before and 115.9 UFC afterwards; $p < 0.001$) with potential pathogens, such as *S aureus* (50% of which were resistant to Methicillin) among others, half of which were multiresistant. We can

conclude from the importance of these results the need to implement educational programs and provide for the health workers, facilities for adequate execution of this practice⁽¹⁶⁾.

In the control and prevention guide for Methicillin resistant *Staphylococcus aureus* (MARSA) it is stated that all personnel involved in hospital assistance should be included in continued education and training programs related to hospital infection prevention⁽¹⁷⁾.

Continued education programs should include information for hospital staff (doctors, nurses, pharmacists, laboratory personnel and other professionals that deal with direct patient care) about the epidemiology of Vancomycin resistant enterococcus (VRE), since it is another important epidemiological pathogen with a substantial impact on patient care costs and results, because the identification of VRE in hospitals requires an even more strict recommendation for its control as well as the development of professional consciousness through educational activities⁽¹⁴⁾.

The principle strategies mentioned for the implementation of a Program of Hospital Infection Control suggested by the hospital infection control staff were: the training of personnel, elaboration of a rules and routines manual for infection control, supervisor involvement, cost and benefit studies⁽¹⁸⁾. Apart from this, some relevant suggestions were received from the interviewed professionals for the efficient execution of prevention procedures in carriers of MDRB or the multiply resistant, as they are currently referred to.

CONCLUSION

We believe that some relevant factors were identified to explain the conduct of professionals faced with preventive measures in the assistance of MDRB carriers in the referred hospital, thus propitiating the necessary information for the construction of intervention strategies capable of positively altering the observed situation.

Knowledge of the risk situation directly implies on the professionals' perception of their susceptibility to contract and disseminate MDRB in the institution in which they work. That is to say, the more knowledge the professional has, the better the perception and, therefore, the greater the possibility of compliance with the preventive measures directed to MDRB carriers.

This study also permitted a better understanding of the professionals' behavior in relation to the various situations presented and we believe that the identification of local reality is relevant to the adoption of specific control measures to overcome the existent gaps in the referred institution.

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