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MANAGEMENT OF PATIENTS DIAGNOSED OR SUSPECTED WITH COVID-19 IN CARDIORESPIRATORY ARREST: A SCOPING REVIEW

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ABSTRACT

Objective: to map the production of knowledge about the recommendations that can be applied in managing patients diagnosed or suspected with COVID-19 in cardiorespiratory arrest.
Method: a scoping review, according to the Joanna Briggs Institute (2020) guidelines. Search was performed in ten data sources, and two electronic search engines were used; from 2001 to 2020.
Results: of the 547 studies found, 14 met the inclusion and exclusion criteria. Most studies were published in 2020 (35.7%), and most studies were conducted in Canada (21.4%). It is observed the use of a systematized care to identify the possible means of care that should be provided to patients who suffer a cardiorespiratory arrest in hospitals, such as the monitoring of suspected cases by assessing the victim's breathing and pulse and identifying arrhythmias and shockable rhythms quickly. Personal protective equipment must be used to protect against droplets and aerosols and respiratory etiquette.
Conclusion: managing patients in cardiorespiratory arrest suspected or diagnosis with COVID-19 requiring cardiopulmonary resuscitation should be performed in isolation areas and with the use of adequate protective equipment. There are gaps in scientific productions so that they address more clearly and instructively management when performing cardiopulmonary resuscitation in patients suspected or diagnosed with COVID-19.

DESCRIPTORS: Cardiopulmonary resuscitation. Personal health services. Coronavirus. Protective devices. Critical care. Pandemics.

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MANEJO DE PACIENTES DIAGNOSTICADOS OU COM SUSPEITA DE COVID-19 EM PARADA CARDIORRESPIRATÓRIA: *SCOPING REVIEW*

Objetivo: mapear a produção de conhecimento sobre as recomendações que podem ser aplicadas no manejo de paciente diagnosticado ou com suspeita de COVID-19 em Parada Cardiorrespiratória.
Método: trata-se de uma revisão de escopo, de acordo com as orientações do Instituto Joanna Briggs (2020). Realizada busca em dez fontes de dados, e utilizados dois buscadores eletrônicos; recorte temporal de 2001 a 2020.
Resultados: das 547 publicações encontradas, 14 atenderam aos critérios de inclusão e exclusão. A maior parte dos estudos foi publicada no ano de 2020 (35,7%), e a maioria dos estudos foi realizada no Canadá (21,4%). Observa-se o uso de um cuidado sistematizado para identificação das possíveis vias de assistência que deverão ser prestadas a pacientes que sofrem uma parada cardiorrespiratória no ambiente hospitalar, como o monitoramento de casos suspeitos da doença através da avaliação da respiração e pulso da vítima e identificação das arritmias e de ritmos chocáveis de forma rápida. Vale salientar o uso de equipamentos de proteção individual para proteção contra gotículas e aerossóis e condutas respiratórias específicas para estes casos.
Conclusão: o manejo do paciente em parada cardiorrespiratória com suspeita ou diagnóstico de COVID-19 que necessita de reanimação cardiopulmonar deve ser realizado em áreas de isolamento e com a utilização de equipamentos de proteção adequados. Foi visto que existem lacunas nas produções científicas, para que abordem de maneira mais clara e instrutiva sobre o manejo ao realizar ressuscitação cardiopulmonar em pacientes com suspeita ou diagnóstico de COVID-19.

DESCRITORES: Reanimação Cardiopulmonar. Assistência individualizada de saúde. Coronavírus. Equipamentos de proteção. Cuidados críticos. Pandemias.

MANEJO DE PACIENTES DIAGNÓSTICOS O SOSPECHOSOS DE COVID-19 EN LA PARADA CARDIORRESPIRATORIA: REVISIÓN DE ALCANCE

RESUMEN

Objetivo: mapear la producción de conocimiento sobre las recomendaciones que se pueden aplicar en el manejo de un paciente diagnosticado o sospechoso de tener COVID-19 en paro cardíaco.
Método: se trata de una revisión de alcance, de acuerdo con las directrices del Instituto Joanna Briggs (2020). La búsqueda se realizó en diez fuentes de datos y se utilizaron dos buscadores electrónicos; período de tiempo de 2001 a 2020.
Resultados: de las 547 publicaciones encontradas, 14 cumplieron los criterios de inclusión y exclusión. La mayoría de los estudios se publicaron en el año 2020 (35,7%) y la mayoría de los estudios se realizaron en Canadá (21,4%). Se observa el uso de una atención sistemática para identificar las posibles vías de asistencia que se deben brindar a los pacientes que sufren una parada cardiorrespiratoria en el ámbito hospitalario, como monitorear los casos sospechosos de la enfermedad mediante la evaluación de la respiración y el pulso de la víctima e identificar rápidamente arritmias y ritmos desfibrilables. Cabe mencionar el uso de equipo de protección personal para protegerse de gotitas y aerosoles y conductas respiratorias específicas para estos casos.
Conclusión: el manejo de pacientes en parada cardiorrespiratoria con COVID-19 sospechado o diagnosticado que requieran reanimación cardiopulmonar debe realizarse en áreas de aislamiento y con el uso de equipo de protección adecuado. Se observó que existen lagunas en las producciones científicas, por lo que se abordan de forma más clara e instructiva sobre el manejo al realizar reanimación cardiopulmonar en pacientes con sospecha o diagnóstico de COVID-19.

DESCRIPTORES: Reanimación cardiopulmonar. Atención Individual de Salud. Coronavirus. Equipos de Seguridad. Cuidados Críticos. Pandemias.

NTRODUCTION

Coronaviruses are a family of Ribonucleic Acid (RNA) viruses that are responsible for respiratory and intestinal infections in humans. Most of these viruses have low pathogenicity, leading to symptoms such as those of the cold, and may be more severe in risk groups, such as children, elderly individuals and those with chronic diseases.[1] At the end of 2019, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2), a name given by the World Health Organization (WHO) to the new virus that emerged in Wuhan city, China, was discovered.[2]

Coronavirus Disease 2019 or COVID-19 is a disease with a high rate of transmissibility, which resulted in an epidemic of Severe Acute Respiratory Syndrome caused by SARS-Cov-2.[3] Among the most well-known clinical manifestations are high fever, cough, odynophagia, and dyspnea.[1] It is worth noting that patients with pre-existing comorbidities are more likely to develop the most severe form of COVID-19.[4]

The overall impact of COVID-19 shows that there are limitations regarding recognizing transmission patterns, risk factors, characteristics, and severity, both in the general population and also for health professionals.[2]

Health professionals are more vulnerable to transmission because they provide direct care to these patients. Studies indicate that a significant amount of these workers were affected in previous outbreaks of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), contributing to disease spread inside and outside the nosocomial environment.[1]

Transmission occurs through respiratory droplets generated by sputum, coughing, sneezing, speech and breathing of individuals infected as well as by aerosol-generating medical procedures (AGMPs) such as respiratory aspiration, orotrate intubation, bronchoscopy and cardiopulmonary resuscitation (CPR). During CPR, due to chest compressions, a certain pressure is applied to the lower sternal region of patients, which may induce sputum of droplets and aerosols.[5]

COVID-19 is a new disease, still little known, and its pathophysiology has not been fully understood. It is known that infected patients may clinically exhibit symptoms very similar to those of SARS-CoV and MERS-CoV infection, with a high probability of developing Acute Respiratory Distress Syndrome (ARDS), which can lead to hospitalization in intensive care unit (ICU), and may progress to respiratory failure and cardiorespiratory arrest (CPA).[6]

Moreover, the guidelines are not clear regarding the protective measures of these health professionals during CPR in patients with COVID-19. In this context, the study is justified by the need to obtain knowledge that can be applied in caring for patients in CPA diagnosed or suspected with COVID-19, who require CPR maneuvers. Thus, providing a greater technical and scientific framework to professionals working in these cases, who are under occupational risks, contributing to greater aptitude of these professionals in the face of this situation considered frequent in these patients. Moreover, it is important to develop studies on COVID-19 in the context of public health, because it is a current topic of pandemic character that presents a scarcity of research conducted in this delimitation.

From this perspective, the study aims to map the production of knowledge about the recommendations that can be applied in managing patients diagnosed or suspected with COVID-19 in CPA.

METHOD

This scoping review was developed according to the 2020 Joanna Briggs Institute framework, which includes defining the research question, identifying relevant studies, selecting studies and data extraction, grouping, abstract and reporting of results.[7]

To screen and identify other scoping reviews or protocols similar to the objective of this study, a search of the following study platforms was conducted in April 2020: International Prospective Register of Systematic Reviews (PROSPERO), Open Science Framework (OSF), The Cochrane Library, JBI Clinical Online Network of Evidence for Care and Therapeutics (COnNECT+) and Database of Abstracts of Reviews of Effects (DARE). The results indicated a lack of research with a similar scope to the objective in this study.

The manual guides the use of Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).[8] The study in question was recorded on the Open Science Framework study platform, and was generated sequentially corresponding from Uniform Resource Locator.[9]

As a way to reach the question that directs the scoping review work, PCC mnemonic strategy was used. "P" represents the population (patients in CPA suspected or diagnosed with COVID-19); the first "C" represents the concept (recommendations that can be applied by health professionals when attending patients in CPA diagnosed or suspected with COVID-19); and the second "C" represents the context (severe patients in need of CPR maneuvers). The delimited research question was: what recommendations can be followed by health professionals in managing CPA in patients diagnosed or suspected with COVID-19 who require CPR maneuvers?

Open Access studies, dissertations and theses, ministerial ordinances and guidelines, from 2001 to 2020, dealing with recommendations for the management of patients suspected or diagnosed with COVID-19, or of infection by viruses of the same nature of origin, of action and transmissibility (SARS-CoV2, MERS-CoV, SARS-CoV), that were in pre, post or during CPA have been included. Scientific articles that did not answer the research question, that were restricted to the pathophysiology of the disease, or that did not meet the objective of the study have been excluded.

This time frame was taken into account with the objective of meeting a scope that addressed not only COVID-19, but also the family of coronaviruses that affect humans causing acute respiratory syndromes (MERS-CoV, SARS-CoV) and diseases derived from them, since the pathophysiological characteristics presented by these viruses are similar.

The research was developed in April 2020. To identify the relevant studies, searches were conducted at Virtual Health Library (VHL) and Journal Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES - *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*), at Latin American & Caribbean Literature on Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Cochrane Library, Cumulative Index of Nursing and Allied Health (CINAHL), The Scientific Electronic Library Online (SciELO), Elsevier's SCOPUS, Web of Science, Catalogue of Theses and Dissertations (CAPES) and *Fundação Oswaldo Cruz* (FIOCRUZ).

The controlled descriptors in Portuguese "*Reanimação Cardiopulmonar*", "*Assistência Individualizada de Saúde",* "*Coronavírus*", and "*Equipamentos de Proteção*" were used according to the Health Science Descriptors (DeCS - *Descritores em Ciências da Saúde*); and "Cardiopulmonary Resuscitation", "Personal Health Services", "Coronavirus" and "Protective Devices", according to Medical Subject Headings (MeSH). The keywords SARS-CoV-2 and COVID-19 were used. Chart 1 discusses the search syntax adopted according to the data sources used.

Chart 1 - Search syntax in scientific data sources in English and Portuguese. Natal/RN, Brazil, 2020.

Data source	Syntax adopted
MEDLINE*	"Cardiopulmonary Resuscitation" [All Fields] AND ("coronavirus" [MeSH Terms] OR "coronavirus" [All Fields]) AND "Personal Health Services" [All Fields] AND ("COVID-19" [All Fields] OR "COVID-2019" [All Fields] AND "Protective Devices" [All Fields] AND ("coronavirus" [MeSH Terms] OR "coronavirus" [All Fields]).
Scopus†	KEY ("Cardiopulmonary Resuscitation") AND TITLE-ABS-KEY (Coronavirus) AND (KEY ("Personal health services") AND KEY (COVID-19) AND KEY ("Protective Devices") AND KEY (Coronavirus).
CINAHL‡	(SU (Cardiopulmonary Resuscitation AND COVID-19)) AND (SU (Cardiopulmonary Resuscitation AND coronavirus)) AND (SU (Coronavirus AND Protective Devices)) AND (SU (COVID-19 OR Coronavirus OR 2019-ncov AND Cardiopulmonary Resuscitation OR CPR OR Resuscitation)).
Web of Science§	TOPIC: (Cardiopulmonary Resuscitation) AND TOPIC: (Coronavirus) AND TOPIC: (Personal Health Services) AND TOPIC: (COVID-19) AND TOPIC: (Protective Devices) AND TOPIC: (Coronavirus).
Cochrane Library‖	(Cardiopulmonary Resuscitation) in Title Abstract Keyword AND (Coronavirus) in Title Abstract Keyword AND (Personal Health Services) in Title Abstract Keyword AND (COVID-19) in Title Abstract Keyword AND (Protective Devices) in Title Abstract Keyword AND (coronavirus) in Title Abstract Keyword.
LILACS¶	*Reanimação Cardiopulmonar* [Words] AND COVID-19 [Words] AND *Reanimação Cardiopulmonar* [Words] AND *Coronavírus* [Words].
SciELO**	(*Reanimação Cardiopulmonar*) AND (*Coronavírus*) AND (*Reanimação Cardiopulmonar*) AND (COVID-19).
Catalog of Theses and Dissertations (CAPES)††	("*Reanimação cardiopulmonar*" AND "*Coronavírus*") AND ("*Equipamentos de Proteção*" AND "*Coronavírus*") AND ("*Assistência Individualizada de Saúde*" AND "*Coronavírus*") AND "*Reanimação cardiopulmonar*" AND "SARS-CoV-2").
FIOCRUZ‡‡	("*Reanimação cardiopulmonar*" AND "*Coronavírus*") AND ("*Equipamentos de Proteção*" AND "*Coronavírus*") AND ("*Assistência Individualizada de Saúde*" AND "*Coronavírus*") AND "*Reanimação cardiopulmonar*" AND "SARS-CoV-2").

*Medical Literature Analysis and Retrieval System Online; †Elsevier's SCOPUS; ‡Cumulative Index of Nursing and Allied Health; §Web of Science; ‖Cochrane Library; ¶Latin American & Caribbean Literature on Health Sciences; **The Scientific Electronic Library Online; ††Catalog of Theses and Dissertations (*Catálogo de Teses e Dissertações*); ‡‡*Fundação Oswaldo Cruz*.

More relevant studies were searched in Google Scholar as well as active search on websites. Other records were selected according to the similarity of their descriptors and objectives.

Two collaborators were searched simultaneously in the same collection period and using different computers, in order to ensure that no study was improperly excluded. For cases of divergence, the studies were selected after peer discussion.

After selecting the studies, they were arranged in a structured form containing data such as authors, year of publication, place of publication, type of study, level of evidence, degree of recommendation according to the Oxford Centre for Evidence-Based Medicine[10] and objectives.

The main recommendations for CPR were laid out according to the theoretical framework of the 2015 American Heart Association (AHA) guidelines. The recommendations were divided according to the links in the in-hospital survival chain, namely: link I, surveillance and prevention; link II, recognition and activation of emergency medical services; link III, high quality immediate CPR; link IV, rapid defibrillation; link V, advanced life support and post-CPA care.[11]

RESULTS

A total of 547 articles were found according to crossings made by descriptors and keywords. It is noteworthy that no results were detected in SciELO and *Fundação Oswaldo Cruz*. After the process, 14 articles were selected to develop this review, as shown in Figure 1.

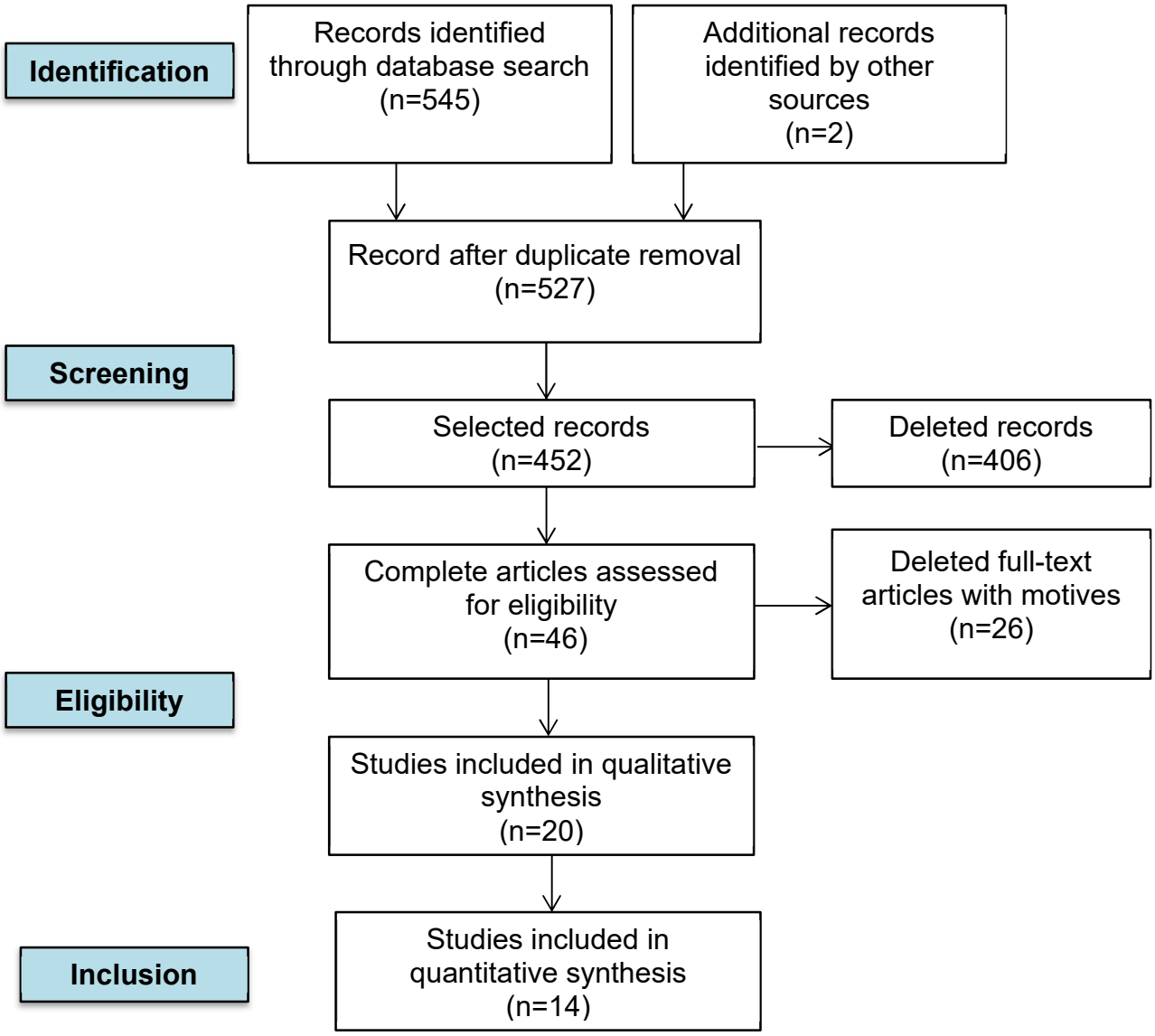

Figure 1 – Search flow diagram in the literature and inclusion of articles based on prisma-scr guidelines (adapted). Natal/Rio Grande do Norte, Brazil, 2020**.**

Concerning the data sources from which the studies were extracted, 42.9% (n=6) were from MEDLINE; 14.3% (n=2), from Web of Science; 14.3% (n=2), from SCOPUS; 7.14% (n=1), from CINAHL; 7.14% (n=1), from Cochrane. Moreover, 14.3% (n=2) were extracted from the studies through active search in other sources.

The studies were conducted between 2004 and 2020, with a higher prevalence of publications in 2020, representing 35.7% (n=5) of the selected articles. The year 2017 presented a percentage of 14.3% (n=2), followed by the years 2019, 2016, 2014, 2010 and 2004, each composing 7.14% (n=1) of the selected sample.

It was found that 21.4% (n=3) were studies conducted in Canada, 14.3% (n=2), in the United States of America (USA), and 7.14% (n=1) of the studies included in this review were from Germany, China, South Korea, Iran, Singapore, Switzerland, and Thailand.

Chart 2 addresses the description of the authors, year, location, study type, level of evidence, degree of recommendation and the objectives of the selected studies. As for the level of evidence and degree of recommendation, the Oxford Center for Evidence-based Medicine guidelines were followed. It is emphasized that the lower the number, the greater the level of evidence in the study. Furthermore, the grade of recommendation "A" is considered the one with the highest recommendation and "D", the one with the lowest.

From a comprehensive analysis of the 14 studies selected to develop this scoping review, it was possible to identify the main recommendations that can be added in the context of COVID-19 according to the links in the AHA in-hospital survival chain, which were organized as shown in Chart 3.

DISCUSSION

The studies in question provide a compilation of information and analysis of scientific evidence on the topic of worldwide relevance.

It was noted that most studies were carried out in Asia, supporting the greater flow of local research caused by identifying the first foci of spread of SARS-Cov-2 among humans, which were recognized in Asian.

Despite the recommendations found, decision-making on the guidelines for whether or not to start a CPR should continue to be carried out individually, in pre-hospital care services, and Emergency Departments and Intensive Care Units (ICUs).[25]

Using survival chains that offer identification of possible care paths that should be provided to patients suffering from a CPA in the extra-hospital and in-hospital environment was recommended.[11] In this regard, the chain of survival of in-hospital CPA (IHCPA) is subdivided into five links that facilitate the management of patients and provides for measures that should be taken in order to avoid a CPA.[11]

The first link in the IHCPA survival chain addresses surveillance and prevention for a rapid response and immediate warning system.[11] Considering the surveillance aspect, a study carried out in Canada[16], through expert opinion, with level of evidence 5 and degree of recommendation D, points out that, in addition to general measures to reduce the spread of infection in the In-hospital scope, there should be an emphasis on monitoring suspected cases with COVID-19.

Researchers[23] argue that all patients suspected or with COVID-19 who are at greater risk of CPA should be given more attention by the RRT, composed of a multidisciplinary team that aims to avoid CPA through assessments and testing, preventing patients from progressing to Emergency Cardiovascular Care (ECC).

The second link of the IHCPA protocol is CPA recognition by health professionals by assessing the victims' breathing and pulse and activating the emergency medical service. The AHA adds that, for this recognition, victims must have no breathing or just gasping and the pulse must be assessed for at least 10 seconds.[11]

Chart 2 – Study characterization regarding authors and year of publication, place of publication, type of study, level of evidence, degree of recommendation, and objectives. Natal, Rio Grande do Norte, Brazil.

Authors (Year)	Location	Study type/Level of evidence*/Degree of recommendation*	Objective
Alavi-Moghaddam (2020).[4]	Tehran - Iran	Expert opinion/5/D	To emphasize the need for emergency department preparation in response to the new coronavirus outbreak in Wuhan, China.
Casanova, Rutala, Weber and Sobsey (2010).[12]	North Carolina - USA	Controlled randomized clinical trial/1B/A	To assess the survival of coronavirus in Personal Protective Equipment (PPE) of health professionals.
Cook et al. (2020).[13]	United Kingdom	Guideline/5/D	To develop principles for airway management of patients with COVID-19 in order to encourage safe, accurate, and fast performance.
Christian et al. (2004).[14]	Toronto - Canada	Controlled randomized clinical trial/1B/A	To suggest interventions to prevent future episodes of SARS-CoV transmission during CPR.
Chung et al. (2014).[15]	Singapore	Case series/4/C	To discuss and present evidence of surgical mask use to protect health professionals against MERS-CoV.
Glauser (2020).[16]	Ontario, Canada.	Expert opinion/5/D	To propose a protocol to avoid in-hospital transmission of COVID-19.
Jones et al. (2020).[17]	Chicago, USA	Exploratory cohort study/2B/B	To propose a systematic risk-based approach to the selection of PPE to protect health professionals against infectious agents.
Nam et al. (2017).[18]	South Korea	Case Report/4/B	To verify the exact route of infection for the case of healthcare professional infection with MERS -CoV during CPR in Korea.
Shin et al. (2017).[19]	Hanyang - China	Uncontrolled randomized trial/2B/B	To assess the effects of chest compressions on the protective performance of respirators.
Thomas-Ruddel et al. (2020).[20]	Germany	Integrative review with observation of results/2C/B	To identify updated measures for anesthesiologists and intensivists in March 2020 about COVID-19.
Wax and Christian (2020).[21]	Toronto - Canada	Integrative review with observation of results/2C/B	To summarize important information about patient screening, environmental controls, PPE, CPR measures (including intubation) and planning of care unit operations in cases of infection by 2019-nCoV.
Wiboonchutikul et al. (2016).[22]	Thailand	Case Series/4/C	To assess the efficacy of infection measures among healthcare professionals exposed to a patient with MERS-CoV and/or body fluids.
Guimarães et al. (2020).[23]	Brazil	Guideline/5/D	To recommend practices on CPR for patients suspected or diagnosed with COVID-19.
Resuscitation Council UK (2020).[24]	United Kingdom	Guideline/5/D	To recommend practices on CPR in adults in the context of COVID-19.

Chart 3 – Synthesis of articles included in this review based on authors, link of the in-hospital survival chain and comparison of the AHA main recommendations and findings of this study. Natal, Rio Grande do Norte, Brazil, 2020.

Authors/Year	Elo	AHA CPR Recommendations 2015	Main recommendations in CPR management that can be added in the context of COVID-19
Alavi-Moghaddam (2020)[4]; Glauser (2020).[16]	I	General recommendations on site surveillance, emphasizing environmental safety.	Early recognition and immediate isolation of patients suspected with COVID-19. Testing and monitoring of suspects at home to reduce overcrowding in emergency departments and the spread of COVID-19 infection.
Guimarães et al. (2020).[23]	I	General recommendations for the implementation of a rapid response system and immediate alertness with patients at risk of CPR, so that they are quickly attended.	Patients suspected or with COVID-19 who are at higher risk of CPR should receive more attention by the Rapid Response Team (RRT).
Nam et al. (2017).[18]	II	Rapid CPA recognition - assess responsiveness, breathing/gasping, pulse within 10 seconds.	Patients should be isolated during CPA and CPR identification.
Thomas-Ruddel et al. (2020)[20]; Resuscitation Council UK (2020)[24]; Jones et al. (2020)[17]; Wax and Christian (2020)[21]; Shin et al. (2017)[19] Wiboonchutikul et al. (2016)[22]; Casanova, Rutala, Weber and Sobsey (2010).[12]	II	Emergency team activation.	During CPR, do not ignore PPE, which must be available in crash carts or at the storage location, avoiding problems with attire. Airway management must be optimized; keep a small team. To avoid contamination, N95 face masks, waterproof aprons, eye protection and gloves should be used when handling patients. Professionals should properly adjust and use appropriately N95 filter face mask respirators. Powered air purifying respirators (PAPR) offer greater protection and are more comfortable during CPR. Furthermore, the team should not reuse PPE.
Wax and Christian (2020)[21]; Chung et al. (2014).[15]	III	For patients without advanced airway - immediate and high-quality CPR with a frequency of 100 to 120 per min., depth of 5 to 6 centimeters. Offer two ventilations with a Bag-Valve-Mask device, lasting 1 second each every 30 compressions, causing chest elevation.	Interventions such as valve ventilation, non-invasive ventilation and intubation allow the formation of aerosols, allowing airborne transmission. PAPR offers greater protection, is more comfortable; however, it can increase the number of contaminations during removal and its cost is high when compared to an N95 mask.

Chart 3 – Cont

Authors/Year	Elo	AHA CPR Recommendations 2015	Main recommendations in CPR management that can be added in the context of COVID-19
Christian et al. (2004)[14]; Guimarães et al. (2020).[23]	III	For patients with advanced airway - immediate and high-quality CPR with a frequency of 100 to 120 per min., depth of 5 to 6 centimeters. Offer ventilation with a Bag-Valve-Mask device, lasting 1 second each, every 5 seconds.	It is recommended to use a Bag-Valve-Mask with bacterial filter. The Bag-Valve-Mask device should not be used in patients suspected or diagnosed with COVID-19 due to the high potential for contamination.
American Heart Association (2015).[11]	IV	Defibrillation should occur as soon as possible, taking priority over other interventions.	Defibrillation should be performed quickly and effectively as well as identification of shockable rhythms.
Cook et al. (2020).[13]	V	Advanced life support with vasopressor drug administration as indicated.	Intubation should be done quickly and efficiently. Airway monitoring should follow the standards of the Association of Aesthesthists, especially continuous waveform capnography. At risk of cardiovascular instability, ketamine 1-2 mg for anesthesia induction and rocuronium 1.2 mg for neuromuscular blockade is suggested. If suxamethonium is used, the dose of 1.5 mg is indicated. Before proceeding with intubation, it is necessary to make sure that the patient is properly unconscious.
Wax and Christian (2020)[21]; Alavi-Moghaddam (2020).[4]	V	Post-CPR care performing emergency coronary angiography, body temperature control, systemic blood pressure control.	It is recommended to use Continuous Positive Airway Pressure (CPAP)/BI-level Positive Airway Pressure (BiPAP). Mechanical ventilation in patients infected with hypoxemic respiratory failure is advised.

The authors[24] recommend PPE use by the entire team that will perform CPR, before contact with patients. Equipment must be readily available in the resuscitation cart or in the location where resuscitation equipment is stored. Other employees[13] also reinforce using appropriate and verified PPE, even in an emergency situation, so that under no circumstances the team is exposed to risks.

Moreover, the Centers for Disease Control and Prevention (CDC) recommend use of eye protection, isolation rooms for aerial infections and N95 respirators or higher when performing aerosol-generating procedures in patients with viral hemorrhagic fevers, SARS -CoV, avian, or pandemic influenza virus.[5]

In some cases of hospital transmission, it was observed that health professionals did not use adequate respiratory and eye protection. Furthermore, some of these professionals, even though aware of respiratory protection measures, used surgical masks by mistake or non-adjusted N95 respirators, which contributes to the lack of protection.[5]

Still in this perspective, researchers[15] argue that N95 masks have had a low tolerance by professionals, after prolonged use of this device there were reports of headache and impaired mental performance. In the case of a transmissible droplet infection, a properly used surgical mask is more protective than a poorly installed and improperly used N95 mask.

As evidenced by the authors[18] in their study, the most likely means of transmission of MERS-CoV, viruses with characteristics similar to SARS-CoV-2, was when the health professional came into contact with patients' body fluids and later with the mucous membranes of the eyes, mouth or nose, from the masks and/or safety glasses used. It is explained that other researchers report that, according to current knowledge, transmission occurs through respiratory droplets and direct contact with body fluids and excretions.[20]

A study carried out in Canada found that, despite the importance of PPE use, many health professionals report that, in an emergency such as a CPA, the time spent for the adequacy of all PPE is seen as a disadvantage in relation to patient survival. Considering the methodology adopted, which consists of a randomized controlled clinical study and its high level of evidence and degree of recommendation (1B/A, respectively), we can observe the importance of this measure considering the risk of exposure to the virus.[14]

Moreover, there is lack of access to appropriate PPE, depending on the health care environment. In this regard, it is essential to determine the risks of certain procedures and viruses, to use the best precautions and to provide resources for their use.[5]

Protection provided by N95 devices depends mainly on the seal quality and the filter efficiency. These properties can be altered if mask sealing and strapping are incorrect, in the same way that movements performed by users influence its protection effectiveness, as, for instance, during chest compressions.[19] Therefore, using these resources is not able to provide health professionals with an indisputably safe protection, as this is influenced by several factors.

Some researchers point out that, in the past, a proper use of PPE has significantly reduced SARS hospital transmission; therefore, it is indicated that these means are also used to combat COVID-19 transmission. The medical helmet does not have extra protection, but it helps to reduce contact between the professional's hand and face. It was also possible to identify that the masks must be placed firmly on the face; in men who have a beard, removal of the beard may be requested.[22]

The health professional is recommended to use masks, gloves, safety glasses and cloak, these being removed after the interruption of contact with patients. The study was classified with a low level of evidence and a degree of recommendation (5/D), since it is an expert opinion; even so, it is important to pay attention to these recommendations[4], adding to this the technique correct hand hygiene, which has also proved effective in reducing contamination. Moreover, another study

highlights that the proper use of PPE by all professionals who participate in assistance to the victim of CPA is essential.[23]

The third link concerns the performance of an immediate high-quality CPR. Thus, there were no changes in the previous recommendations, and chest compressions should be performed with a frequency of 100 to 120 compressions/minute, with a minimum depth of 5 centimeters, maximum of 6 centimeters, based on an adult victim. Furthermore, quality ventilation must be ensured, whether it is the cause of cardiac CPA or not.[11]

Concerning this link, it was found that CPR is a procedure that has sputum as one of its consequences; therefore, precautions with air are necessary, so that the health professional is not contaminated, especially with regard to procedures such as orotracheal intubation, fluid suction, chest compressions, manual ventilation and during defibrillation.[18]

It is advised that health professionals do not remove the facial mask in patients using oxygen therapy during CPR, especially during chest compressions, as the mask significantly reduces the disseminated aerosols. It is noteworthy that, in cases in which patients do not use a facial mask, it is recommended to put on the face.[24,26]

Another study reinforces this guideline, by recommending that CPR be initiated only when the victim's airway is isolated, either with a face mask or with a, supraglottic device that must be connected to a viral filter.[27]

With regard to ventilation during a CPR of a patient suspected or diagnosed with COVID-19, the researchers reinforce the need to use a bacterial filter in the Bag-Valve-Mask (BVM), in order to prevent the release of viruses into the environment reducing the chances of infection with this equipment.[14]

Conversely, another record guides the prioritization of apneic oxygenation to the detriment of BVM, as this procedure will allow greater airway permeability.[28]

A study[23] emphasized the non-use of BVM in patients diagnosed or suspected with COVID-19, due to the great potential for contamination of professionals working in CPR. BVM should only be used in cases where there is an extreme need, with the mask being sealed by two professionals, in addition to Guedel cannula use. Judging by the level of evidence (2B) brought by a research developed on the studied issue, it is reported that BVM use poses a risk to professionals, because it is in the respiratory tract the site of greatest exposure to SARS-CoV, since the cell receptors of the virus are located in the bronchi and alveoli.[17]

Another research recommends suspending chest compressions during the time of patient intubation, mitigating the risks of contamination by intubator professionals by inhaling aerosols, contrary to the AHA recommendations not to suspend chest compressions, or suspend as little time as possible.[28]

The fourth link in the IHCPA survival chain concerns rapid defibrillation. This link occurs from Automatic External Defibrillator (AED), or manual defibrillator device use, which is considered an essential component in assisting victims of CPA because it significantly increases the probability of survival of these patients, being able to identify and treat cardiac arrhythmias.[11]

After the identification of a shockable rhythm, the defibrillator is used, following the usual protocol for AED.[29]

Thus, the identification of arrhythmias must be made quickly and the defibrillation of shockable rhythms must happen quickly as well as the restoration of circulation so that using ventilatory support and airway ventilation is reduced.[30]

With regard to airway procedures, they must be performed by professionals who have mastered the techniques. Moreover, all devices used during CPR must be disposed of or cleaned immediately

after procedures. At the end of resuscitation, PPE needs to be safely removed to avoid contamination and hands must be cleaned with water and soap or alcohol gel.[24]

Finally, the IHCPA fifth link consists of medication administration, special equipment use for ventilation, and care after the return of spontaneous circulation. According to the researchers[4], patients may need the administration of oxygen therapy, being necessary in cases in which the arterial oxyhemoglobin saturation (SaO2) is less than or equal to 90% in adults, except for pregnant women, Sa02 among 92 -95% in pregnant women and SaO2 less than or equal to 94% in children. It is worth noting using mechanical ventilation in patients with hypoxemic respiratory failure, since the acute respiratory distress syndrome caused by COVID-19, in many cases, results in significant changes in the ventilation-perfusion ratio.[11]

Furthermore, due to hypoxia being strongly related to CPA in patients diagnosed with COVID-19, invasive airway access should be prioritized in these patients.[23] Another research developed on the theme also shares similar guidelines, in presenting the importance of orotracheal intubation in patients with the etiology in question, which will avoid positive pressure ventilation from face mask use.[27]

There is a high incidence of patients who have respiratory failure in the airways due to COVID-29 and are using CPAP/BiPAP units with an expiration filter. However, mask leakage, in addition to promoting escape of droplets into the environment, can cause inefficient filtering, accelerating the pathway deterioration, and may require an emergency intubation, leading to the risk of errors when placing PPE by health professionals due to the time needed to perform CPR maneuvers. Considering the methodology of choice and level of evidence (2C), it is important a good attire by professionals and adjust the PPE to avoid exposure to droplets.[21]

In this perspective, there is a high risk of exposure to the virus due to inhalation of aerosols, in addition to exposure of the nose and mouth by deposition of the aerosol and self-contact with contaminated hands or objects.[17]

To avoid any type of exposure, it is necessary for professionals involved in CPR to remove the PPE safely, avoiding self-contamination. According to the study[31], the virus can remain viable and infectious on surfaces from hours to days (depending on the inoculum); therefore, it is necessary that professionals perform hand hygiene with water and soap and use alcohol gel as well as cleaning surfaces; perform debriefing after each resuscitation as well as PPE removal training.[23] An extremely important conduct in order to avoid the infection to spread supports another study that highlights the continued importance of good hand hygiene after removing PPE, according to its level of evidence (1B).[12]

The topic of recommendations that can be applied in the management of CPA in patients suspected or diagnosed with COVID-19 is still a poorly addressed area of knowledge, with few studies that explore this subject in the literature.

The available studies did not provide information on new protocols to be used and more details on the management of these patients. Some studies were not presented in Open Access format, making it impossible to access, and/or did not demonstrate the flow to be followed, from the identification of a patient in CPA suspected or diagnosed with COVID-19, until the removal of PPE after conduct, for instance.

Other limitations found were: the scarcity of previous research on the topic addressed, since the main sources of national and international data were checked, as well as the lack of studies addressing the drugs used in advanced life support in patients suspected or diagnosed with COVID-19. Furthermore, there were few results on changes in the protocol in relation to post-cardiorespiratory care for infected patients, explaining which better conducts are more appropriate to the current situation, which we are experiencing.

CONCLUSION

The main findings suggested by the selected studies supported the previous AHA recommendations, and still propose recommendations on using N95 face masks, waterproof aprons, eye protection and gloves in the management of patients in CPA suspected or diagnosed with COVID-19. PAPR use was also recommended as they offer greater protection and are more comfortable during a CPR.

BVM should be used during CPR when, in fact, it is necessary, and should be used with a bacterial filter.

Managing critically ill patients suspected or diagnosed with COVID-19 requiring CPR should be performed in isolation areas and with appropriate PPE. It is essential to take preventive measures, discard or clean equipment used during CPR and clean surfaces as well as hand hygiene at the end of each procedure.

More collaborative clinical research about the risks of COVID-19, in isolation, is suggested, since the scarcity of theoretical references that suggested more specific recommendations was identified. Numerous approaches to PPE and respiratory procedures were noted; however, there was a lack of studies that included management, indicating how to proceed from prevention to patient recovery, taking into account only COVID-19.

Therefore, it was seen that there are gaps in scientific productions, so that they address in a clearer and more instructive way about how health professionals should perform all steps in CPR cases of patients who present with COVID-19 clinical manifestations, or already diagnosed with such pathology.

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NOTES

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