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Personal Protective Equipment in the coronavirus pandemic: training with Rapid Cycle Deliberate Practice

Equipamento de Proteção Individual na pandemia por coronavírus: treinamento com Prática Deliberada em Ciclos Rápidos

Equipo de Protección Personal en pandemia de coronavirus: entrenamiento con Práctica Deliberada en Ciclos Rápidos

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ABSTRACT

Objective: to discuss the application of Rapid Cycle Deliberate Practice for attire and unattire training in the context of COVID-19 and structure a practical guide to the application at this juncture. **Methods:** this methodological study described theoretical and practical aspects of the application of a simulation strategy as a technological training tool. An application guide was constructed from the search for evidence from the main health authority bodies in Brazil. **Results:** maximizing time in Deliberate Practice, feedback with evidence and psychological security are the principles of this strategy. The dynamic involves repetition and feedback. The application guide presents the sequence of actions for attire and unattire. **Final considerations:** coping with this pandemic requires appropriate use of personal protective equipment. The authors suggest the Rapid Cycle Deliberate Practice as a technological educational tool for attire/unattire, since it encourages mastery performance.

Descriptors: Simulation Training; Personal Protective Equipment; Covid-19; Pandemics; Containment of Biohazards.

RESUMO

Objetivo: discutir a aplicação da Prática Deliberada em Ciclos Rápidos para o treinamento de paramentação e desparamentação no contexto da COVID-19 e estruturar um guia prático para a aplicação nesta conjuntura. **Métodos:** estudo metodológico que descreve aspectos teóricos e práticos da aplicação de uma estratégia de simulação na qualidade de ferramenta tecnológica de treinamento. Um guia de aplicação foi construído a partir da busca de evidências provenientes dos principais órgãos de autoridade em saúde do Brasil. **Resultados:** maximização do tempo em Prática Deliberada, *feedback* com evidência e segurança psicológica **são os princípios d**esta estratégia. A dinâmica envolve repetições e *feedbacks*. O guia de aplicação apresenta a sequência de ações para paramentação e desparamentação. **Considerações finais:** o enfrentamento desta pandemia requer uso apropriado de Equipamento de Proteção Individual. Os autores sugerem a Prática Deliberada em Ciclos Rápidos como ferramenta educacional tecnológica para paramentação/desparamentação, visto que incentiva uma performance com maestria.

Descritores: Treinamento por Simulação; Equipamento de Proteção Individual; Coronavírus; Pandemia; Contenção de Riscos Biológicos.

RESUMEN

Objetivo: discutir la aplicación de la Práctica Deliberada en Ciclos Rápidos para la formación de vestimentas y depargaciones en el contexto de COVID-19 y estructurar una guía práctica para la aplicación en esta coyuntura. **Métodos:** estudio metodológico que describe aspectos teóricos y prácticos de la aplicación de una estrategia de simulación como herramienta de capacitación tecnológica. Se creó una guía de aplicación a partir de la búsqueda de evidencia de las principales autoridades de salud en Brasil. **Resultados:** maximizar el tiempo en la práctica deliberada, la retroalimentación basada en evidencia y la seguridad psicológica son los principios de esta estrategia. La dinámica implica repeticiones y retroalimentaciones. La guía de aplicación presenta la secuencia de acciones para vestirse y vestirse. **Consideraciones finales:** enfrentar esta pandemia requiere el uso apropiado de Equipo de Protección Personal. Los autores sugieren la práctica deliberada en ciclos rápidos como una herramienta educativa tecnológica para vestirse/desvestirse, ya que fomenta un desempeño magistral.

Descriptores: Entrenamiento Simulado; Equipo de Protección Personal; Coronavirus; Pandemia; Contención de Riesgos Biológicos.

INTRODUCTION

The Coronavirus Disease epidemic (COVID-19), caused by the new coronavirus (Sars-CoV-2), originated in 2019 in the city of Wuhan, China. In early 2020 it became a pandemic as it hit 24 countries. Currently, on April 16, global statistics figures point to nearly two million people infected and nearly 130 thousand deaths caused by the virus. The countries most affected by coronavirus disease are the United States, with more than 600 thousand confirmed cases; Italy, Spain, Germany and France, with more than 100 thousand confirmed cases each; United Kingdom, with more than 98 thousand cases; and China, with more than 80 thousand confirmed cases. Among those mentioned, all have a rate of contamination of health professionals[1]. Italy, for instance, had 14,032 cases of contamination of these professionals, with a lethality rate of 11.8% of those aged between 70 and 79 years old, and 1.3% among those aged 60-69 years old[2].

Since it is a respiratory transmission virus, personal protective equipment (PPE) use is essential to contemplate the standard precautions, contact and droplet measures recommended to face this pandemic[3]. Therefore, an investment in knowledge, training and qualification of health professionals on proper use of this equipment in care management of infected patients becomes indispensable. Proper attire and unattire are an effective way to avoid contamination among health professionals[4].

A strategy to achieve the proper use of this equipment, as well as the protection of health professionals, is the implementation and compliance with strict PPE protocols. In 2014, during the Ebola outbreak, contamination of two health professionals was associated with probable non-compliance with these protocols. A study found that approximately half of the sample of health professionals touched, without gloves, a potentially contaminated PPE surface and about 26% inappropriately touched the front of the mask[5], which shows the inappropriate disposal of PPE.

Research shows that all professionals without updating and who do not practice repeatedly end in stagnant skills or deviations in techniques, over time[6]. In addition, prolonged periods of non-use of skills, known as retention intervals, lead to a decline in performance[6]. That said, it is significant that health services provide training for all professionals who will have or may have contact with people infected with the new coronavirus (Sars-CoV-2).

However, conventional training using demonstrations does not guarantee that the professional will be properly and unparalleled. A study on training and education, in the context of highly infectious diseases, in emergency services, showed that professionals felt the need for quality training and lack of sufficient confidence to respond to these diseases[7]. Therefore, it is necessary to conduct training that allows practical implementation of appropriate technique among all participants, in favor of minimizing technical errors, a fact that implies a reduction in the risk of contamination of health professionals.

Rapid Cycle Deliberate Practice (RCDP) is a simulation strategy aimed at improving participants' performance to achieve mastery in a skill. It is organized to promote task repetition and provide immediate evidence-based feedback through an instructor. Created in a setting of pediatric cardiorespiratory arrest, RCDP showed improvement in the cardiopulmonary resuscitation skills of health professionals[8]. By assuming that the RCDP should be applied as a technological tool in other populations and in different contexts of skills, the present study suggests RCDP use in capacity building and training of attire and unattire of PPE. Thus, health professionals will perform with mastery when facing COVID-19. RCDP is an educational technology with an immediate impact on the improvement and technical improvement of health professionals, meeting the current demand for information in the health setting.

OBJECTIVES

To discuss the application of Rapid Cycle Deliberate Practice for training in attire and unattire and to structure a practical guide to the application of RCDP in attire and unattire of PPE in procedures that generate aerosolization in the context of COVID-19.

METHODS

This methodological study was structured in two parts: 1) Explanation of the theoretical and operational aspects for the applicability of the RCDP in attire and removing the necessary PPE for procedures that may generate aerosols, in the context of coping with the COVID-19 pandemic; 2) Construction of a RCDP application guide at this juncture.

To construct the guide, relevant information was gathered for attire and unattire the PPE necessary to face COVID-19. The data were extracted from the main official materials released by the agencies linked to the Brazilian health area, such as Ministry of Health, Brazilian National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária*, abbreviated Anvisa), Federal Nursing Council (*Conselho Federal de Enfermagem*, abbreviated COFEN), and Regional Nursing Council (*Conselho Regional de Enfermagem*, abbreviated COREN). From the data collected, the best evidence and recommendations in force were selected.

Respecting the RCDP principles, the guide was built in five cycles, with specific objectives. The first two cycles refer to proper attire, and the next three refer to unattire. Each cycle contains three to eleven tasks considered to be critical points, which are points whose errors would lead to potential contamination. The cycles and stages were named as follows: Cycle 1 refers to the first stage of unattire, Cycle 2 to the second stage of attire, Cycle 3 to Unattire stage I, Cycle 4 to Unattire stage II and Cycle 5 to Unattire stage III.

THEORICAL ASPECTS OF RAPID CYCLE DELIBERATE PRACTICE

Deliberate Practice is a concept based on studies on skill acquisition. It was coined by Ericsson *et al*. in their research on expertise. It is defined as a series of specific activities that improve the performance of individuals by being subjected to the following factors: a) task with a defined objective; b) motivation to improve; c) feedbacks; and d) vast opportunity for repetition and gradual refinement of performance[9]. Rapid Cycle Deliberate Practice is a simulation strategy created by Hunt *et al*. in 2014,

which appropriated the concept of Deliberate Practice and added an intense and rapid transition between feedbacks and task practice in an explored clinical case until the skill was mastered. This alternation was dubbed the fast cycle[8].

For the proper application of the RCDP, one must be aware of its three basic principles. The first is called maximizing time in deliberate practice, in which it is recommended to give several opportunities to perform the task perfectly. The idea is to seek to achieve automatization in performance through repetition, i.e. to create muscle memory to do the right thing. For this to be possible, it is necessary to receive corrections from an instructor, in case there is an error in the performance. These corrections are called feedbacks, which configure the second principle: feedback with evidence[8].

RCDP feedbacks are classified as directed and immediate. They are provided after an error is detected. Thus, it is understood that the instructor will make interruptions to explain the most appropriate way to perform that task, according to the existing scientific evidence, or even from the consensus of experts. This means that coaches need to master the training topic, in addition to possessing ownership and confidence in the application of the RCDP. After feedback, participants are asked to go back 10 seconds and perform the task again[8]. In case of an error, a new block is performed, creating a quick cycle between task, interruption and feedback. The dynamics of interruptions can be seen in Figure 1.

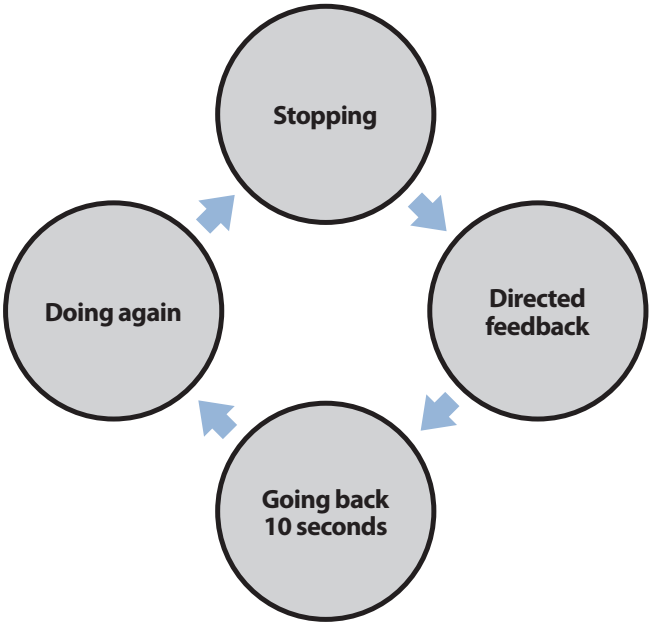

Figure 1 - Dynamics of interruptions in the face of an error in the Rapid Cycle Deliberate Practice

In order for these interruptions to be accepted favorably and to prevent participants from behaving defensively, it is necessary to ensure a partnership agreement between coach and participant. Training should not be started without an understanding that interruptions are essential to achieving mastery performance. It is noteworthy that Hunt *et al*. call this style as coaching[8] . With this, the third principle is explicit psychological security.

RAPID CYCLE DELIBERATE PRACTICE OPERATING ASPECTS IN THE ATTIRE AND UNATTIRE

Having understood the three principles of the RCDP, the training dynamics is discussed. A minimum of two and a maximum of five participants are suggested. The first action of RCDP training is to ensure psychological security. At this point, the trainer must explain the dynamics of the simulation. He/she should stress that his/her role is to help participants improve their performance, in order to create muscle memory to perform the attire and unattire without errors and that this will bring benefits to avoid contamination by Sars-CoV-2. He/she must also inform about the possibility of several interruptions necessary to hear feedback, but which will be resumed immediately after the feedback, taking into account the explanations given. All of these instructions must be verbally welcoming and charismatic, in accordance with the RCDP's own coaching style.

When guaranteeing the third principle of the RCDP, the trainer demonstrates all the equipment, inputs and items existing in the simulation and chooses a participant to start the setting (or decide together). The trainer then narrates the clinical case and declares the start of training. The chosen one begins to carry out the activities. The other participants are positioned on the sides so that they can hear feedback. In case of a critical error, participants are interrupted. At this point, immediate and targeted feedback should take place. Targeted feedback means that the trainer must make the information explicit, always based on the best evidence available. This proved to be more efficient than encouraging participants to try to answer or look for the answer[8].

This is an interesting aspect of RCDP, since in the scope of simulation, some techniques, such as debriefing, encourage self-perception and self-reflection, in which the facilitator exercises the function of guiding thinking so that participants and their group find their conclusions. RCDP goes against the grain, as it does not aim at reflective debates, but focuses on task repetition, aiming at the creation of muscular memory to act with mastery. Therefore, it is essential to provide explicit evidence for participants to receive it, understand its importance and return to practice as soon as possible.

To exemplify the targeted feedback, one can imagine a situation in which participants forget to mold the nose support on the respiratory protection mask. In this case, the trainer must say "It is necessary to mold the nose on the mask so that the correct sealing occurs, according to Anvisa's Technical Note 4 of 2020". If participants keep the error, the trainer interrupts them by saying "Let's stop, go back 10 seconds and try again"[8].

Participants who started training continue to train and receive feedback until the end of the first cycle. Upon completing it perfectly, the initiator takes his/her position with another participant, taking the place of observer. This happens until everyone has completed the first cycle. This dynamic is repeated until the end of the training. It is worth mentioning that before starting any cycle, the participants of the turn must perform all the tasks of the first cycle and proceed with the second and so on. Participants must always start in the first cycle.

RAPID CYCLE DELIBERATE PRACTICE APPLICATION GUIDE

Chart 1 - Guide to Rapid Cycle Deliberate Practice in attire and unattire for professionals who work less than 1 meter from the suspected or confirmed patient with the new coronavirus infection and who perform procedures with risk of aerosol generation

Cycle 1 - Attire stage I
Hand hygiene;
Wearing surgical gown;
Tying the surgical gown properly (so it doesn't fall off);
Cycle 2 - Attire stage II
Assessing conditions*[1] of the respiratory protection mask (particulate respirator) with minimum efficiency in the filtration of 95% of particles up to 0.3µ (N95, N99, N100, PFF2 or PFF3);
(In the case of a new mask) Holding the outside in the shape of a cup and approaching the nose and mouth;
(In case of already used mask) Putting on gloves before holding by the outside;
With the other hand, directing the elastics of the mask to the back of the head, one at a time;
Shaping the nose support;
Performing sealing test of the respiratory protection mask;
(In case of already used mask) Removing the glove, discarding it and hand hygiene;
Putting safety glasses or face shield, which covers the front and side of the face;
Putting on cap;
Going to the room or area where the patient is;
Hand hygiene with 70% alcohol for 20-30 seconds;
Cycle 3 - Unattire Stage I
Not leaving the patient's room;
Removing gloves by pulling the first one from the outside of the wrist with the fingers of the opposite hand;
Holding the removed glove with the other gloved hand;
Touching the inside of the gloved hand's wrist with the opposite index finger (without gloves) and removing the other glove;
Disposing the glove in infectious waste;
Hand hygiene with 70% alcohol for 20-30 seconds;
Cycle 4 - Unattire Stage II
Untying the bottom of the surgical gown;
Untying the top of the surgical gown, keeping your hand in the region;
Holding the surgical gown from the inside;
Pulling it in the anterior-inferior direction (extending the forearms);
With the right hand, holding the surgical gown close to the wrist of the left hand;
Pulling the left hand;
With the left hand, holding the surgical gown close to the wrist of the right hand;
Pulling the right hand;
Holding the inside of the surgical gown and fold it;

To be continued

Chart 1 (concluded)

Disposing in infectious garbage;
Hand hygiene with 70% alcohol for 20 to 30 seconds;
Cycle 5 - Unattire Stage III
Going outside the room or antechamber (without surgical gown and gloves);
Hand hygiene with 70% alcohol for 20 to 30 seconds;
Removing the cap by the inner region;
Disposing in infectious garbage;
Hand hygiene with 70% alcohol for 20 to 30 seconds;
Removing safety glasses or face shield (covering the front and side of the face, holding from the sides and supporting it on a surface*[2]);
Hand hygiene;
Removing the mask by the side elastics without touching the inner surface (NEVER holding the front of the mask). Pulling in the upper-anterior direction;
Packing the mask in a paper envelope*[3] with the elastics out, to facilitate the removal of the mask;
Hand hygiene;
At the end of separation, wearing gloves to clean the safety glasses or the face shield and the area where they were supported.

*Note: *[1] Inspect mask integrity (damp, dirty, torn, dented or creased masks cannot be used) and make sure that strips, nasal bridge and nasal foam material are not degraded[4]; *[2] Safety glasses should be used exclusively by each professional, should be cleaned with water and soap and then disinfected with 70% liquid alcohol, sodium hypochlorite or another disinfectant recommended by the manufacturer[4]; *[3] Plastic or other materials can be used, as long as they are not hermetically sealed. Never place the used mask in a closed plastic bag, as it may become damp and potentially contaminated[4].*

FINAL CONSIDERATIONS

This article presents theoretical aspects and practical instructions for the application of the Rapid Cycle Deliberate Practice in the attire and unattire of the personal protective equipment needed to cope with coronavirus disease (COVID-19). This theme is different from the original context of creating the RCDP strategy. It was carried out in a pediatric cardiopulmonary resuscitation environment, however the authors who created the strategy encourage research to be carried out to test the applicability of RCDP in other situations and institutions. Due to the Sars-CoV-2 pandemic and the growing need for quality training in attire and unattire, we suggest the RCDP strategy as a technological tool in the educational field. It must be applied to train health professionals in order to achieve mastery in the skill of attire, avoiding contamination by the virus.

Due to the emergency situation of COVID-19, in addition to the discussion as to the applicability of the RCDP in vesting and de-vesting, this methodological article was limited to the stage of creating the RCDP application guide. Adjustments can be made in this guide both to meet the reality of the institutions and to update the protocols in force in Brazil. The article did not proceed to the validation of the guide by specialists. It is suggested that clinical studies be conducted to generate concrete results on the applicability of RCDP in this perspective.

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