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ERGONOMICS RISK FACTORS FROM THE BRAZILIAN HEALTHCARE PROFESSIONALS' PERSPECTIVE DURING COVID-19: WHICH ARE MOST HARMFUL

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ABSTRACT: Background: Since the outbreak of the pandemic caused by COVID-19, numerous occupational Risk Factors (RF) inherent to the activity of Healthcare Professionals (HP) were intensified given the high demand of Healthcare Facilities (HF). Objective: Identify and classify which RF are considered most harmful on the health and safety of HP under their perception in Brazil. Methods: Exploratory research with 42 HP using a Data Collection Instrument (DCI) to compare pairs of RF. The Analytic Hierarchy Process (AHP) method was used to rank the risks that cause most harm to HP. Results: Of the respondents, 30.23% were nurses, 25.58% were from physicians and 16.28% were from work safety. The average age of participants was 35.2 years with 8.2 years of professional experience. The RF with the greatest impact on workers' health was violence at work (9.64%); high labor demand (9.39%); and lack of active management support (8.89%). Conclusion: Even with the high demand for work due to the COVID-19 pandemic in Brazil, the risk of workplace violence was still the most harmful risk identified by HCPs. Furthermore, HCPs should be supported by the management team to report any occupational RFs related to their activity, since a preventive safety culture is essential.

PALAVRAS CHAVE: Ergonomics risk factors; healthcare professionals; COVID-19; occupational health.

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1. INTRODUCTION

"There is hardly enough protective equipment. (...) we become too obsessed with everything. (...) it's scary. We think that everything is contagious because of our obsession ... at home too (...) It exhausted us mentally" (Moradi et al., 2021). Phrases like these demonstrate the concern that Healthcare Professionals (HP) are having with the emergence of Coronavirus Disease (COVID-19), an acute respiratory syndrome caused by a new coronavirus called Severe Acute Respiratory Disease Coronavirus (SARS-CoV-2).

If, on the one hand, the majority of the world population remained at home under a "home-office" regime during quarantine, HP have been highly requested by Healthcare Facilities (HF) for the confrontation of the new disease (WHO, 2022). This high exposure increased the risk of contamination by the SARS-COV-2 virus (The Lancet, 2020; Papagiannis et al., 2020; Wei et al., 2020). In Poland, for instance, until May/2021, more than 50% of the HP had been contaminated (Drobnik et al., 2021). In Brazil, until March/2022, a study with 859 nurses concluded that the occurrence of COVID-19 was almost 60% among these professionals (Oliveira et al., 2022).

The risks to HP go beyond the contamination by the SARS-COV-2 virus. The occupational risks typical of HP activities were intensified as the demand for health services increased during the COVID-19 pandemic. Studies are reporting increased demand and working hours (Rathore; Gupta, 2020; Savitsky; Radomislensky; Hendel, 2021; Zhou et al., 2021); incidence of depression, panic disorder, and anxiety (Amer et al., 2021; Khasawneh et al., 2021; Pappa et al., 2021); burnout syndrome and emotional exhaustion (Pappa et al., 2021; Sriharan et al., 2020); psychological, physical and sexual violence (Ghareeb; Shafei; Eladl, 2021; Kibunja et al., 2021), dread and stress of acquiring COVID-19 and spreading it to relatives and friends (ILO, 2020; Pappa et al., 2021; Woon et al., 2020).

Despite the increase of studies on the subject, there is still a lack of understanding of which are the RF that causes higher impacts on the health of HP, especially in Brazil. Based on an exploratory survey, this study aims to identify and classify which RF are considered most harmful on the health and safety of HP under their perception.

2. MATERIALS AND METHODS

2.1 Study design and setting

This research consisted of two phases. Phase 1 - exploratory literature review, intending to identify common RF in HP activities. This phase allows us to classify the RF by categories inside Ergonomics Domains. Phase 2 - exploratory survey, conducted among 42 HP that worked during the pandemic in HF, such as hospitals, radiological examinations facilities, and medical clinics. Professionals varying from different training areas, such as physicians, engineers, and technicians participated in the survey. The AHP method was used to compose a priority ranking of RF and to identify those who are most harmful to HP.

2.2 Data Collection

The Data Collection instrument (DCI) was prepared based on the exploratory literature review conducted in phase 1 of this study. Risk Factors were classified according to the Ergonomic Domains (Physical, Cognitive and Organizational) (IEA, 2022) and their categories, classified by Postural Risks/Biomechanical and Biological Risks to Physical domain; Psychosocial Risks to Cognitive domain; and Factors associated with PPE, qualifications and training guidelines and Management support to Organizational domain, according results of literature review (Table 1). Data collection occurred through the filling of the DCI by the HP, which happened from mid-October/2021 until near June/2022.

2.3 Data analysis

For data analysis, we choose to use the AHP method developed by Saaty (Saaty; Vargas, 2012), as it is a multicriteria decision method suited for the proposes of this study. The AHP method helps to make complex choice decisions between variables, considering its most important criteria according to personal judgment among pairwise comparison alternatives. Thus, AHP was used to establish a system of weights between the various categories of risks in the activities of HP, which takes into account the personal judgments of professionals themselves, based on their experiences. These calculated weights served to rank occupational risks in order to identify the most harmful ones.

Data collection for the application of the AHP was performed through paired comparisons between the risk factors identified in the initial phase of the literature review. Study participants were asked to evaluate the relative importance of each risk factor in relation to the others, using a numerical scale from 1 to 9, where “1” represented “equally important” and “9” indicated “extremely more important”. The comparative analysis was performed for each of the factors within the ergonomic domains (physical, cognitive and organizational). The AHP, as a multicriteria decision method, allows the transformation of the subjective evaluations of the participants into a quantitative analysis, facilitating the prioritization of the most significant risks to the health and safety of health professionals.

2.4 Ethical considerations

Ethical approval was obtained from the Ethics Committee on Research with Human Beings of the Federal University of Santa Catarina (CAAE: 39124920.0.0000.0121). The participants were randomly selected for the interview, in which they signed the Free and Informed Consent Form, agreeing to participate as volunteers, confidentially and anonymously. No personal identifiers were collected, and all information was treated with confidentiality.

3. RESULTS

Table 1 presents the identified and established criteria of common RF in HP’ activities. Associated factors of each category are briefly described. This information served as a basis for the development of the questionnaire.

Table 1 - Established criteria which served as the basis for the application of the questionnaire.

Ergonomic Domain	Categories	Associated Factors
Physical	Biological Risks	Pathological microorganisms present in hospitals, such as bacteria, viruses, and others; SARS-CoV-2 (COVID-19); hepatitis B and C-causing virus; Mycobacterium tuberculosis (tubercu losis); Staphylococcus (MRSA); and others.
Physical	Postural Risks / Biomechanical	Inadequate posture; transport and movement of patients; requests from extreme forces; aggressive postural conditions; repetitive movement; risk of Work-related Musculoskeletal Disorders (WMSD) and/or Repetitive Strain Injuries (RSI); and others.
Cognitive	Psychosocial Risks	Fatigue; voltage; exhaustion and Burnout; anxieties disorder; fears; high mental load and stress; physical and psychological violence, bullying; among others.
Organizational	Factors associated with PPE*	Absence, scarcity, rationing and/or incorrect use of PPE; lack of training, maintenance, inadequate choice of PPE at risk; improvisations (such as cloth mask); and others.
Organizational	Training and training guidelines	Lack of training on topics such as: proficiency and safety work within the ES; work principles and procedures operational standards; principles of IPEs and their manipulations; basic principles of disaster and emergency medicine; infection control; recognition and classification of occupational risks; and others.
Organizational	Management support	Absence of active physical and social support; lack of involvement of the management and management team; absence of communication in forums, discussion group and weekly/daily message exchanges; recognition and classification of occupational risks; and others.

Source: Authors, 2022. *Personal Protective Equipment (PPE).

Of the 45 participants of the questionnaire, 42 took part in this research, yielding an approximate response rate of 93.3%. The majority of participants were female (62%). Areas of activity with most respondents were nursing (30.23%), medicine (25.58%), and work occupational safety (16.28%), composed of engineers and technicians. Other activity areas include psychology, physiotherapy, biomedicine, pharmacy, social assistance, and radiology (all sum below 5%). The respondents are from 4 of the 5 Brazilian regions, namely northeast (16.28%), midwest (6.98%), southeast (6.98%), and south (69.77%). From these regions, we had responses from 8 different states. The average age of participants was 35.2 years with 8.2 years of professional experience.

Table 2 presents the results of the AHP method applied to the variables of our study. Overall weight of each Ergonomic Domain is shown as well as the partial weight of each category. Partial weights were calculated multiplying the overall weight of each ergonomic domain with their categories. All consistencies were below 10%, indicating the validity of the results for this case.

Table 2 - Overall and partial weights of RF and answers' consistency.

Domain (Categorie) Risk Factors (RF)	Overall Weight (%)	Partial Weight (%)	Consistency (%)
Physical Domain (Biological)	**26**	**-**	**0.7**
Miscellaneous Pathological	18.22	4.74	
Sars-Cov-2	25.64	6.67	1.83
Hepatitis B and C	30.01	7.80	
Tuberculosis	26.14	6.80	
Physical Domain (Postural/Biomechanical)	**26**	**-**	**0.7**
Harmfull postures and efforts	18.22	3.32	
Patient movement	11.21	2.92	
Repetitive movements	18.22	3.19	1.06
Extended Journeys	12.26	7.29	
High Work Demand	36.10	9.39	
Cognitive Domain (Phychosocial)	**26**	**-**	**0.7**
Burnout syndrome	25.12	6.53	
Mental Stress	19.27	5.01	0.25
Violence at work	37.08	9.64	
Bullying at work	18.53	4.82	
Organizational Domain	**22**	**-**	**0.7**
Factors related to PPE	28.28	6.00	
Qualification and traning	32.36	7.12	2.38
Lack of management support	40.36	8.88	

Source: Authors, 2022.

In the main domains of Ergonomics, HP believes that the Physical domains, composed of Biological and Postural/Biomechanical and Cognitive Domain, composed of Psychosocial, are equally important and the most risk categories (26%). The organizational Domain, however, were not so low (22%), indicating a certain balance under the judgment of the HP. The answer consistence was 0.7%

In the Biological category of the Physics domain, Tuberculosis (6.80%) and Hepatitis B and C (7.80%) were the factors that had more disturbance. In the postural/Biomechanical category, high work demand (9.39%) and extended journeys (7.29%) were most harmful. On the other hand, in Cognitive Domain, violence at work (9.64%) and Burnout syndrome (6.53%) draw attention. Last, in Organizational Domain, lack of management support (8.88%) and factors related to qualification and training (7.12%) were the highest RF that harm the workers.

4. DISCUSSION

The results allowed us to identify that RF do not equally impact the health and safety of HP. For example, violence at work, that addresses issues such as sexual, physical and psychological violence suffered from patients' relatives was the RF most harmful to the health of HP (9.64%). This data is in line with other studies (Kibunja *et al.*, 2021; Stahl-Gugger; Hämmig, 2022; Woon *et al.*, 2020) which reported most HP have already suffered some kind of violence from the patients' relatives in their work environments, generating several psychological and physical effects on their health.

Even though different studies show similar results, the work of Kibunja *et al.* (2021) went a step further and reported that in more than 50% of the incidents of violence, no action was taken to prevent such aggression and improve the quality of the work environment. This data may be related to the lack of management support, which was identified by our study as one of the main impacting factors to the health of HP (8.88%).

To mitigate violence in the hospital environment, it is recommended to implement structured policies and specific training aimed at raising awareness among staff and patients (Barros *et al.*, 2022). Strategies such as strengthening physical security, creating accessible reporting channels, and educational programs to prevent conflicts have been successful in other hospital settings, reducing incidents of violence and promoting a safer work environment (Oliveira *et al.*, 2014; Pavão *et al.*, 2024). These measures can be adapted to the Brazilian context, especially in health units that have a high incidence of violence, as highlighted in this study.

High work demand was the second RF with the highest harm potential for participants' health in our study (9.39%). Other works also identified this RF on HP (Joo, Liu, 2021; Martínez-López; Lázaro-Pérez; Gómez-Galán, 2021; Raza *et al.*, 2019). The increase in work demand has intensified with the unfolding of COVID-19, once healthcare services have been more requested and there was a high absence of HP due to health problems. This situation caused more fatigue and mental stress on HP, once they had to perform activities beyond their usual daily routines, without proper standardized operational procedures and with many improvisations (Labrague; Santos, 2021).

In addition, some works pointed that violence and high work demand can increase Burnout Syndrome (Pappa *et al.*, 2021; Raza *et al.*, 2020; Sriharan *et al.*, 2020; Stocchetti *et al.*, 2021; Yuan *et al.*, 2020; Zhou *et al*, 2021), which was also considered a high risk harmful to the physical and mental health of HP (6.53%) in our study.

Regarding the high work demand, it is suggested that structural reorganizations, such as the redistribution of tasks and the use of technology to automate administrative processes, can alleviate the workload of HP (Yankam *et al*., 2023). Additionally, the temporary hiring of support teams in times of greatest need and the provision of psychological support to workers have shown effectiveness in reducing occupational stress (Silva; Silva, 2015). These actions, aligned with burnout prevention programs, are essential to minimize the negative impacts described by this study.

Lack of management support was the third RF with the greatest impact (8.88%), also identified in some other works (Goldfarb *et al.*, 2021; Pappa *et al.*, 2020; Raza *et al.*, 2020). Researches discuss the importance of the involvement of the psychological support team to assist HP professionals (Contreras *et al.*, 2021; Halcomb *et al.*, 2020; Pappa *et al.*, 2020). To Pappa *et al.* (2020), 70% of the HP reported that they would like to receive more access/support from the psychological team.

The lack of management support can be addressed with initiatives that promote greater engagement of managers in the workplace. Studies indicate that regular discussion forums between workers and managers, accompanied by concrete actions to improve working conditions, generate greater trust in the team and reduce the perception of abandonment. Structured feedback policies, in which managers transparently report the measures adopted based on workers' demands, also contribute significantly to a more collaborative and safer organizational environment (Brennan; Wendt, 2021; Navajas-Romero *et al*., 2022).

Regarding the organizational domain, factors involving qualification and training were considered one of the most harmful risks (7.12%). This result may be associated with non-existent, incorrect, or lack of a robust employee safety training policy. On the other hand, Factors related to Personal Protective Equipment (PPE) were the last one considered most worrisome (6.00%). This may indicate that professionals are more aware of the importance of a prevent safety culture other than just using individual control measures. Studies have reported that training programs have significantly reduced occupational and disease incidents in HF (Barratt; Shaban; Gilbert, 2020; Contreras *et al.*, 2021; Du; Chan, 2021; Ragazzoni *et al.*, 2021). In addition, some authors suggest fostering the ownership of safety by all employees – moving from “involvement” to “empowerment”. Consequently, employees do not just follow procedures, but also take ownership of collective safety

measurements (Dekker *et al.*, 2022; OSHA, 2022; Turner *et al.*, 2021).

In the biological risk categories, Hepatitis B and C were the factor considered with high impacts on HP (7.80%). Atlaw *et al.* (2021) states that almost half of the Hepatitis B contamination in HP was caused by occupational accidents with needlestick and sharp objects. This may be related to a lack of management programs, such as Program for Prevention of Needlestick and Sharps Objects (PPNSO). In Brazil, PPNSO is a mandatory program by occupational health and safety laws, since 2012.

In the domains of ergonomics, HP believes that the physical RF (biological and postural/biomechanical, 26%) and cognitive risks (26%) are the most harmful categories of risk. The organizational factors, however, were not so low (22%), indicating a certain balance under the judgment of the HP. Finally, regarding the consistencies of the answers, they were all below the limit suggested by Saaty and Vargas (2012), which is 10%, indicating that there were no inconsistencies in the evaluators' responses.

A specific analysis of risk factors among the different professions involved in this study revealed significant variations in the activities that present the highest number of risks. Nursing professionals, for example, faced a greater risk related to patient movement and inadequate postures, due to the nature of their daily duties, which often involve long hours and intensive physical handling. Physicians, with a greater focus on decision-making and clinical monitoring, reported a greater number of risk factors related to mental stress, such as high workload and psychosocial risks. Occupational safety professionals, in turn, highlighted the risk of biological contamination as one of the most relevant, given their close involvement in the management of PPE and safety procedures. This comparison between professions highlights the need for specific strategies to mitigate occupational risks, adapted to the particularities of each role, which can increase the effectiveness of occupational health policies in hospital environments.

4.1. Strengths and limitations

This study was conducted with a small number of respondents, limiting the generalization of the findings. Besides, the sampling doesn't have a very regular distribution between each Federal State of Brazil. Another limitation is that respondents have different vocational training areas, making it harder to identify the most harmful RF on health in certain professions. For nurses, e.g., because they work more actively in patient care, patient movement can generate a more harmful risk to their health than for physicians. Additionally, the answers were collected from October/2021 to June/2022. During such a period, many COVID-19 vaccines started being administered in Brazil. Thus, this fact may have influenced the direction of this study. For instance: HP could think that the biological risk of SARS-CoV-2 was more harmful before the vaccines developed, which could have a more negative impact on their health when they were not so protected. After vaccination, HP could set SARS-CoV-2 with a lower impact on their health, as they were less likely to get severe cases and deaths from COVID-19.

In addition to the small sample size, the regional representativeness of the data is another limiting factor. The predominance of respondents from the South region (69.77%) may have influenced the results, limiting the applicability of the findings to other regions of Brazil, where work contexts and occupational risk factors may be different. This regional concentration reinforces the need for future research that expands the sample to include proportionally more professionals from all regions of the country, ensuring greater geographic and occupational diversity. Such studies could investigate the consistency of the results found, exploring how cultural, economic, and structural factors in each region impact the perception and severity of occupational risks faced by health professionals.

Nevertheless, most findings in this research are consistent with other data found in recent

studies, especially after COVID-19 was declared a world pandemic. Another strength was the consistency of the answer's applications, calculated by the AHP method. Those were values well below 10%, which can be a validation of the Data Collection Instrument filling out.

5. CONCLUSION

Even with the high work demand caused by the COVID-19 pandemic, Brazilian HP still considers violence at work as the most harmful RF to their health. This fact may facilitate the emergence of some work-related diseases, such as Burnout Syndrome. In order to support HP in their working environment, Healthcare Facilities should implement a zero-violence policy at work as well as develop supporting strategies for HP when they are subject to any occupational RF related to their activity.

High work demand was the RF pointed out as the second most harmful. In this scenario, HP are performing unusual activities in their job, with many improvisations. These situations facilitate the incidence of work accidents.

Lack of management support was the third RF most harmful identified by our study. It may indicate the professionals' mindset changing towards prevention and collective control measures, such as safety management programs, instead of personal safety measures. Notably, workers' awareness of a preventive safety culture is essential for the reduction of accidents and occupational diseases in an effective way.

To implement the recommendations of this study, some practical actions can be considered by health managers. In the case of a zero-tolerance policy for violence at work, it is essential to establish clear protocols for reporting incidents, promote regular training on conflict management and offer immediate psychological support to victims. To foster a culture of preventive safety, managers can develop training programs on ergonomics, proper use of PPE and infection control, in addition to holding regular meetings to identify new risks. In relation to high workloads, strategies such as hiring additional professionals during critical periods, flexible work schedules and encouraging regular breaks during shifts can help reduce stress and prevent burnout. Such measures can strengthen the work environment, contributing to the health and safety of health professionals.

Although the end of the COVID-19 pandemic and its health emergency has been declared, the findings of this study remain relevant. The risk factors identified, such as workplace violence, high work demands, and lack of management support, are not exclusive to pandemic periods and continue to impact the health and safety of healthcare professionals in various contexts. These results reinforce the need for permanent preventive measures, regardless of a new global emergency. The implementation of occupational safety policies, such as a preventive safety culture and active management support, is essential to improve working conditions and prepare the healthcare system to respond more efficiently to future crises. In addition, this study serves as a basis for monitoring the evolution of occupational risks over time, providing support for ongoing research to assess whether the identified factors remain consistent or whether new demands emerge with the transformations in healthcare systems in subsequent years.

FATORES DE RISCO PARA ERGONOMIA NA PERSPECTIVA DOS PROFISSIONAIS DE SAÚDE BRASILEIROS DURANTE A COVID-19: QUAIS SÃO MAIS PREJUDICIAIS?

RESUMO: Desde o início da pandemia provocada pela COVID-19, numerosos Fatores de Risco (FR) ocupacionais inerentes à atividade dos Profissionais de Saúde (PS) intensificaram-se dada a elevada procura dos Estabelecimentos de Saúde (ES). Objetivo: Identificar e classificar quais FR são considerados mais prejudiciais à saúde e segurança dos PS sob sua percepção no Brasil. Métodos: Pesquisa exploratória com 42 PS por meio de um Instrumento de Coleta de Dados (DCI) para comparação de pares de FR. O método *Analytic Hierarchy Process* (AHP) foi utilizado para classificar os riscos que mais causam danos à ES. Resultados: Dos respondentes, 30,23% eram de enfermeiros, 25,58% eram de médicos e 16,28% eram de segurança do trabalho. A idade média dos participantes foi de 35,2 anos com 8,2 anos de experiência profissional. O FR de maior impacto na saúde do trabalhador foi a violência no trabalho (9,64%); alta demanda de trabalho (9,39%); e falta de apoio ativo da gestão (8,89%). Conclusão: Mesmo com a alta demanda de trabalho devido à pandemia de COVID-19 no Brasil, o risco de violência no trabalho ainda foi o risco nocivo identificado pelos PS. Além disso, os PS devem ser apoiados pela equipa de gestão para reportar quaisquer FR ocupacionais relacionados com a sua atividade, uma vez que a cultura de segurança preventiva é essencial.

PALAVRAS - CHAVE: Fatores de risco ergonômicos; profissionais de saúde; COVID – 19; saúde ocupacional.

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Appendix 1 - Data Collection Instrument - AHP method

UNIVERSIDADE FEDERAL DE SANTA CATARINA
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA DE PRODUÇÃO
CAMPUS UNIVERSITÁRIO - TRINDADE - CAIXA POSTAL 476
CEP 88.040-900 - FLORIANÓPOLIS - SANTA CATARINA
TEL: (048) 3721-2724 - FAX: (048) 3721-7032

Caros especialistas,

Este trabalho é parte de uma dissertação de mestrado do Programa de Pós-graduação em Engenharia de Produção (PPGEP) da Universidade Federal de Santa Catarina (UFSC). O objetivo da pesquisa é desenvolver um sistema que consiga indicar quais são os fatores de risco de maior significância em ambientes hospitalares de acordo com os profissionais que neles atuam. Além disso, o sistema proposto visa verificar qual é o nível de adoção da gestão de riscos em tais ambientes. O tempo médio de resposta é de 15 minutos.

Por conta do seu conhecimento e experiência no tema, o senhor(a) foi convidado(a) a participar desta pesquisa como especialista. Sua participação ajudará a determinar quais são os riscos que têm maiores significância para causar danos à saúde e à segurança dos profissionais da saúde.

Gostaríamos de obter sua opinião através de escolhas entre alternativas. Conforme indica o método multicritério de apoio à tomada de decisão chamado Análise Hierárquica de Processo (AHP). As perguntas deste questionário devem ser respondidas da seguinte maneira: se o atributo à esquerda for mais significativo que o correspondente à direita, coloque sua marca de seleção à esquerda, no nível do seu julgamento. Se um atributo à direita for mais significativo que o correspondente à esquerda, coloque sua marca de seleção, no nível de seu julgamento.

Por exemplo, frente aos Critérios A e B, o senhor(a) pode avaliar qual delas tem maior significância para ocasionar lesões à saúde e segurança dos profissionais da saúde: se achar que a Categoria A tem uma significância fortemente maior que a Categoria B, marque com (X) no lado esquerdo, no nível 5, como mostra o exemplo a seguir:

Ao final da pesquisa, o autor se compromete a relatar a(o) senhor(a) os resultados obtidos. Destaca-se que todas as informações e resultados serão apresentados de forma sigilosa, e nenhum dado pessoal será divulgado sem que haja a autorização dos respondentes.

Desde já agradeço sua colaboração.

Atenciosamente,
Eng. Esp. André Luís Zanella, Mestrando.
Orientadora da Pesquisa: Prof. Dra. Lizandra Garcia Lupi Vergara

FOLHA DE PREENCHIMENTO

E-mail:
Profissão:
Local de atuação:
Setor de atuação:
Tempo de experiência:

Parte I

Pergunta: ***Há ainda algum risco presente no dia a dia de vocês que não foi contemplado na listagem apresentada anteriormente? Se sim, qual seria esse risco?***
(Escreva sua resposta na linha a seguir)

Resposta:
( ) Não, todos os riscos estão contemplados na listagem anterior
( ) Sim
_____
_____
_____
_____

Parte II

Considerando o exposto neste documento, dê sua opinião comparando a significância dos critérios a seguir: