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REVIEW ARTICLE

Laryngeal mask insertion by nurses: an integrative literature review

Inserção da máscara laríngea por enfermeiros: revisão integrativa da literatura

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ABSTRACT

Objective: To identify evidence-based literature on the laryngeal mask airway insertion by nurses. **Method:** Integrative literature review conducted in November 2020, searched in the Cumulative Index to Nursing and Allied Health Literature, Cochrane, Excerpta Medica Database, Latin American and Caribbean Health Sciences Literature, US National Library of Medicine National Institutes Database Search of Health and Web of Science through the Rayyan Study Selection Program. **Results:** Eight out of the 1,156 studies identified met the inclusion criteria. Studies were categorized into first and second-generation devices. **Conclusion:** The use of a first and second-generation laryngeal mask airway by nurses is a recommended alternative for its speed, success and effectiveness in ensuring the advanced airway, especially in situations of cardiopulmonary arrest in adults. However, adverse effects of its use should be evaluated.

Descriptors: Laryngeal Masks; Airway Management; Nursing; Nursing Care; Nurses.

RESUMO

Objetivo: Identificar as evidências científicas da literatura sobre a inserção de máscara laríngea por enfermeiros. **Método:** Revisão integrativa de literatura, realizada em novembro de 2020, cuja busca ocorreu nas bases de dados *Cumulattive Index to Nursing and Allied Health Literature*, *Cochrane*, *Excerpta Médica Database*, Literatura Latino-Americana e do Caribe em Ciências da Saúde, U*S National Library of Medicine National Institutes Database Search of Health* e *Web of Science* por meio do programa Rayyan para seleção dos estudos. **Resultados:** Identificaram-se 1.156 estudos, do quais oito atenderam aos critérios de inclusão. Os estudos foram categorizados em dispositivos de primeira e segunda geração. **Conclusão:** Conclui-se que o uso de máscara laríngea de primeira e segunda geração por enfermeiros é uma alternativa recomendada por sua rapidez, sucesso e eficácia em garantir a via aérea avançada, em especial, em situações de parada cardiorrespiratória em adultos, porém, recomenda-se verificar os efeitos adversos de seu uso.

Descritores: Máscaras Laríngeas; Manuseio das Vias Aéreas; Enfermagem; Cuidados de Enfermagem; Enfermeiras e Enfermeiros.

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INTRODUCTION

The laryngeal mask airway (LMA) is one of the most used supraglottic devices and has revolutionized airway management[1,2]. Since its introduction into clinical practice, there has been a great expansion in its applications[3]. Currently, several settings in addition to the surgical include its use, such as the intensive care unit, emergency department, outpatient clinics, among others[4].

The LMA is orally inserted and its distal end accommodates in the hypopharynx, sealing around the glottic entrance and establishing an advanced airway for oxygenation and ventilation[2]. It can be classified into two generations; the first has a single channel, the breathing, while the second generation has two channels, breathing and gastric[5].

Situations that require active airway management are critical events occurring at any time in an in-hospital or out-of-hospital environment[6]. In this sense, LMA plays an important role in airway management algorithms and is recognized as an alternative in the impossibility of performing adequate ventilations using a bag-valve-mask (BVM), lack of trained/skilled personnel, difficulty in performing orotracheal intubation (OTI) and in difficult airway management[6-9]. In addition, although there is a risk of aerosolization with fluid particles containing virus, LMA is an alternative in the process of accessing the airways of patients infected with the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), known worldwide as COVID-19[10].

The main indications for LMA insertion in the emergency context are: need for advanced treatment and urgent airway protection, cardiopulmonary arrest (CPA), severe trauma, respiratory emergencies, severe agitation, low Glasgow Coma Scale score (≤8) and altered mental status[11,12].

Laryngeal mask airway is contraindicated in patients with limited mouth opening, pathological airway abnormality and high risk for bronchoaspiration, including the presence of a pharyngeal reflex, as the device does not have reliable protection against this adverse event[13,14].

Nationally, the use of supraglottic devices by nurses in situations of imminent risk of death is regulated by resolution 641/2020 of the Federal Council of Nursing, which includes a description of the responsibilities, competences and necessary training[15]. In addition, an update to the Emergency Cardiovascular Care and the Cardiopulmonary Resuscitation (CPR) Guideline indicates that supraglottic devices can be inserted by trained nurses[16].

The importance of the nurse's role in the CPA scenario stands out, as it contributes to the activation of the survival chain by acting quickly in the beginning of CPR maneuvers and airway management[17].

In airway management, the insertion of LMA by nurses is also a potential contribution to the initiative for introduction of intermediate life support ambulances manned by the driver and the nursing staff, in which the autonomy of the nurse and its protagonist role is emphasized, in particular, in invasive procedures[18].

Furthermore, the current context of the COVID-19 pandemic, in addition to significantly increasing the demand for health services, highlighted the weaknesses in the availability of human and material resources in health care[19]. In this sense, in scenarios of possible lack of physicians and/or situations of imminent risk of death, it is essential that nurses identify the care needs and make the necessary interventions, including advanced nursing practices, such as the use and handling of supraglottic devices[18,20].

In view of the above, nurses must have knowledge, skills and attitudes to optimize the use of available means and resources, implement appropriate strategies and make sure that patients receive the appropriate airway management quickly, efficiently and effectively[21].

We believe that by analyzing and synthesizing relevant research on the subject, this study has the potential to support the improvement of nurses' clinical practice in airway management. The aim of this article was to identify the evidence-based literature on LMA insertion by nurses.

METHOD

Integrative literature review performed from November 2020 to February 2021, supported by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA®), a theoretical-methodological framework composed of a 27-item checklist and a three-step flowchart that appraise the quality of review studies[22].

The steps followed were:

- definition of the research question;
- literature search;
- definition of information to be extracted from the selected studies and their categorization;
- evaluation of included studies;
- interpretation of results; and
- presentation of the review/synthesis of knowledge[23].

In the first step, the guiding question was developed using the PICOS strategy[24]. The letter "P" (population) referred to nurses; the "I" (intervention) to the insertion of a laryngeal mask; the "C" (comparison) did not apply; the "O" (outcome) did not apply; and the "S" (type of study) comprised original quantitative studies. Thus, the question for this review study was: "What is the scientific evidence available in the literature on the insertion of LMA by nurses?".

In the second step, the inclusion criteria were defined: primary studies with a quantitative methodology that answered the research question, without language delimitation and

within a ten-year period in order to update the information on the theme.

Studies conducted exclusively with other health professionals and other supraglottic devices and those that did not present individualized data on nurses and on laryngeal mask insertion were excluded. Literature reviews, letters to the editor, editorials, case reports, abstracts presented at conferences, personal opinions, dissertations, theses, book chapters and institutional manuals were also excluded.

The search for studies took place in November 2020 and the Endnote® reference manager was used to export the studies. The following databases were consulted: US National Library of Medicine National Institutes Database Search of Health (PubMed®/MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, Excerpta Medica Database (Embase), Latin American and Caribbean Health Sciences Literature (LILACS) and Web of Science.

The search strategy was composed of the controlled descriptors of the Medical Subject Headings Section (MeSH), Health Sciences descriptors (DeCS), their synonyms in singular and plural forms, search terms and Boolean operators. As databases work in different ways and respond to different commands, the search strategy had to be adapted to each database, as exemplified below.

In PubMed®/MEDLINE and Scopus, the controlled descriptors were identified in Medical Subjects Headings (MeSH): Nurses; Laryngeal Masks. The strategy used was: (Nurses OR Nurse OR Nurs* OR "Registered Nurses" OR "Registered Nurse") AND ("Laryngeal Masks" OR "Laryngeal Mask" OR "Laryngeal Mask Airways" OR "Laryngeal Mask Airway" OR "Extraglottic Devices" OR "Extraglottic Device" OR "Extraglottic Airway Devices" OR "Extraglottic Airway Device" OR "Supraglottic Devices" OR "Supraglottic Device" OR "Supraglottic Airway Devices" OR "Supraglottic Airway Device").

In CINAHL, the controlled descriptors in English were identified in Titles/Subjects Nurses; Laryngeal Masks. The strategy used was: (MH"Nurses") OR Nurses OR Nurse OR Nurs* OR "Registered Nurses" OR "Registered Nurse") AND (MH"Laryngeal Masks") OR "Laryngeal Masks" OR "Laryngeal Mask" OR "Laryngeal Mask Airway" OR "Laryngeal Mask Airways" OR "Extraglottic Devices" OR "Extraglottic Device" OR "Extraglottic Airway Devices" OR "Extraglottic Airway Device" OR "Supraglottic Devices" OR "Supraglottic Device" OR "Supraglottic Airway Devices" OR "Supraglottic Airway Device").

In Cochrane, controlled descriptors in English were used: Nurses; Laryngeal Masks. The adopted strategy was: (Nurses OR Nurse OR Nurs* OR "Registered Nurses" OR "Registered Nurse") AND ("Laryngeal Masks" OR "Laryngeal Mask" OR "Laryngeal Mask Airway" OR "Laryngeal Mask Airways" OR "Extraglottic Devices" OR "Extraglottic Device" OR "Extraglottic Airway Devices" OR "Extraglottic Airway Device" OR "Supraglottic Devices" OR "Supraglottic Device" OR "Supraglottic Airway Devices" OR "Supraglottic Airway Device").

In Embase, controlled descriptors in English were used: Nurses; Laryngeal Masks. The adopted strategy was: ('nurses'/exp OR nurses OR 'nurse'/exp OR nurse OR nurs* OR 'registered nurses' OR 'registered nurse'/exp OR 'registered nurse') AND ('laryngeal masks'/exp OR 'laryngeal masks' OR 'laryngeal mask'/exp OR 'laryngeal mask' OR 'laryngeal mask airway'/exp OR 'laryngeal mask airway' OR 'laryngeal mask airways'/exp OR 'laryngeal mask airways' OR 'extraglottic devices' OR 'extraglottic device' OR 'extraglottic airway devices' OR 'extraglottic airway device'/exp OR 'extraglottic airway device' OR 'supraglottic devices' OR 'supraglottic device'/exp OR 'supraglottic device' OR 'supraglottic airway devices' OR 'supraglottic airway device'/exp OR 'supraglottic airway device').

In LILACS, the controlled descriptors were present in the Health Sciences Descriptors (DeCS) in Portuguese: Enfermeiras and Enfermeiros; Máscaras Laríngeas. The strategy was: ("Enfermeiras e Enfermeiros" OR Nurses OR "Enfermeras y Enfermeros" OR Enfermeira OR Nurse OR Enfermera OR "Enfermeira e Enfermeiro" OR "Enfermera y Enfermera" OR Enfermeiras OR Enfermeras OR "Enfermeiros Registrado" OR "Enfermeras registradas" OR "Registered nurses") AND (("Máscaras Laríngeas" OR "Laryngeal Masks" OR "Máscaras Laríngeas")) OR (("dispositivos extraglóticos" OR "extraglottic devices" OR "dispositivo extraglótico" OR "extraglottic device" OR "dispositivos extraglóticos para vias aéreas" OR "extraglottic airway devices")) OR (("Dispositivos Supraglóticos" OR "supraglottic devices" OR "Dispositivo Supraglótico" OR "supraglottic device" OR "dispositivos Supraglóticos para vias aéreas" OR "Supraglottic Airway Devices" OR "dispositivos supraglóticos para las vías respiratorias" OR "dispositivo Supraglótico para vias aéreas" OR "Supraglottic Airway Device" OR "dispositivo supraglótico para las vías respiratorias")).

In the web of Science, controlled descriptors in English were used: Nurses; Laryngeal Masks. The adopted strategy was: ("Nurses" OR "Nurse" OR "Nurs*" OR "Registered Nurses" OR "Registered Nurse") AND ("Laryngeal Masks"[Mesh Terms] OR "Laryngeal Masks" OR "Laryngeal Mask" OR "Laryngeal Mask Airways" OR "Laryngeal Mask Airway" OR "extraglottic devices" OR "extraglottic device" OR "extraglottic airway devices" OR "extraglottic airway device" OR "supraglottic devices" OR "supraglottic device" OR "Supraglottic Airway Devices" OR "Supraglottic Airway Device").

Titles and abstracts were read for the selection of studies. Subsequently, the studies were read in full by two reviewers

independently with use of the blinding tool activated on the Rayyan platform, a free review software available on the web, single version, called Rayyan Qatar Computing Research Institute[25]. In addition, a third reviewer with expertise in the subject was consulted to resolve differences in the inclusion process of studies.

In the third step, data were extracted from the studies included. A previously validated instrument was used to this end[26], comprising the items: identification of the original study, methodological characteristics of the study, studied interventions, results found and methodological rigor.

In the fourth step, a critical assessment of the methodological quality was performed. An instrument adapted from the Critical Appraisal Skills Program (CASP) was used. It contains 10 items related to: objective; appropriateness of the method; presentation of theoretical-methodological procedures; sample selection criteria; sample detailing; relationship between researchers and respondents (randomization/blinding); respect for ethical aspects; rigor in data analysis; capacity to discuss results; and, contributions and limitations of the study. Subsequently, the studies were classified as: level A (score between 6 and 10 points), considered as good methodological quality and reduced bias, or level B (up to 5 points), meaning satisfactory methodological quality, but with significant risk of bias[27].

The definition of the level of evidence was identified through the study design. Thus, they were recognized as: "I" systematic reviews and meta-analysis of randomized clinical trials; "II" randomized clinical trials; "III" non-randomized controlled trial; "IV" case-control or cohort studies; "V" for systematic reviews of qualitative or descriptive studies; "VI" qualitative or descriptive studies; "VII" for authoritative opinion and/or expert committee reports[28]. This hierarchy classifies levels I and II as strong; III to V as moderate; and VI to VII as weak[28].

RESULTS

In this integrative review, 1,156 primary studies were identified and eight studies were selected for the final sample. Details of their selection process are shown in Figure 1, according to the PRISMA recommendations[22].

Chart 1 presents the data and evaluation of selected studies.

The studies of the final sample were published between 2012 and 2020 and most publications were from year 2014 (n=3; 37.5%)[32-34], with a four-year interval until a new publication in 2018[31]. After that year, publications became constant and their frequency became annual[29-31].

With regard to language and origin, all studies (n=8; 100%) were published in English and in European countries[28-35]. The country that published the most on this topic was France (n=2; 25.0%)[31,35].

The sample consisted of non-experimental studies (n=4; 50.0%)[30-32,35] and experimental studies (n=4; 50.0%)[32,33,35,36]. The classification of the levels of evidence was: level II (n=4; 50%)[32-36], level IV (n=2; 25.0%)[30,34], level VI (n=2; 25.0%)[29,31].

After reading and analyzing the studies, two categories were built: first-generation devices and second-generation devices. The first included the Laryngeal Mask Airway (LMA)[33,36], LMA-Unique[35], Intubating Laryngeal Mask Airway (ILMA)[30,34] and Laryngeal Mask Airway Air-Q Self-Pressurized (LMA-Air SP)[31], and the second referred to the I-gel[29,35] or the Laryngeal Mask Airway Supreme (LMA-S)[32]. Note that in one of the studies, the use of devices from both generations was presented[35].

DISCUSSION

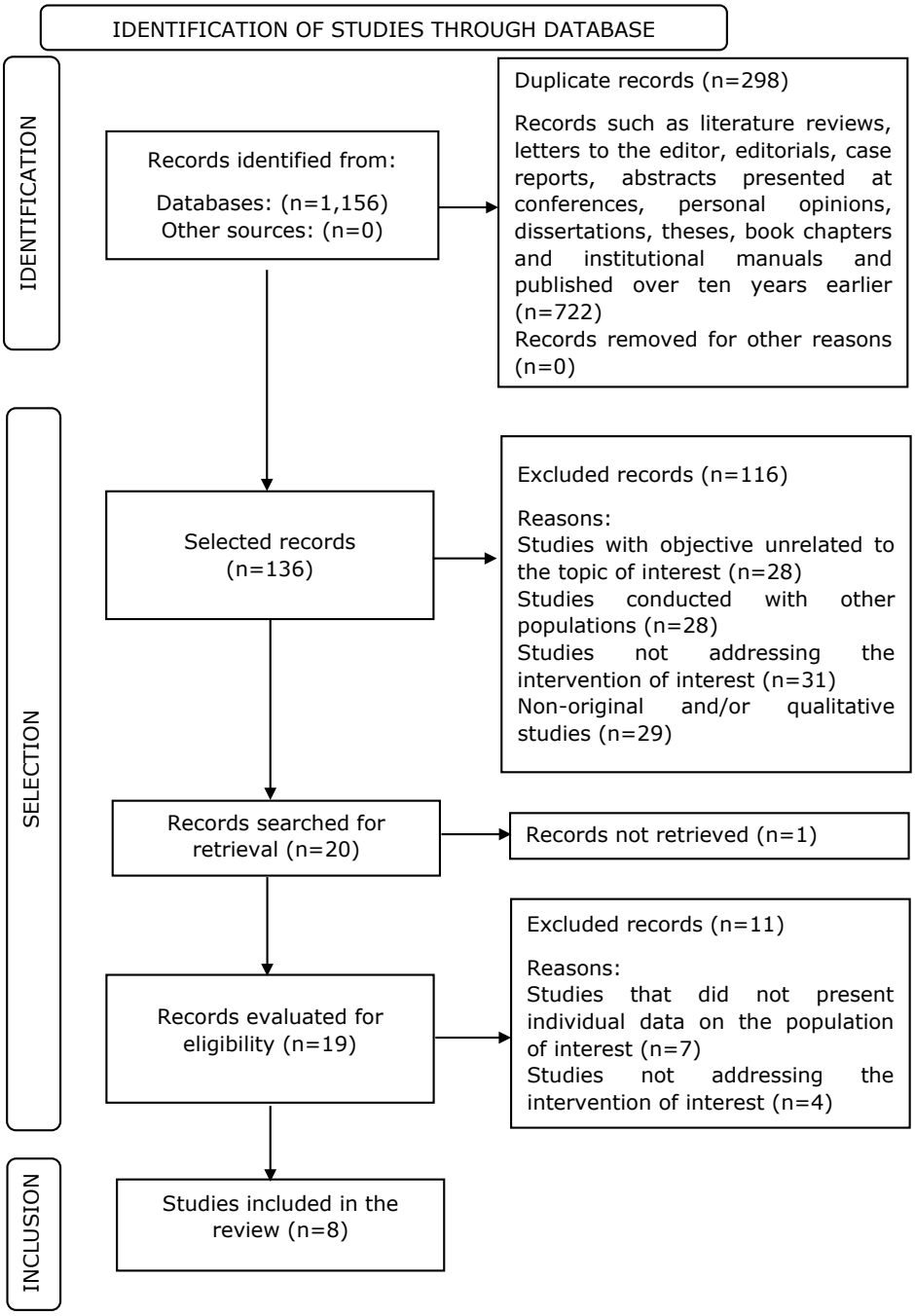
The insertion of LMA in airway management and its algorithms has changed nurses' clinical practice. It is an alternative device that reduces the gap between the face mask and the endotracheal tube[2]. The emphasis given to LMA is related to aspects such as insertion speed, ease of learning and use, among others[2].

In this perspective, this study brings to nursing a compilation of knowledge published in the world about insertion of a laryngeal mask by nurses in order to support the decision-making process in the airway management context and expand the possibilities of safe and effective interventions, favoring better health outcomes.

A national integrative review of 2011 with a theme similar to this study showed that LMA was a reliable device for allowing airway management by nurses in critical situations[37]. However, the authors highlighted the need to expand studies and intervention research involving professional nurses, since no experimental studies were identified[37].

In the present study, half of articles had a randomized clinical trial design[32-36] with a strong level of evidence[28]. Randomized clinical trials are essential for the safe and effective development of technologies, medicines, medical devices and other interventions in the context of health/disease[38], and contribute considerably to the construction of practice based on methodologically well-delineated evidence.

Studies conducted in a simulated environment predominated among the sample[29,31-33,35,36]. Simulations with manikin have been frequently used in studies related to airway management[39,40] and are important strategies to aid the development of clinical skills and decision-making, as they can reproduce realistic scenarios of critical situations without compromising patients' wellbeing[41].



Source: Research database
Prepared by the authors.

Figure 1. Flowchart of the study selection process according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Uberaba, MG, Brazil, 2021.

Cardiopulmonary arrest was the main clinical situation in which the use of LMA was evidenced[30,31,34,35]. The European origin of the studies demonstrates compliance with the European Resuscitation Council Guidelines, which indicate that in the lack of qualified personnel in OTI, a supraglottic airway such as the LMA is an acceptable alternative[9].

The studies in this review did not measure the effect of professionals' exposure to activities of demonstration of the use of devices, training sessions and practical activities.

Chart 1. Synthesis of the articles included according to the variables of interest. Uberaba, MG, Brazil, 2021.

Authors Year Origin	Study title	Study design	Objective	Main results	Conclusions	Level of evidence	Methodological quality
Nørkjær et al.[29] 2020 Denmark	Comparing Surf lifeguards and nurse anesthetists use of the I-gel supraglottic airway device – an observational simulation study.	Cross-sectional observational study.	To compare the use of supraglottic airway by lifeguards and experienced anesthetist nurses.	Participation of 30 lifeguards and 30 anesthetist nurses. The median time for first ventilation was 20 s (15–22) for surf lifeguards and 17 s (15–21) for anesthetists (p=0.31). Mean tidal volume was 0.55 L (0.21) for lifeguards and 0.31 L (0.10) for anesthetist nurses (p<0.0001). Lifeguards and anesthetist nurses provided 100% and 95% ventilations with visible chest enlargement on a manikin (p=0.004) and 19% and 5% ventilations within the recommended tidal volume, respectively (p<0.0001).	In a simulated environment, there was no significant difference between lifeguards and experienced anesthetist nurses in time for first ventilation when using a supraglottic airway.	VI	A
Lemaitre et al.[30] 2019 France	Effectiveness of intubating laryngeal mask airway in managing out-of-hospital cardiac arrest by non-physicians.	Longitudinal observational study.	To evaluate the feasibility and effectiveness of intubation using the Intubating Laryngeal Mask Airway (ILMA), used by pre-hospital emergency nurses in the treatment of out-of-hospital cardiopulmonary arrest.	A total of 1,464 ILMA placements were attempted by emergency nurses during out-of-hospital cardiopulmonary arrest. Ventilation was possible in 1,250 patients (85.38%) after ILMA placement and in 1,078 patients (73.63%) after intubation. Regurgitation of gastric contents occurred in 237 (16.18%) patients, mainly during basic life support.	The use of ILMA is feasible and allows for effective airway management when performed by trained non-medical health professionals during out-of-hospital cardiopulmonary arrest.	IV	A

Continue...

Chart 1. Continuation.

Authors Year Origin	Study title	Study design	Objective	Main results	Conclusions	Level of evidence	Methodological quality
Cierniak et al.[31] 2018 Poland	Comparison of ventilation effectiveness of the BVM and the LMA Air-Q SP in nurses during simulated CPR.	Cross-sectional observational study.	To evaluate the quality of ventilation with the BVM and the LMA Air-Q SP by nurses.	The mean time from the beginning of CPR to the beginning of ventilation was 18±5.4 s for the BVM and 16.15±4.4 s for the LMA. Ventilation with BVM was 3.47±1.43 L /min, and with LMA was 5.54±1.73 L /min. There were no cases of gastric insufflation in the case of LMA, whereas in BVM the event occurred in five cases.	Nurses obtained better ventilatory results using the LMA Air-Q SP. Attempts to insert the LMA were shorter than in the case of the BVM.	VI	A
Gruber et al.[32] 2014 Italy	Basic life support trained nurses ventilate more efficiently with laryngeal mask supreme than with facemask or laryngeal tube suction-disposable--a prospective, randomized clinical trial.	Randomized clinical trial.	To compare the airway management and ventilation performed by basic life support trained nurses with ventilation mask, LMA-S and the LTS-D.	Ventilation failed in 34% of patients with a face mask, 2% with LMA-S and 22% with LTS-D ($p<0.001$). In patients who could be successfully ventilated, the mean tidal volume was 240±210 mL with a face mask, 470±120 mL with LMA-S, and 470±140 mL with LTS-D ($p<0.001$). Leakage pressure was lower with LMA-S (23.3±10.8 cm H_2O, 95%CI 20.2–26.4) than with LTS-D (28.9±13.9 cm H_2O, 95%CI 24.4–33.4; $p=0.047$).	After an hour of introductory training, nurses were able to use the LMA-S more effectively than the face mask and the laryngeal tube suction - disposable.	II	A

Continue...

Chart 1. Continuation.

Authors Year Origin	Study title	Study design	Objective	Main results	Conclusions	Level of evidence	Methodological quality
Saeedi et al.[33] 2014 Iran	Comparison of endotracheal intubation, combitube, and laryngeal mask airway between inexperienced and experienced emergency medical staff: a manikin study.	Randomized clinical trial.	To evaluate if LMA or Combitube can be used by inexperienced healthcare professionals.	Airway success was 73% for OTI, 98.3% for LMA and 100% for Combitube. LMA and Combitube were faster and more successful than OTI (p=0.0001). The inexperienced group had no differences in time to protect LMA compared to the experienced group (6.05 *vs* 5.4 seconds respectively p=0.26).	Airway management time decreased and the success rate significantly increased with the use of LMA and Combitube, regardless of experience level. This study suggests that Combitube and LMA may be acceptable choices for airway management in the prehospital setting by inexperienced personnel.	II	A
Tritsch et al.[34] 2014 France	Intubating laryngeal mask airway placement by non-physician healthcare providers in management out-of-hospital cardiac arrests: a case series.	Longitudinal observational study.	To evaluate the feasibility and effectiveness of ILMA by prehospital emergency nurses trained in the management of out-of-hospital cardiopulmonary arrest.	During the study period, emergency nurses attempted 302 ILMA placements in the course of out-of-hospital resuscitation. After ILMA placement, but prior to attempted intubation, ventilation was possible in 290 patients (96%). Obstruction or larger leaks were observed in 12 patients (4%). Regurgitation of gastric contents occurred in 43 (14.2%) patients; in 23 cases before the arrival of the first aid team, in 18 cases before ILMA placement, and in two cases after ILMA placement.	The use of ILMA is feasible and allows active airway management when performed by non-medical health professionals during out-of-hospital cardiopulmonary arrest. In this setting, ILMA has the potential to decrease the incidence of regurgitation.	IV	A

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Chart 1. Continuation.

Authors Year Origin	Study title	Study design	Objective	Main results	Conclusions	Level of evidence	Methodological quality
Schunk et al.[35] 2013 Germany	A comparison of three supraglottic airway devices used by healthcare professionals during paediatric resuscitation simulation.	Randomized clinical trial.	To determine the best airway device between the ILMA, the I-gel and the laryngeal tube used by healthcare professionals with different levels of experience in pediatric airway management.	Participation of 66 health professionals (22 paramedics, 22 anesthetist nurses and 22 anesthesia residents). The mean insertion time of the laryngeal mask and tube was significantly longer than the I-gel for all professional groups (p<0.001). The success rate with the I-gel was higher than with the laryngeal mask or tube (p<0.001).	The I-gel appears to be the best device overall for use by relatively inexperienced providers during pediatric airway emergencies.	II	A
Xanthos et al.[36] 2012 Greece	Inexperienced nurses and doctors are equally efficient in managing the airway in a manikin model.	Randomized clinical trial.	To investigate if minimally trained medical and nursing school graduates would be equally efficient in placing a laryngeal mask and OTI with a Macintosh blade or video laryngoscope on a manikin.	There was no statistically significant difference between physicians and nurses in the number of attempts and the time required for the first successful attempt with the three techniques studied. Of these three techniques, LMA placement was the fastest (p<0.001).	Nurses are as efficient as physicians in the safe and proper airway management with the three different techniques on manikins.	II	A

ILMA: Intubating Laryngeal Mask Airway; BVM: bag-valve mask; LMA Air-Q SP: Laryngeal Mask Airway Air-Q Self-Pressurized; CPR: cardiopulmonary resuscitation; LTS-D: laryngeal tube suction-device; LMA: laryngeal mask airway; LMA-S: Laryngeal Mask Airway Supreme; IC: confidence interval; OTI: orotracheal intubation.

Source: Research database.

Prepared by the authors.

In this sense, a previous study addressing the teaching of supraglottic airway handling to people not trained in medicine[42] demonstrated that a high level of success was achieved after the teaching activity, and practical training is superior compared to theoretical class and presentation of an instructional video.

A study in this review showed that the greater the number of insertion attempts the lower the success rate, and highlights that in the second LMA insertion attempt, the success rate decreases by 20 times[30]. Therefore, the training and improvement of practical skills can favor better results on the use of LMA.

The characteristics of the different types of LMA were considered for the categorization of studies, and divided into first and second-generation devices. The first generation has a single breathing channel while the second generation has a separate gastric channel[5].

First generation devices

This category was composed of six studies involving the use of LMA[33,36], LMA-Unique[35] and ILMA[30,34], and LMA Air-Q SP[31].

In a study that compared the quality of ventilation with the BVM and the LMA Air-Q SP by nurses, better results were obtained with the second device with regard to speed for effective ventilation and tidal volume[31], despite the divergent findings observed in the literature[43].

In this perspective, the American Heart Association (AHA) guidelines recommend (class II B) that either a BVM device or an advanced airway, supraglottic airway or OTI can be used for oxygenation and ventilation during CPR by trained health professionals[8].

Laryngeal mask airway insertion by minimally trained physicians and nurses with no previous experience was equally efficient in device placement, without significant differences in the number of successful attempts[36]. Other studies that present positive findings regarding the use of LMA by different operators converge with these results[44,45]. This demonstrates the ease of use of LMA by different professional classes and even lay people.

The results of the study conducted in the pre-hospital environment by inexperienced personnel, including nurses, showed a success rate of LMA insertion of 100% and 62.5% in the case of OTI[33]. These findings may be related to the learning curve in relation to the different devices.

In a systematic review, was reached the conclusion that under ideal conditions, a minimum of 50 OTIs is required for a success rate of at least 90% in two intubation attempts per patient[46], whereas LMA has a shorter learning curve of fast and correct placement, even by novices[39].

The time for airway management was faster with LMA compared to OTI, corresponding to a median of 6.2 s and 17.2 s (p=0.0001), respectively[33]. From this perspective, the use of LMA favors compliance with resuscitation guidelines that emphasize the need to minimize interruption of chest compressions[8,9] and, thus, positively affect cerebral and cardiac perfusion during CPA[39].

The ILMA offers the opportunity for secondary OTI[3]. It was used in two studies that dealt with the management of out-of-hospital cardiopulmonary arrest[30,34], in which successful ventilation was observed in 85.38% and 96.0% of cases, respectively. Another study conducted on the management of out-of-hospital cardiopulmonary arrest is in line with these positive results, as 89.4% of successful placement of LMA was found[44].

The risk of aspiration of gastric contents is considered one of the main disadvantages in the use of LMA[3]. However, a low incidence of aspiration was observed in the included studies, corresponding to 1.7%[30] and 0.3%[34].

The presence of leaks occurred more frequently, corresponding to 25.61% with minimal volumes and 8.46% with large volumes[30]. This situation was also evidenced in other studies with a rate of 0.5%[44]. As for other adverse effects, one of the studies reported the lack of gastric insufflation when using LMA[31].

Second generation devices

Three studies that present the use of I-gel[29,35] and LMA-S[32] are in this category.

The I-gel had a success rate of 100% in the first attempt[35], in line with data in the literature, where its insertion is defined as easy by most professionals who use it[47]. Compared to LMA, the I-gel was placed more quickly[35]. Studies have shown that insertion of the I-gel was faster when compared to other types of LMA[47,48]. This may be related to its characteristic of having a non-inflatable cuff[3].

In addition, in a simulated condition, the insertion time was 17 seconds (p=0.31)[29], which is similar to other studies that showed a time of 13.1 seconds[49] and 16.4 seconds[48]. A study conducted in Japan identified results suggesting a significant association between the fast advanced insertion of airways and better neurological results in cases of out-of-hospital cardiopulmonary arrest[50].

In a study conducted[35] in a pediatric resuscitation setting, the insertion time was 5.98 seconds (p<0.001), which differs considerably from the aforementioned results. This disparity may be related to the use of these devices by different groups of people in different manikins and settings.

We observed that only 5% of ventilations performed by nurses were appropriate to the recommended tidal volume of 0.5 to 0.6 L[29], which may indicate non-compliance. However, 95% of ventilations were enough to promote chest elevation[29], which meets one of the recommended parameters for application of ventilations[16].

Another second-generation device used in the studies was the LMA-S[32], which stood out for frequently offering appropriate tidal volume and 95% success in its insertion by nurses trained in basic support. A similar success rate was observed in a study conducted with an experienced professional[48].

As for adverse effects, although second-generation devices have protective mechanisms for aspiration, the studies included in this category did not present results regarding the aspiration of gastric contents, which may be related to their simulated nature[29,35]. In addition, an included study conducted in the operating room[32] showed a 21% incidence of blood stains, which may indicate trauma associated with insertion of the device.

The main limitation identified in this study was the scarcity of articles with population and intervention exclusively for nurses. In this integrative review, we considered the studies including other professionals and the use of other devices. The main variables measured were insertion time and success rate and information regarding others such as ventilatory parameters (leakage pressure, tidal volume, minute ventilation, peripheral oxygen saturation, capnography), adverse effects and skill retention was scarce.

CONCLUSION

In view of the aspects highlighted in this study, the use of LMA by nurses is a recommended alternative due to its speed, success and effectiveness in ensuring the advanced airway, especially in situations of CPA in adults. However, the possible disadvantages/adverse effects of its use should also be taken into account.

This study contributes to nursing research, care and education by presenting a structured body of knowledge based on the best available scientific evidence. It also contributes to the decision-making process on using a laryngeal mask for airway access in legally supported situations, in addition to fostering discussions that reach educational institutions, so that there is greater emphasis on the development of airway management skills.

The scarcity of articles with population and intervention exclusively for nurses emphasizes the need for studies with larger samples involving the variables of interest to strengthen the findings of this review and support nurses in their clinical practice.

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