Reasons and consequences of low adherence to standard precautions by the nursing team

Motivos e consequências da baixa adesão às precauções padrão pela equipe de enfermagem

Razones y consecuencias de la baja adhesión a precauciones estándar para el equipo de enfermería

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ABSTRACT

Standard precautions (SP) are recommendations to prevent infection and protect health care workers during the provision of care, however, still exists low adherence to these recommendations.

Objective: To analyze the reasons and consequences of low adherence to standard precautions by the nursing staff.

Method: integrative literature review, search in seven databases, from 2005 to 2014.

Results: 30 articles were selected for analysis. The reasons for low adherence evidenced relate to deficient practices of lifelong learning, risk behaviors of workers, inadequate provision of equipment and protective equipment and inadequate working conditions. The consequences are accidents and occupational diseases. There are few intervention studies, which merely provide guidance to professionals.

Conclusions: The low adhesion to standard precautions is linked to individual aspects of workers, employers and educational institutions. Intervention strategies carried out have shown little efficient by only focusing on the worker.

Keywords: Standard precautions. Universal precautions. Occupational health. Accident prevention. Nursing, team.

RESUMO

As precauções padrão (PP) são recomendações para prevenir infecções e proteger os trabalhadores de saúde durante a prestação de cuidados. Porém, constata-se baixa adesão a estas recomendações.

Objetivo: Analisar os motivos e as consequências da baixa adesão às PP pela equipe de enfermagem.

Método: Revisão integrativa da literatura, busca em sete bases de dados, período de 2005 a 2014.

Resultados: 30 artigos foram selecionados para análise. Os motivos da baixa adesão evidenciados relacionam-se a práticas deficitárias de educação permanente, comportamentos de risco de trabalhadores, provisão de material e equipamentos de proteção inadequados e condições de trabalho inadequadas. As consequências são os acidentes e as doenças do trabalho. Os estudos de intervenção são escassos e limitam-se à educação dos profissionais.

Conclusões: A baixa adesão às PP está vinculada a aspectos individuais dos trabalhadores e às instituições empregadoras e formadoras. As estratégias de intervenção realizadas mostram-se pouco eficientes por focar apenas o trabalhador.

Palavras-chave: Precauções padrão. Precauções universais. Saúde ocupacional. Prevenção de acidentes. Equipe de enfermagem.

RESUMEN

Las precauciones estándares (PE) son recomendaciones para prevenir infecciones y proteger a los trabajadores de la salud durante la prestación de cuidados, pero, se constata baja adhesión a estas recomendaciones.

Objetivo: analizar los motivos y consecuencias de la baja adhesión a las PE por el equipo de enfermería.

Método: revisión integradora de la literatura, busca en siete bases de datos, periodo de 2005 a 2014.

Resultados: 30 artículos fueron seleccionados para análisis. Los motivos de la baja adhesión evidenciados se relacionan a precarias prácticas de educación permanente, comportamientos de riesgo de trabajadores, inadecuada provisión de material y equipos de protección e inadecuadas condiciones de trabajo. Las consecuencias son los accidentes y las enfermedades del trabajo. Son escasos los estudios de intervención y se limitan a la educación de los profesionales.

Conclusiones: la baja adhesión a las PE se vincula a los aspectos individuales de los trabajadores, las instituciones empleadoras y formadoras. Las estrategias de intervención realizadas se muestran poco eficientes por enfocar solo al trabajador.

Palabras clave: Precauciones estándares. Precauciones universales. Salud laboral. Prevención de accidentes. Grupo de enfermería.

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INTRODUCTION

Work environments pose risks to workers exposing them to situations that may cause accidents and occupational diseases when individual and collective safety measures are not taken. Occupational hazards related to the organization and work environment, individual characteristics of the workers, quality and quantity of work material available are factors that interfere with the occurrence of occupational accidents and sickening caused by nursing work[1-3].

Biological, physical, chemical, mechanic, ergonomic and psychosocial risks are present in the hospital environment hospital[4], though biological risks have been most frequently identified and investigated[5] due to its potential for creating unsafe and unsanitary conditions in the workplace, since health professionals are in direct and permanent contact with patients, handling objects contaminated with pathogens that cause serious diseases such as hepatitis C and B and the Acquired Immunodeficiency Syndrome[6].

Nursing workers are the most affected by occupational accidents, being exposed to potentially contaminated biological material, due to the peculiarity of their activities that involve direct and permanent care, constant and frequent handling of needles and other sharp objects and daily contact with potentially contaminated objects in the process of cleaning, disinfection, sterilization, handling of fecal specimens and materials for laboratory testing[7-9].

Standard Precautions (SP) are measures established by the *Centers for Disease Control and Prevention* that were internationally adopted aimed to the control of exposure to occupational hazards in health services, especially regarding disease transmission and isolation of bodily substances, based on the principle that any bodily fluids, excluding sweat, may contain infectious agents[10]. The SP are designed to protect health workers when providing care from contamination nd prevent transmission of pathogens in health care[11].

The prevention model adopted by healthcare institutions is based on the concept of hierarchy of control with the purpose of eliminating or minimizing the use of sharp materials, where possible, isolate risks, protect health workers from exposure to biological hazards through the use of control engineering e.g. needles with safety devices and use of rigid-wall containers for disposal of sharp objects. If these strategies fail to provide total protection, actions targeted to the control of work practices and the use of Personal Protective Equipment are adopted[12].

Adherence to SP by nursing workers, however, is below the recommended levels, according to the literature, which increases the vulnerability of these workers to accidents and occupational diseases[5,13-18]. Thus, this behavior must be changed.

The implementation of health promotion programs in the workplace aims to reduce the risks to health workers has achieved satisfactory results in the prevention of occupational diseases, e.g., the strategy adopted by the United States of America for preventing exposure to blood and other bodily fluids where the introduction of primary prevention interventions, such as the SP, the availability of personal protective equipment, standardization of the site for disposal of sharp materials, proper hand washing, training and education programs related to the risks of exposure to biological material reduced the number of occupational accidents involving biological material and reached risk control levels[19].

In developing countries, the systems for occupational accidents control and surveillance involving accidents with exposure to biological materials should be improved in health services, given the difficulties in registration, little availability of safety devices and health professionals failing to adhere to the Standard Precautions (SP)[5,16].

The theoretical references that address changes in behavior and the promotion of healthy habits include Bandura's social cognitive theory[20], which states that behaviors do not depend solely on personal factors, but also on the environment and cognition, and uses the concept of perceived self-efficacy for a given behavior, and the widely adopted Theory of Planned Behavior (TPB) focused on the on the ability to predict behavioral intention. The TPB explains the relationship between behavioral intention and actual behavior[21]. Based on these theoretical references, it can be affirmed that preventive strategies should be planned to minimize the number of occupational accidents involving exposure to potentially contaminated biological material and the occurrence of occupational diseases.

It should be considered in the planning of preventive strategies the need for behavioral, managerial and organizational actions in health interventions, in order to change the tendency to blame the victim (focus on the individual), adopted by most organizations[22].

Since the occurrence of occupational accidents with exposure to potentially contaminated biological material is recognized as a public health issue, as well as the consequences of these accidents for workers and institutions when preventive measures are not taken, the present study aims to analyze the reasons and consequences of low and non-adherence to standard precautions by the nursing team.

Its purpose is to support the elaboration of strategies targeted to increase adherence to the SP, since both the

problem and the measures needed to its mitigation must be investigated, focusing on the worker and on the solutions adopted by employers and governmental agencies, contextualizing the work conditions, how it is organized and the best problem solving solutions.

METHODOLOGY

Integrative literature review structured in the following procedural steps: formulation of guiding question, search in literature of related studies, categorization of the studies found, analysis of the selected studies, discussion and interpretation of the findings and synthesis of the knowledge highlighted in the analyzed studies[23].

The guiding question was – what are the reasons for low adherence to standard precautions and the impact on the health of nursing professionals?

The studies were selected by electronic search to articles from the following databases: *Medical Literature Analysis and Retrieval System Online* (MEDLINE/PubMed), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), *Web of Science* (WOS/ISI), *Cumulative Index to Nursing and Allied Health Literature* (CINAHL), SCOPUS and bibliotecas *Scientific Electronic Library Online* (SciELO) e COCHRANE. The descriptors adopted in the search strategy were extracted from the Database of Descriptors in Health Sciences (DeCS) and *Medical Subject Headings (*MeSH), as follows: precauções universais OR "universal precautions"OR "standard precautions" OR saúde do trabalhador OR "occupational health", prevenção de acidentes OR "accident prevention", acidentes de trabalho OR "occupational accidents". All these descriptors were combined using the Boolean operator AND for descriptor enfermagem ("nursing").

The inclusion criteria established for this study were full-text articles from studies published from 2005 to 2014 (10 years), in Portuguese, English and Spanish, in the selected databases and providing the information needed to answer the research question.

Data collection occurred from January to April 2015. Two independent reviewers identified the studies that met the inclusion criteria, through analysis of the titles and abstracts of the identified publications; in the event of any disagreement, a third reviewer was asked to provide his/her opinion on the inclusion or non-inclusion of the study. All articles that failed to meet the inclusion criteria were excluded after abstract review. The instrument of integrative review produced by the *Núcleo de Estudos Saúde e Trabalho* (NUESAT/USP), which obtained satisfactory results in previous studies, was used. The referred instrument contemplates the methodological features of the study, assessment of accuracy of research methodology, assessment of the results and contribution to advancing scientific knowledge.

Data analysis began with extraction of data from the databases by the two reviewers, the authors of the study, independently, and then each article was classified regarding its relevance (containing information needed to answer the research question) and their levels of evidence with use of the scale of the Oxford Centre for Evidence-based Medicine[24] , which rates evidence in the following levels: 1A – systematic review (with homogeneity) of randomized controlled clinical trials; 1B – randomized controlled clinical trial with narrow confidence interval (with homogeneity); 1C – "all-or-nothing" therapeutic results"; 2A – systematic review of cohort studies; 2B – cohort study (including lower quality randomized clinical study); 2C – ecological study of observed therapy results; 3A – systematic review (with homogeneity) of case-control study; 3B – case-control study; 4 – case reports (including lower quality cohort and case-control) and level 5 – expert opinion without explicit critical appraisal or based on physiology, bench research or first principles.

The articles were grouped in the following categories of analyzes: reasons for low or non-adherence to standard precautions; consequences of low or non-adherence to standard precautions such as occupational accidents and sickening; interventions used to increase adherence.

RESULTS

Initially, 378 studies were identified, and 303 were excluded because of duplicity, because they did not address the research question or because the full-text article was unavailable. Of the 75 full-text selected articles, 45 were excluded after thorough reading because they did not provide relevant information to answer the research question. Thus, 30 articles were included in the analysis. These articles were distributed in the following selected databases: MEDLINE/PubMed: 6 articles; LILACS: 5 articles; WOS/ISI: 13 articles; SCOPUS: 3 articles; CINAHL: no article and Bibliotecas SciELO: 1 article and COCHRANE: 2 articles.

The studies detected in more than one database were kept in the database with the greater number of articles. The chart shown in Figure 1 illustrates the process of article selection.

Regarding the year of publication, 40.0% (12) of the articles were published between 2005 and 2009 and 18(60.0%) between 2010-2014. Of the total number of publications, 19 (63.3%) were in English and 11 (36.7%) in Portuguese.

Regarding the origin of the studies, there was a significant number of Brazilian publications: 13 (43.3%). There were 17 (56.7%) international publications.

Of the total number of studies, 13 (43.3%) were conducted by nurses with training ranging from graduation to post-doctoral degree. However, there were studies conducted by a multidisciplinary team, as follows: 2 (6.7%) by physiotherapists, 2 (6.7%) by physicians and 1 (3.3%) by a biologist. The other articles did not include such information: 12 (40%).

Regarding the target population, in 14(46.7%) articles, it was composed by nursing workers (nursing assistants, nursing technicians and nurses) and in 16 (53.3%) articles the focus was on health professionals in general (physicians, nursing professor, transport personnel, nursing students and nursing workers).

Concerning the level of scientific evidence of the analyzed articles, 28 (93.3%) articles correspond to level of evidence 2C and the remaining 2 (6.6%) are literature reviews. Of the total number of articles rated as level 2C, 26 (86.6%) are quantitative (incidence and prevalence) and 2(6.6%) are qualitative (focal and observational).

Concerning compliance with SP, the 30 (100%) articles analyzed revealed that the recommendations are not entirely observed, indicating unsatisfactory adherence to SP by nursing professional, particularly regarding proper handling and disposal of sharp materials, hand washing and use of personal protective equipment. Besides, 14 (6.6%) studies showed that these professional had poor knowledge on standard precautions.

The reasons identified for low adherence to SP include work organization, overwork, double shifts, reduced teams, urgency, individual aspects of the workers, e.g. forgetfulness, and because they disagreed with some recommendations: 8 (26.6%); lack/insufficiency of material resources: 8 (26.6%); failure to perceive risk: 4 (13.3%); reasons specific to professional groups: 2 (6.6%); and poor quality of PPE, dermatitis and dermatitis and discomfort: 2 (6.6%).

The articles analyzed revealed the main consequences of non-compliance with SP, as follows: occupational exposure and exposure of patients to potentially contaminated biological agents that convey diseases that can be fatal such as Hepatitis C and B and Aids: 21 (70.0%); occurrence

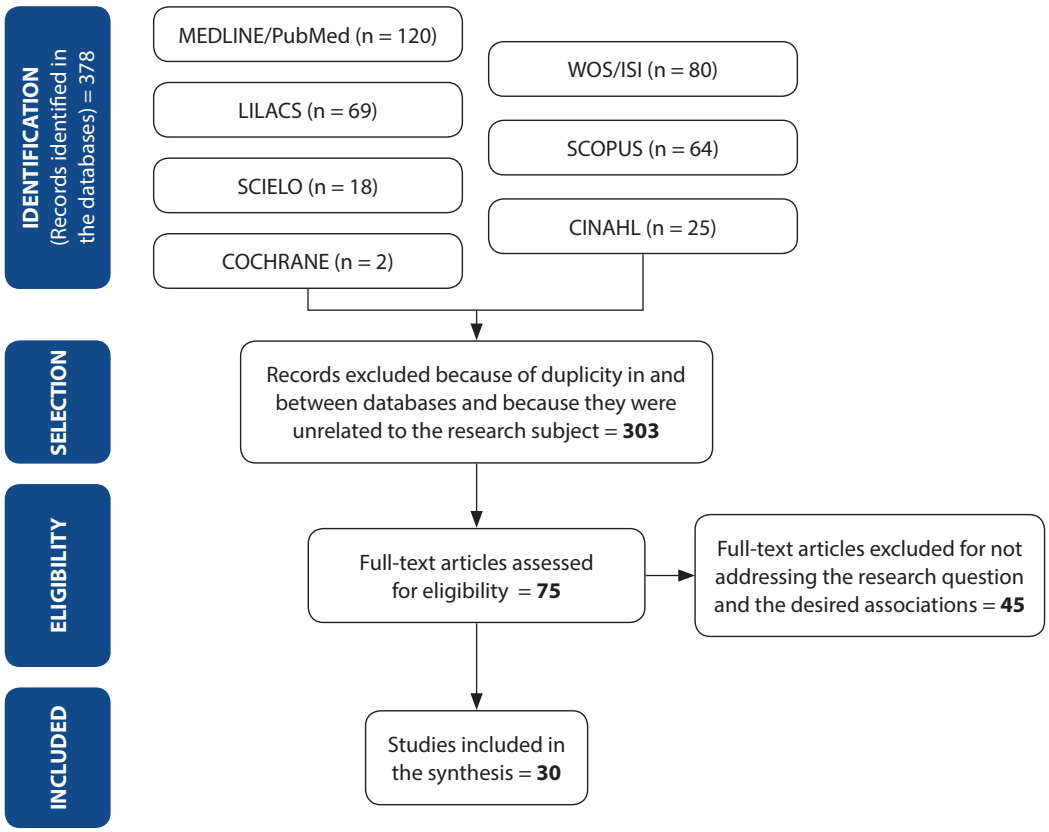

Figure 1 – Chart of the selection of articles for the integrative review.

Source: Research data, 2015.

of occupational accidents and diseases: 20 (66.6%); and inappropriate behaviors following the occurrence of occupational accidents: 10 (33.3%). These figures These figures exceeded the total number of articles examined, since some consequences are repeated in the results obtained.

Regarding the recommended interventions, 22 (73.3%) articles reported continuing professional development to increase adherence to SP, and 12 (40.0%) articles emphasized the inclusion of content other than SP in educational programs, particularly on the perception of risks and standards that regulate health work. The other studies were focused on work conditions and implementation of standards and routines.

Chart 1 shows the articles that composed the sample analyzed in this study.

DISCUSSION

Most of the analyzed articles are descriptive and have a methodological design that results in poor scientific evidence; however, they provide contributions to the planning of action aimed to revert low adherence to SP. Most studies are focused on investigation and few are focused on interventions. The studies that integrate the review stress the need for further research on the reasons for poor adherence to SP in health services, once this issue impacts the safety of health professionals and patients. Nevertheless, in spite of this gap, there has undeniably been an increase in publications on the issue over the past five years, indicating greater involvement and concern of researchers with the subject.

The SP include hand hygiene (hand washing), safe and preventive handling and disposal of sharp material, use of personal protective equipment to protect the patients and the environment and immunization of health workers. Such recommendations should be adopted during care provided to any patient, regardless of their diagnosis[25].

Analysis of the reasons of low or non-adherence to SP shows that many of them are related to lack or insufficient investment on work conditions, which, in addition to exposing health professionals and patients to risks, generates an atmosphere of disharmony, dissatisfaction and lack of motivation in the workplace[26]. Therefore, we stress the importance of well-established standards and routines, with well-defined and disseminated flows, so that everyone has access to them and is aware of what

Citation/ Database/ Country	Title	Methodological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Silva et al, 2012 / SCIELO / Brasil	Knowledge and use of standard precautions by health professionals	Descriptive cross-sectional study	Most professionals recognize and adopt standard precautions, but a significant part of them show low or no-adherence to SP.	Insufficient training in biosafety to promote changes of habits that many health workers find it difficult to handle.	The occurrence of occupational accidents, and accidents are trivialized, poorly reported and monitored.
Chan MF, 2010 / MEDLINE / Singapura	Factors affecting the compliance of operating room nursing staff toward standard and transmission based precautions in an acute care hospital	Descriptive cross-sectional study	Higher education and recent training in the service were not sufficient to establish a strong correlation between attitude and compliance, but there was a significant correlation between knowledge and compliance.	The reasons may be specific to the different groups of workers.	Exposure of workers to diseases and accidents and risk to patient safety. Identify the reasons for low adherence and provide the appropriate intervention.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Method-ological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Nowak et al, 2013 / SCOPUS / Brasil	Risk factors for accidents with sharp materials	Retrospec-tive study	Low adherence to standard precautions, particularly incorrect use of PPE and improper handling and disposal of sharp materials .	Excessive work, double shifts, reduced teams were reported as possible reasons for low adherence to SP and causes of accidents.	Occurrence of occupational accidents. Preventive measures such as immunization, availability of PPE and appropriate sizing of personnel are recommended.
Amin T, Al Wehedy A, 2009 / SCOPUS / Arabia Saudita	Healthcare providers knowledge of standard precautions at the primary healthcare level in Saudi Arabia	Descrip-tive cross--sectional study	Lack of knowledge on the PP, especially related to handwashing, waste disposal, accident management and environment cleaning.	Lack of resources and opportunities of training (due to excessive work).	Occurrence of occu-pational accidents and mistakes in post-accident conducts. It is suggested that contents on epide-miology of transmissible infections, ergonomy and risk perception are includ-ed in nursing curricula.
Askarian et al, 2015 / SCOPUS / Irã	Knowledge, practice, and attitude among iranian nurses, midwives, and students regarding standard isolation precautions	Descrip-tive cross--sectional study	Despite the lack of resources and increased exposure, characteristics observed in Iran, there is a positive linear correlation between knowledge, practice and scores of attitude for the nursing groups, instructors and students of obstetrics, indi-cating proper adherence to standard precautions.	Adherence is no yet ideal due to unavailability of resources.	Contamination by pathogens, accidents with sharp materials. Increasing the supply of resources to meet the demands is recommended.
Efstathiou et al, 2011 / LILACS / Sul da Turquia – Cyprus	Factors influ-encing nurses' compliance with standard precautions in order to avoid occupational exposure to microorgan-isms: a focus group study	Qualitative study with a focus group	In general, health professionals recognize the importance of precautions, but adherence is low or nonexistent.	Lack of knowl-edge, lack of time, forgetfulness, lack of resources, negative impact of PPE on nursing skills, PPE is un-comfortable, caus-es skin irritation, conflict between the need to pro-vide care and use of self-protection.	Exposure to potentially contaminated material, occurrence of occupational diseases and accidents. Further studies are needed to understand the lack of compliance with standard precautions.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Methodological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Melo et al, 2006/ LILACS / Brasil	Nurses' understanding of standard precautions at a public hospital in Goiania – GO, Brazil	Qualitative descriptive study	Knowledge consistent with the implementation of SP by professionals, but there are distorted perceptions on its comprehensiveness. There is also the selection of use according to the patient's diagnosis.	Cognitive, emotional and behavioral aspects directly related to non-implementation of SP.	Occurrence of occupational accidents and diseases. It is necessary to invest in training in nursing skills using appropriate strategies for training in the service.
Rezende et al, 2012/ LILACS / Brasil	Adherence to handwashing and the use of personal protective equipment by nursing professionals in basic health care	Descriptive cross-sectional study	Low adherence to handwashing and the use of PPE.	Few educational actions and lack of na effective management regarding adherence to SP.	Inappropriate behavior poses risk to workers and users. It is necessary to implement educational programs related to adherence to SP.
Costa et al, 2012/ LILACS / Brasil	The nursing team is informed on a mobile care on precautions	Descriptive cross-sectional study	Most professionals provided incorrect answers on the importance of SP. None of the nurses recognizes the disposal of sharp materials as a SP measure. None of the professionals described all the SP, safety practices, nor explained what to do in the event of an accident.	Lack of knowledge on the importance of use of SP, on educational actions and on biosafety and post-accident conducts.	Occurrence of occupational accidents with sharp materials, inappropriate post-accident conducts. It is important to disseminate the principles of the SP during training and maintain regular education programs in the service.
Campos et al, 2011/ LILACS / Brasil	Biosafety: knowledge and adherence to standard precaution measures in a hospital	Descriptive cross-sectional study	Low level of knowledge on the SP, occupational hazards and reporting services. Adherence is greater among professionals who had accidents.	Little knowledge on SP and lack of dissemination of standards.	Occurrence of accidents, inappropriate post-accident conducts and underreporting. It is important to implement educational actions and a manual for dissemination of SP .
Pereira et al, 2013 / PUBMED / Brasil	Adherence to standard precautions by nursing professionals who perform their activities in intensive care of a university hospital	Descriptive cross-sectional study	Adherence to SP is not sufficient.	Individual factors such as personality and perception of risk and factors related to work such as the perception of obstacles and long working hours	Occurrence of occupational accidents and diseases. Activities aimed to increase the perception of risks, reduce obstacles and provide training of professionals on SP are recommended.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Method-ological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Brevidelli MM, Cianciarullo TI, 2009/ PUBMED / Brasil	Psychosocial and organizational factors relating to adherence to standard precautions	Descrip-tive cross--sectional study	The global rate of adher-ence to SP was 38.5%. The involved factors were: belonging to the group of physicians, trained in the implementation of standard precautions (SP), reduced perception of the obstacles to be overcome to adhere to SP, more ac-curate perception of work-loadl feedback from safety practices and support to safety management.	Individual and organizational factors: level of knowledge, training, perception of obstacles and workloead and management and safety practices.	Exposure of workers and patients to biological agents. It is important to consider the individual and organizational factors in prevention programs.
Jeong et al, 2008/ PUBMED / Coréia do Sul	Compliance with standard precautions among operating room nurses in South Korea	Descrip-tive cross--sectional study	All investigated hospitals have educational programs for new employees, but not on a regular basis for all of them. Only 12% of the respondents always wear protective gloves , 2% al-ways wear glasses and 10% are not always concerned with needle recapping.	Lack of regular training for all the workers.	Occupational exposure to biological agents that may result in accidents and diseases. The implementation of regular training programs for all employees is suggested.
Oliveira et al, 2009/ PUBMED / Brasil	Knowledge and attitude regarding standard precautions in a Brazilian public emergency service: a cross-sectional study	Descrip-tive cross--sectional study	Different levels of knowledge among the team members. The drivers showed a lower level of knowledge on SP. Although the other professionals had adequate knowledge of SP, adherence was low.	Level of knowledge on SP and characteristics of work can be reasons for low adherence.	Contamination by infectious agents and occupational accidents. The implementation of educational programs for different groups of professionals is recommended.
Cirelli et al, 2007/ PUBMED / Brasil	Adherence to standard precautions in peripheral vascular access o	Prospec-tive study	It was found that 84.4% of the punctures were per-formed without gloves and previous handwashing, in 29.7% of the cases needles were recapped and in 93.2% of the cases professionals reported that material supply was adequatel.	Urgency procedure, rush, low-risk patient, disagreement with precaution and unpredictable situations.	Exposure of professionals and patients to risk of infections. Innovative interventions that arouse the team's attention to increased adherence to SP is recommended.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Methodological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Zhou et al, 2014 / ISI / China	Healthcare-Associated Infections and Shanghai Clinicians: A Multicenter Cross-Sectional Study	Descriptive cross-sectional study	The self reporting of professionals regarding practices and adherence to SP showed less than satisfactory results.	Lack of knowledge on standard precautions.	Occupational exposure and inappropriate post-accident conducts. Innovative interventions based on strategies targeted to the promotion of a culture of safety and health are suggested.
Atif et al, 2013/ ISI / França	Awareness of standard precautions for 4439 healthcare professionals in 34 institutions in France	Multicentric cross-sectional study	The study showed a range of correct answers regarding SP of 37.1-91%. Regarding handwashing, the percentage of correct answers was 72.6%, but only 7,3% provided correct answers to questions on the use of barriers and disposal of needles. The nurses were found to have greater knowledge than the other professionals.	Lack of knowledge on SP, particularly regarding the disposal of needles and the use of appropriate protective barriers.	Occupational exposure to possible accidents and diseases. Investment in educational programs on SP for all professionals is recommended.
Cutter J, Jordan S, 2012/ ISI / País de Gales	Inter-professional differences in compliance with standard precautions in operating theatres: A multi-site, mixed methods study	Descriptive cross-sectional study	The results showed an unsatisfactory level of adherence: 10% always adhere to all available precautions; 0.003% (1) reported never adhering to precautions; the others have low adherence to SP according to their risk perception. The groups of professionals have different perceptions of exposure to risk.	Risk perception varies among the professions and this may cause distorted views on the use of SP.	The occurrence of occupational accidents. It is important to include content on risk perception in the curricula and invest in health and safety at work policies .
Paiva MHRS, Oliveira AC, 2011/ ISI / Brasil	Knowledge about the attitudes of workers from a public emergency service on the adoption of standard precautions	Descriptive cross-sectional study	Nurses and drivers showed the highest and the lowest level of knowlege regarding SP, respectively. Non-adherence to precaution measures was greater among professionals older than 31 years.	Being older than 31 years appeared as a factor that may interfere with non-adherence to SP.	Occurrence of occupational accidents and diseases in workers and patients. It is necessary to invest in educational programs targeted on SP.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Method-ological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Sreedharan et al, 2011/ ISI / Emirados Arabes Unidos	Knowledge about standard precautions among university hospital nurses in the United Arab Emirates	Descrip-tive cross--sectional study	Although 97% of the respondents were familiar with the concept of SP, a significant part of them re-ported that only diagnosed patients or suspected cases of infectious diseases pose risk, and less than half of respondents aggreed that the SP are aimed to protect health professionals and patients (45.9%).	Lack of knowledge on control of infections and SP.	Possibility of accidents and diseases due to occupational exposure and improper use of precautions. The implementation of a program aimed to improve knowledge on SP is recommended.
Efstathiou et al, 2011/ ISI /	Compliance of Cypriot nurses with standard precautions to avoid exposure to pathogens	Descrip-tive cross--sectional study	The results showed unsatisfactory adherence to SP. Only 9.1% reported full adherence. Exposed professionals who participated in trainings reported greater adherence.	Probably not all the professionals are being benefitted by educational pro-grams, generating deficit of knowl-edge and lower adherence to SP.	Exposure of professionals and patients to biolog-ical risks. Educational strategies targeted to all the professionals to improve knowledge and practices related to SP are recommended.
Reda et al, 2010 / ISI / Etiópia	Standard Precautions: Occupational Exposure and Behavior of Health Care Workers in Ethiopia	Descrip-tive cross--sectional study	Practices unfavorable to SP such as needle recapping and discriminatory attitudes towards patients with HIV/AID; insufiicient supply of PPE.	Discriminatory attitudes can be related to lack of knowledge and impact adherence to SP, insufficient supply of PPE.	Risk of sickening and occupational accidents and hospital infections by patients. I Invest-ment on the training of professionals, adequated supply of PPE, preven-tion of hospital infec-tions and assessment and communication of occupational exposures are recommended.
Luo et al, 2010 / ISI / China	Factors impacting compliance with standard precautions in nursing, China	Descrip-tive cross--sectional study	Low adherence to SP among the nurses who participated in the study.	Low level of knowledge on SP, work characteristics, experience of exposure and availability of container for disposal of sharp materials.	Exposure of health personnel and patients. It is important that the authorities involved become concerned with adherence to SP and provide the personal pro-tective equipment (PPE). Training should include information on SP.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Method-ological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Parmeggiani et al, 2010 / ISI /	Healthcare workers and health care-associated infections: knowledge, attitudes, and behavior in emergency departments in Italy	Descrip-tive cross--sectional study	Health professionals have high levels of knowledge but show low adherence to SP. Nurses have greater knowledge, perception of risks and take more adequante measures of control of infections compared to physicians.	Low level of knowledger was a key fctor in adherence to SP.	Occupational exposure with possible occurrence of accidents and diseases. Investment in education, perception of risks and supply of PPE is suggested.
Ferrer et al, 2009 / ISI / Chile	Observed use of standard precautions in Chilean Community Clinics	Obser-vacional study	The study showed inconsistency in the use of SP, particularly regarding handwashing, cleaning of surfaces and general materials.	Lack of materials was the most commonly observed reason, which made it difficult to adhere to SP in many situations.	Exposure to risks may result in accidents and disease in professionals and patients. The delivery of training to the professionals involved in care is recommended.
Kagan et al, 2009 / ISI / Israel	Perceived knowledge of blood-borne pathogens and avoidance of contact with infected patients	Descrip-tive cross--sectional study	Adherence to SP differs according to the patient's disease. Knowledge on SP has little impact on adherence to these measures.	Existence of bias and values that interfere with the use of SP.	Occurrence of accidents and diseases. It is necessary to introduce psychological and educational aspects in educational programs to health professionals.
Souza Lopes et al, 2008 / ISI / Brasil	Adherence to standard precautions by the mobile prehospital care team from Belo Horizonte, Minas Gerais, Brasil	Descrip-tive cross--sectional study	The professionals reported not obtaining satisfactory results for use of facial masks, goggles and other PPE; the drivers reported inadequate attitudes for all the items.	Lack of training on biosafety and SP, of periodical meetings with the teams, of a center for materials (cleaning, disinfection and sterilization).	Occurrence of accidents and diseases. The implementation of educational programs on biosafety and PPE, a calendar of periodical meetings and the creation of a center for materials.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (continue)

Citation/ Database/ Country	Title	Method-ological design	Results on adherence to SP	Reasons for low and/or no adherence to SP	Consequences of low and/or no adherence to SP and recommended interventions
Chan et al, 2007 / ISI / China	Investigating the knowledge, attitudes and practice patterns of operating room staff towards standard and transmission-based precautions: results of a cluster analysis	Descriptive cross-sectional study	Insufficient attitudes regarding adherence to SP. Adherence was more significant in the group with greater knowledge.	Lack of knowledge is reported as one factor of low adherence to SP.	Implications for the control of hospital infections and exposure to accidents and diseases. Investment in training and changes of attitudes and practices related to SP are recommended.
Gammon et al, 2008 / Cochrane / Reino Unido	A review of the evidence for suboptimal compliance of healthcare practitioners to standard/ universal infection control precautions	Study of literature review – 1994 to 2006	Adherence to SP is lower than the what is internationally recommended as ideal. Compliance with aspects of the standards varies among professionals.	There is no evidence regarding interventions and durations that impact adherence to SP and whether non-adherence is.	Implications for the safety of personnel, patients and the care environment. It is recommended the identification of the reasons for non-adherence to the standards and the implementation of measures to improve adherence to SP.
Aguiar et al, 2008 / Cochrane / Brasil	Use of standard precautions in nursing care: a retrospective study	Study of literature review – 1999 a 2005	Low adherence to SP, which makes control of infections difficult.	Not included in the article.	Lack of control of hospital infections exposing patients and health professionals. The implementation of educational programs to improve knowledge on the issue is suggested.

Chart 1 – Characterization of the articles, results of adherence to standard precautions, reasons and consequences of low adherence and recommended interventions. Ribeirão Preto, 2015 (conclusion)

to do in situations of exposure to risks and accidents, as stipulated in the labor legislation[13,27-28].

Adherence to SP is one of the strategies used to protect workers from exposure to pathogens and to protect the patient[29]. The factors with a positive impact on adherence to SP include training[17,30]; perception of the organizational safety environment[31]; care provided to a smaller number of patients [32]; organization and cleaning of the workplace[33]; size of the establishments, since larger sites usually count on more active infection control committees[34]; perception of obstacles faced by workers to adhere to SP[31]; risk behaviors of workers[35] and perceived self-efficacy of the use of safe practices[16].

A study on multicausality of occupational accidents with exposure to biological material in a teaching hospital found that these accidents were not only caused due to peculiarities of the work, but also to work conditions and the process of hospital work. The study also identified that failure in supervision and planning of procedures by nurses can lead to such accidents[36].

Understaffing, work overload, stressful working hours, shifts, night shifts, physical and emotional exhaustion, poor technical training, inattention, overconfidence, use of inappropriate materials, stress and no adherence to precaution measures are crucial factors predisposing to exposure to biological materials[31].

The results obtained revealed that adherence or non-adherence to SP is related to individual aspects of the workers, work conditions and organizational structure; that health institutions should provide safe work conditions, which comprises the materials and equipment used, collective and personal protective equipment, continuing professional development/education, establishment and dissemination of health standards and routines, among other measures aimed to minimize occupational exposure and, hence, the occurrence of occupational accidents and diseases.

Risk behavior and perception of individual risk are factors that may interfere with adherence to SP. Thus, institutional strategies are recommended to change such behaviors without blaming the workers for them, but rather seeking to involve them in the process [37-38]. Despite the challenges posed by the establishment of such strategies (since subjectivity is individual and based on specific reasons), it is necessary to identify them and confront them [39].

Scientific knowledge resulting from studies and social and political actions has contributed to the establishment of a legislation that favored the implementation of measures aimed to improve safety in the workplace in different sectors in many countries. Among these measures, we stress Regulatory Standard 32[40], in the area of health and nursing in Brazil, on the prevention and control of occupational hazards, Regulatory Standard 9[41] on the prevention of environmental risks and Regulatory Standard 7[42] on workers' health regarding promotion, prevention and rehabilitation of health.

Low adherence to SP may have negative consequences for workers, patients and institutions such as the occurrence of occupational accidents, hospital infections and institutional damage. In this regard, the analyzed articles recommend interventions aimed to increase adherence to SP, reducing occupational exposure. Most of them emphasized the importance of interventions consisting of educational programs using innovative strategies that provide the professionals with the opportunity of reporting their experiences, that is, through a dialogical approach. This would allow the identification of the reasons for low adherence to SP and the planning of actions targeted to the reduction of the obstacles, individual or organizational, that might be interfering with adherence to SP[43]. Some instruments have been used to identify adherence to SP[44-45], which produced satisfactory results for the planning of strategies aimed to improve safety measures and minimize occupational hazards.

It should also be stressed the need to include in nursing curricula contents targeted to the practice of health and safety at work, not only biosafety, but also the other norms that regulate work in health services, in order to make it safer and focused on the perception of risks by professionals[14,31-32,37-39,46-51]. These studies, which account for 40.0% of the analyzed sample stress that risk perception should be included in continuing education actions, since the way in which health professionals perceive risks is directly related to the protective measures adopted by them.

Occupational accidents with exposure to biological material among nursing workers still occur in many health services, particularly in developing countries, and effective strategies that go beyond the traditional educational practices, should be implemented, such as: organizational culture, the model of management and organization of work adopted, empowerment of workers and work conditions[52].

CONCLUSION

The reasons for low adherence of health workers to standard precautions concern poor training, risk behaviors, unawareness of the importance of SP, insufficient availability of personal protective equipment and inappropriate work conditions (excessive workload and reduced teams) The consequences are occupational accidents, particularly exposure to potentially contaminated biological material and sickening of health workers.

There are few studies on interventions related to this subject. The pertinent studies revealed that interventions concern educational practices, correction of situations in the workplace and strategies aimed to adherence to work safety rules. Thus, intervention studies are needed to contemplate strategies to change risk behaviors, improve work conditions e.g. appropriate staff sizing, availability of material and equipment of personal protective equipment and continuing professional development.

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