ReGeo ISSN: 2177-3246

VIDEOLARYNGOSCOPY VERSUS DIRECT LARYNGOSCOPY FOR RAPID SEQUENCE INTUBATION IN EMERGENCY SURGERY

VIDEOLARINGOSCOPIA VERSUS LARINGOSCOPIA DIRETA PARA INTUBAÇÃO EM SEQUÊNCIA RÁPIDA EM CIRURGIA DE EMERGÊNCIA

VIDEOLARINGOSCOPIA FRENTE A LARINGOSCOPIA DIRECTA PARA LA INTUBACIÓN DE SECUENCIA RÁPIDA EN CIRUGÍA DE URGENCIA

https://doi.org/10.56238/revgeov17n10-092

Data de submissão: 14/09/2026 **Data de publicação:** 14/10/2026

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ABSTRACT

Rapid sequence intubation in emergency surgery must secure the airway promptly while limiting aspiration, hypoxemia, and cardiovascular instability. Videolaryngoscopy improves glottic visualization, but its effects depend on blade geometry, operator experience, and the circumstances of intubation. This structured narrative review examines PubMed-indexed randomized trials, evidence syntheses, observational studies, and practice guidelines identified through focused searches and targeted retrieval through October 8, 2026. Evidence from emergency surgery and operating-room rapid sequence intubation is considered separately from elective surgery, emergency departments, and intensive care units. A multicenter operating-room trial involving 1000 patients found first-pass success of 94.0% with Macintosh-style videolaryngoscopy and 71.6% with direct laryngoscopy. A smaller trial restricted to emergency surgery also favored videolaryngoscopy, whereas a 2026 trial in elective surgical patients requiring rapid sequence intubation found similar first-attempt success and modestly longer intubation time with video guidance. Large surgical and critical-care trials support improved procedural success, but reductions in severe physiological complications, aspiration, or mortality remain less consistently demonstrated. Airway contamination, difficulty delivering the tube despite a clear image, and unfamiliar equipment can compromise performance. Videolaryngoscopy is a reasonable preferred initial technique for many adults undergoing emergency surgical intubation when equipment and operator competence are established. Its use should be integrated with preoxygenation, physiological

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preparation, suction, suitable tube-delivery aids, and a rehearsed rescue plan. Current evidence supports prioritizing successful intubation on the first attempt without treating the choice of laryngoscope as a substitute for comprehensive airway management.

Keywords: Videolaryngoscopy. Direct Laryngoscopy. Rapid Sequence Intubation. Emergency Surgery.

RESUMO

A intubação em sequência rápida na cirurgia de emergência deve garantir a via aérea prontamente, ao mesmo tempo em que minimiza a aspiração, a hipoxemia e a instabilidade cardiovascular. A videolaringoscopia melhora a visualização glótica, mas seus efeitos dependem da geometria da lâmina, da experiência do operador e das circunstâncias da intubação. Esta revisão narrativa estruturada examina ensaios clínicos randomizados indexados no PubMed, sínteses de evidências, estudos observacionais e diretrizes de prática clínica identificados por meio de buscas direcionadas e recuperação específica de dados até 8 de outubro de 2026. As evidências provenientes de cirurgias de emergência e intubações em sequência rápida no centro cirúrgico são analisadas separadamente daquelas referentes a cirurgias eletivas, serviços de emergência e unidades de terapia intensiva. Um estudo multicêntrico realizado em centro cirúrgico, envolvendo 1.000 pacientes, constatou uma taxa de sucesso na primeira tentativa de 94,0% com a videolaringoscopia (lâmina tipo Macintosh) e de 71,6% com a laringoscopia direta. Um estudo menor, restrito a cirurgias de emergência, também favoreceu a videolaringoscopia; por outro lado, um estudo de 2026 com pacientes cirúrgicos eletivos submetidos à intubação em sequência rápida observou taxas semelhantes de sucesso na primeira tentativa e um tempo de intubação ligeiramente maior com o uso de videolaringoscopia. Grandes estudos nas áreas de cirurgia e medicina intensiva corroboram a maior taxa de sucesso do procedimento, embora a redução de complicações fisiológicas graves, aspiração ou mortalidade não tenha sido demonstrada de forma consistente. Fatores como contaminação da via aérea, dificuldade na introdução do tubo (apesar da boa visualização da imagem) e falta de familiaridade com o equipamento podem comprometer o desempenho. A videolaringoscopia é uma técnica inicial preferencial razoável para muitos adultos submetidos à intubação cirúrgica de emergência, desde que haja disponibilidade de equipamento e competência técnica do operador. Seu uso deve ser integrado a medidas como pré-oxigenação, preparo fisiológico, aspiração, dispositivos auxiliares adequados para a introdução do tubo e um plano de resgate previamente ensaiado. As evidências atuais apoiam a priorização do sucesso da intubação na primeira tentativa, sem tratar a escolha do laringoscópio como um substituto para o manejo abrangente das vias aéreas.

Palavras-chave: Videolaringoscopia. Laringoscopia Direta. Intubação em Sequência Rápida. Cirurgia de Emergência.

RESUMEN

La intubación de secuencia rápida en cirugía de urgencia debe asegurar la vía aérea con prontitud, minimizando al mismo tiempo la aspiración, la hipoxemia y la inestabilidad cardiovascular. La videolaringoscopia mejora la visualización de la glotis, pero sus efectos dependen de la geometría de la hoja, la experiencia del operador y las circunstancias de la intubación. Esta revisión narrativa estructurada examina ensayos aleatorizados indexados en PubMed, síntesis de evidencia, estudios observacionales y guías de práctica clínica identificados mediante búsquedas dirigidas y recuperación específica de información hasta

el 8 de octubre de 2026. La evidencia proveniente de la cirugía de urgencia y de la intubación de secuencia rápida en quirófano se analiza por separado de la correspondiente a la cirugía programada, los servicios de urgencias y las unidades de cuidados intensivos. Un ensayo multicéntrico realizado en quirófano con 1000 pacientes reveló una tasa de éxito al primer intento del 94,0 % con videolaringoscopia tipo Macintosh y del 71,6 % con laringoscopia directa. Un ensayo de menor tamaño, limitado a la cirugía de urgencia, también favoreció el uso de la videolaringoscopia; por el contrario, un ensayo de 2026 en pacientes quirúrgicos programados que requerían intubación de secuencia rápida halló tasas similares de éxito al primer intento, aunque con un tiempo de intubación ligeramente mayor al utilizar videoguía. Los grandes ensayos en cirugía y medicina crítica respaldan una mejora en el éxito del procedimiento, si bien la reducción de complicaciones fisiológicas graves, de la aspiración o de la mortalidad no se ha demostrado de manera tan consistente. La contaminación de la vía aérea, la dificultad para introducir el tubo a pesar de obtener una imagen clara y el uso de equipos desconocidos pueden comprometer el desempeño. La videolaringoscopia constituye una técnica inicial preferente razonable para muchos adultos sometidos a intubación quirúrgica de urgencia, siempre que se disponga del equipo adecuado y el operador cuente con la competencia necesaria. Su uso debe integrarse con medidas como la preoxigenación, la preparación fisiológica, la aspiración, el empleo de dispositivos auxiliares adecuados para la inserción del tubo y un plan de rescate previamente ensayado. La evidencia actual respalda priorizar el éxito de la intubación al primer intento, sin considerar la elección del laringoscopio como un sustituto de un manejo integral de la vía aérea.

Palabras clave: Videolaringoscopia. Laringoscopia Directa. Intubación de Secuencia Rápida. Cirugía de Urgencia.

1 INTRODUCTION

Emergency surgical patients may require anesthesia before fasting is complete, while bowel obstruction, active bleeding, trauma, or impaired consciousness can further increase the complexity of airway management. Rapid sequence induction and intubation aims to minimize the interval during which protective airway reflexes are lost and the airway remains unsecured. The technique encompasses preparation, preoxygenation, induction, neuromuscular blockade, and timely placement of a cuffed tracheal tube, with modifications determined by the patient's physiological reserve and aspiration risk.[1]

Direct laryngoscopy requires a usable line of sight to the larynx, whereas videolaryngoscopy places a camera near the blade tip and provides an indirect image. This change can improve visualization without requiring the same alignment of the airway axes, but tube advancement remains a separate technical step. Contemporary difficult-airway guidance emphasizes maximizing first-attempt success, maintaining oxygen delivery, confirming ventilation with waveform capnography, and progressing promptly to alternative techniques when initial attempts fail.[2,3]

The evidence supporting videolaryngoscopy is substantial, yet much of it comes from elective operations or critically ill patients intubated outside the operating room. Emergency surgical anesthesia overlaps with both settings but differs in available preparation time, aspiration risk, staffing, patient selection, and induction practice. A clinically useful comparison must therefore establish which findings directly concern emergency surgery and which require cautious extrapolation from adjacent populations.[4,5,6]

2 OBJECTIVE

This review evaluates the effectiveness and safety of videolaryngoscopy compared with direct laryngoscopy for rapid sequence intubation in adults undergoing emergency surgery. It examines first-attempt success, failed intubation, visualization, procedural time, airway injury, aspiration, and physiological complications. It also identifies how device design, operator competence, airway contamination, and rescue planning influence interpretation and implementation.

3 METHODS

A focused PubMed search was conducted on October 8, 2026, using the expression (videolaryngoscop*[Title/Abstract] OR "video laryngoscopy"[Title/Abstract] OR "video

laryngoscope"[Title/Abstract]) AND "rapid sequence"[Title/Abstract] AND (direct[Title/Abstract] OR Macintosh[Title/Abstract]). The search applied an upper publication-date limit of October 8, 2026, without a lower date limit, and returned 51 records. Targeted retrieval added major adult laryngoscopy trials, relevant airway guidelines, observational studies of difficult or contaminated airways, and studies of preoxygenation and tube-delivery aids.

PubMed records and available primary-source text were examined for population, setting, device, comparator, outcome definitions, and numerical results. Greater interpretive weight was assigned to randomized comparisons involving emergency surgery or operating-room rapid sequence intubation, with other surgical and emergency-care populations described explicitly as supporting evidence. Pediatric studies, simulation-only comparisons, protocols without outcomes, correspondence without primary data, and articles unrelated to airway management were not used as clinical effectiveness evidence.

The synthesis is a structured narrative review rather than a systematic review or a new meta-analysis. Selection was purposive, no protocol was registered, and independent duplicate screening or formal study-level risk-of-bias scoring was not performed. All bibliography entries were checked against PubMed metadata, and outcomes were retained with their original denominators and definitions rather than pooled across heterogeneous settings.

4 RESULTS AND DISCUSSION

4.1 THE CLINICAL MEANING OF FIRST ATTEMPT SUCCESS

First-attempt success is a practical endpoint because repeated laryngoscopy prolongs the period before a secure airway is established and may produce trauma or worsen oxygenation. Nevertheless, an uncomplicated first attempt and a successful first attempt are not equivalent when induction precipitates hypotension or severe hypoxemia. The relevant clinical goal is successful tube placement with preserved oxygenation and circulation, rather than a favorable view or a procedural success measure in isolation.[7,8]

Definitions of an attempt vary between trials and can include removal and reinsertion of the blade, repeated tube insertion, or a change of device. Similarly, failed intubation may mean failure with the allocated device rather than an inability to secure the airway using any available technique. These differences affect comparisons between studies and explain why first-pass rates, total attempts, and ultimate airway rescue should be interpreted together.[4,9]

4.2 RANDOMIZED EVIDENCE CLOSEST TO EMERGENCY SURGICAL PRACTICE

Kriege and colleagues randomized 1000 adults requiring rapid sequence intubation for elective, urgent, or emergency surgery to a McGrath MAC videolaryngoscope or direct laryngoscopy, both using Macintosh-shaped blades. First-pass success was 470 of 500 patients with videolaryngoscopy and 358 of 500 with direct laryngoscopy, corresponding to 94.0% and 71.6% and an absolute difference of 22.4 percentage points. The findings directly support video guidance during operating-room rapid sequence intubation, although the mixed surgical population prevents treating the overall estimate as an emergency-surgery-only effect.[5]

In the same trial, a Cormack–Lehane grade of at least 3 occurred in 1.0% of video-guided procedures and 19.0% of direct procedures. Adverse events were reported in 2.6% and 12.2%, respectively, and the first-pass advantage was observed among both trainees and consultants. The composite result supports procedural benefit but does not establish that videolaryngoscopy independently reduces each uncommon outcome, particularly aspiration or mortality.[5]

Chauhan and colleagues studied 76 patients presenting for emergency surgery, allocating 38 to each laryngoscopy technique during rapid sequence induction. First-attempt success was 86.8% with videolaryngoscopy and 63.2% with direct laryngoscopy, with better glottic visualization in the video group. This trial addresses the requested population particularly closely, but its small sample limits estimates of rare complications and the extent to which its findings can represent different emergency surgical services.[10]

A 2026 randomized study of resident-performed operating-room rapid sequence induction included 172 adults with normal airways and compared C-MAC videolaryngoscopy with Macintosh direct laryngoscopy. First-attempt success was 93% versus 67%, and video guidance was associated with better visualization and less need for several adjunct maneuvers. Residents received teaching and simulation before participation, making the result evidence for a trained novice workforce rather than evidence that an unfamiliar device automatically improves performance.[11]

An important counterpoint is the 2026 multicenter trial by Tire and colleagues in adults undergoing elective noncardiac surgery who nevertheless required rapid sequence intubation. Among 193 video-group and 201 direct-group patients, first-attempt success was 86.5% and 87.6%, and median intubation time was 35 and 30 seconds, respectively. The absence of an observed advantage in this lower-risk elective setting demonstrates clinical

heterogeneity, although a nonsignificant result does not prove equivalence or negate the emergency-surgery findings.[12]

4.3 SUPPORTING EVIDENCE FROM BROADER SURGICAL POPULATIONS

The 2023 EMMA trial randomized 2092 elective surgical patients without predicted difficult airways to McGrath videolaryngoscopy or conventional laryngoscopy. First-pass success was 94% versus 82%, with no significant difference in intubation-associated adverse events. This study supports the effectiveness of Macintosh-style video guidance in routine anesthesia, but neither its elective population nor its airway selection provides a direct estimate for emergency surgical rapid sequence intubation.[13]

Ruetzler and colleagues conducted a cluster-randomized crossover trial involving 8429 cardiac, thoracic, or vascular surgical procedures in 7736 adults, of which 85% were elective. More than one attempt was needed in 1.7% of procedures allocated to hyperangulated videolaryngoscopy and 7.6% allocated to direct laryngoscopy. Device-defined intubation failure was also less frequent with video guidance, while airway and dental injury rates did not differ significantly.[9]

The latter trial broadens the evidence beyond Macintosh-shaped video blades and provides a large surgical comparison under everyday operating-room conditions. Its unit of analysis was the surgical procedure, and its failure definition included switching devices or requiring more than three attempts, so its result should not be relabeled as catastrophic inability to intubate. The study also does not isolate emergency rapid sequence induction, which remains the principal limitation when applying its large effect estimate to the present question.[9]

4.4 EVIDENCE FROM EMERGENCY DEPARTMENTS AND INTENSIVE CARE

The DEVICE trial randomized 1417 critically ill adults in 17 emergency departments and intensive care units. First-attempt success was 85.1% with videolaryngoscopy and 70.8% with direct laryngoscopy, an absolute difference of 14.3 percentage points with a 95% confidence interval of 9.9 to 18.7. Severe complications occurred in 21.4% and 20.9%, respectively, showing that improved procedural success did not produce a demonstrated reduction in the trial's composite of severe physiological events.[6]

DEVICE is highly relevant to acutely ill surgical patients because emergency operations may involve the same hypoxemia, shock, or limited reserve seen in critical care.

However, 91.5% of intubations were performed by emergency medicine residents or critical care fellows, and the trial was stopped at a planned interim analysis for efficacy. These features support the first-pass finding while requiring caution when extrapolating its magnitude to experienced anesthesiologists or to a specific emergency surgical subgroup.[6]

The earlier MACMAN trial in 371 intensive-care patients found first-pass success of 67.7% with video guidance and 70.3% with direct laryngoscopy, without a significant difference. A post hoc analysis reported more severe life-threatening complications in the video group, a finding that warrants attention but has weaker inferential status than a prespecified primary endpoint. Together with DEVICE, MACMAN illustrates how device familiarity, tube delivery, case mix, and procedural practice can affect the translation of a better image into a successful intubation.[14]

Sulser and colleagues provide a useful example of a ceiling effect in an emergency-department rapid sequence trial. Among 147 analyzed patients intubated by three highly experienced anesthesia consultants, first-attempt success was 73 of 74 with C-MAC and 73 of 73 with direct laryngoscopy, despite better video-guided visualization. Patients with several important difficult-airway conditions were excluded, so this result applies to a selected population with exceptionally high direct-laryngoscopy success.[15]

In a smaller emergency-department trial involving 158 patients, Sanguanwit and colleagues reported first-attempt success of 73.1% with video guidance and 58.8% with direct laryngoscopy. The difference did not reach conventional statistical significance, although glottic views were better in the video group. The direction of the estimate is compatible with benefit, but its uncertainty prevents presenting that trial as definitive proof of higher first-pass success.[16]

4.5 WHAT THE EVIDENCE SYNTHESES ESTABLISH

The 2022 Cochrane review included 222 studies with 26,149 adults and analyzed Macintosh-style, hyperangulated, and channelled videolaryngoscopes separately. Macintosh-style devices probably reduced failed intubation relative to direct laryngoscopy, with a risk ratio of 0.41 and a 95% confidence interval of 0.26 to 0.65, while hyperangulated devices had a corresponding risk ratio of 0.51. Most participants underwent elective surgery, so these pooled estimates support the general effectiveness of video guidance without quantifying an emergency-surgery-specific effect.[4]

The review found that Macintosh-style videolaryngoscopy probably reduced hypoxemia, whereas the estimate for hyperangulated devices remained imprecise. First-attempt success generally favored video devices, but certainty and effect magnitude differed by design, and substantial heterogeneity prevented pooling intubation times. A separate review of novice intubators supports attention to operator experience, although the mix of devices and clinical settings limits any single prediction for a local training program.[4,17]

4.6 INTERPRETING DIFFERENCES BETWEEN TRIALS

The absolute advantage associated with a device depends partly on the success rate achieved with the comparator in that trial. A direct-laryngoscopy service already achieving near-universal first-attempt success has less room for improvement than a service with a much lower baseline rate, even if video guidance improves visualization in both. The contrast between the large operating-room RSI trial and the experienced-consultant emergency-department trial therefore helps explain why a single percentage-point benefit should not be used as a universal prediction.[5,15]

Randomization balances patient characteristics within a trial, but it does not make the operators, protocols, and case mix of separate trials interchangeable. Differences in the familiarity of clinicians with each device, permissible adjuncts, difficult-airway exclusions, and the threshold for changing techniques may influence results alongside the optical advantages of video guidance. These are credible explanations for heterogeneity rather than demonstrated causes of the disagreement, and they should be tested directly before attributing a negative trial to inadequate training.[4,12,14]

Safety comparisons require particular restraint when events are rare or combined into a composite endpoint. A composite can improve statistical efficiency, yet a reduction may be driven by relatively frequent minor events while uncommon aspiration, cardiac arrest, or major injury remains too infrequent for a precise estimate. Reporting the endpoint as defined, with its components and population in view, avoids converting fewer recorded adverse events into evidence for a mortality benefit that the trial did not demonstrate.[5,6]

4.7 BLADE GEOMETRY AND DELIVERY OF THE TRACHEAL TUBE

Macintosh-style videolaryngoscopes preserve familiar blade geometry and can offer both direct and screen-based views, which may simplify transition from conventional laryngoscopy. Hyperangulated blades can improve access to an anterior larynx but usually

require a tube shaped to the blade's trajectory and deliberate coordination of screen and oral views. The distinction matters because a clear image can coexist with failed tube advancement, especially when the operator advances the blade excessively or selects an unsuitable stylet.[2,4]

Tube-delivery aids introduce another source of variation that should not be attributed solely to the laryngoscope. The single-center BEAM trial favored a bougie over a tube with stylet in patients with difficult-airway characteristics, whereas the larger multicenter BOUGIE trial did not demonstrate higher first-attempt success with routine bougie use in critically ill adults. These findings support matching the aid to the blade, airway, and operator's practiced technique instead of assuming that one adjunct improves every emergency intubation.[18,19]

4.8 TIME TO INTUBATION AND ASPIRATION OUTCOMES

Intubation time is especially important when oxygen reserve is limited, but published measurements start and end at different procedural points. Some measure blade insertion to tube passage, while others incorporate ventilation or confirmation, preventing reliable comparison of raw times across trials. The five-second median difference in the elective 2026 rapid sequence trial is therefore informative for that protocol but cannot establish a universal time penalty for videolaryngoscopy.[4,12]

Aspiration prevention remains a central reason to perform rapid sequence intubation, yet most device trials are insufficiently powered to detect differences in this uncommon outcome. Fewer attempts plausibly shorten exposure to an unsecured airway, but that mechanism should not be converted into a proven reduction in aspiration pneumonia or death. Device choice consequently complements appropriate preparation and prompt cuffed tube placement while leaving the wider aspiration-prevention strategy essential.[1,6]

4.9 ANATOMICALLY DIFFICULT AND CONTAMINATED AIRWAYS

Registry studies in trauma and difficult emergency-department airways associate videolaryngoscopy with greater first-pass success. Propensity matching and regression reduce some measured differences between groups, but device choice may still reflect clinician preference, perceived difficulty, and institutional experience. These studies support the plausibility of benefit in difficult emergency surgical airways while remaining less reliable for causal effect estimates than randomization.[20,21]

Blood, vomitus, and secretions can obstruct a camera and also impair direct visualization. In a large observational emergency-department cohort, soiling reduced first-pass success by approximately ten percentage points with both GlideScope and direct laryngoscopy. This finding argues for ready suction and an alternative visualization plan rather than assuming either technique will remain reliable in a heavily contaminated airway.[22,23]

Restricted mouth opening and complex upper-airway pathology can limit the use of any rigid laryngoscope, even when video guidance would otherwise improve the view. If the assessment suggests difficult intubation together with difficult ventilation, major aspiration risk, or poor tolerance of apnea, an awake strategy may deserve consideration before induction. The urgency of surgery increases the need for an explicit plan and does not remove the relevance of these anatomical and physiological concerns.[2]

4.10 PHYSIOLOGICAL PREPARATION REMAINS NECESSARY

The INTUBE observational study found major peri-intubation events in 45.2% of 2964 critically ill adults, with cardiovascular instability predominating. This incidence cannot be applied directly to all emergency surgical patients, but it demonstrates that technical airway success addresses only part of the risk in patients with shock or respiratory failure. Assessment of circulation, induction-related hypotension, and oxygen reserve should therefore accompany decisions about the first laryngoscopy device.[8,24]

PREOXI randomized critically ill adults to preoxygenation with noninvasive ventilation or an oxygen mask and found hypoxemia below 85% in 9.1% and 18.5%, respectively. That trial evaluated preoxygenation rather than laryngoscope choice, and its participants and exclusions must be considered before extending its approach to a patient with obstruction, active vomiting, or other urgent surgical concerns. Its central implication for this comparison is that oxygenation strategy can materially influence safety independently of glottic visualization.[25]

4.11 SELECTING A TECHNIQUE FOR THE INDIVIDUAL PATIENT

For an emergency surgical patient with adequate mouth opening and a device familiar to the clinician, the randomized operating-room evidence supports beginning with video guidance. A Macintosh-style blade may be a practical choice when the team routinely uses its geometry and can deliver the tube efficiently, whereas an anticipated anterior larynx may favor a practiced hyperangulated approach. These choices are clinical applications of the

evidence and airway assessment, rather than a randomized comparison establishing one video design as the best for every urgent operation.[2,4,5]

If significant blood or regurgitated material is anticipated, the planned technique should include effective suction and a response to loss of camera visibility. If cervical movement is restricted or positioning is constrained, the advantages of indirect visualization must be balanced against mouth opening and the ability to advance the selected tube. A device that performs well in a clean elective airway can still fail in a contaminated emergency airway, and readiness to change the approach is more useful than confidence based only on the monitor image.[20,22,23]

The availability of an expert operator should influence planning, particularly when apnea is unlikely to be tolerated or airway rescue may be difficult. Shared decision-making within the anesthesia team can establish who performs the first attempt, who monitors physiology, and who prepares the alternative technique before induction. The most appropriate response to an anticipated difficult airway may be a change in the overall airway strategy, including awake intubation when indicated, rather than merely substituting a video blade within an otherwise unchanged RSI plan.[2,3]

4.12 TRAINING AND IMPLEMENTATION IN EMERGENCY OPERATING ROOMS

A service adopting videolaryngoscopy should provide routine supervised use before relying on the device during an urgent operation. Training needs to include blade insertion, tube shaping, management of a good view with difficult tube passage, suction, and recognition of device failure. Shared screen visibility can support supervision and coordinated maneuvers, but competence remains specific to the equipment and requires practice beyond observing the monitor.[11,17]

Before induction, the team should confirm that the selected device functions, identify the intended tube-delivery aid, and ensure that rescue equipment is immediately accessible. Repeated attempts using an unchanged approach should be avoided when the cause of failure remains unresolved, and restoration of oxygenation takes priority over persistence with an ineffective device. Current guidance organizes rescue around alternative intubation techniques, supraglottic airway ventilation, facemask ventilation, and emergency front-of-neck access when required.[2,3]

Local evaluation should record first-attempt success with adverse events, device changes, hypoxemia, hypotension, and time to confirmed ventilation. Rates should be

stratified by operator experience, blade type, predicted difficulty, contamination, and surgical urgency so that changes in case mix are visible. This approach can determine whether a published benefit translates into safer local care without treating all video devices or all emergency patients as interchangeable.[7,9]

Equipment reliability and access are also part of implementation, although comparative trials do not establish a universal economic advantage for video devices. A local adoption decision should consider whether functioning equipment, compatible blades, suitable stylets, and trained staff are available when an emergency operation begins, including outside routine hours. Preserving competence with direct laryngoscopy and rescue methods remains useful because camera failure, contamination, or an ineffective video-guided attempt can require an immediate alternative.[3,23]

Future studies focused specifically on emergency surgical RSI should stratify urgency, aspiration risk, anatomical difficulty, operator experience, and physiological instability. They should report both technical success and clinically important complications using clearly defined time points, while documenting device changes and the adjuncts used. Such studies could clarify whether the first-pass gains already demonstrated translate into fewer serious complications in high-risk surgical patients and identify the circumstances in which the two techniques perform similarly.[6,10,12]

Table 1

Principal comparative evidence and applicability to emergency surgical rapid sequence intubation

Reference	Population / Intervention / Comparison	Outcomes	Main conclusions
Hansel et al. (2022) [4]	Cochrane review; 222 studies, 26,149 adults; mainly elective surgery. Separate analyses by VL design.	Failed intubation RR 0.41 for Macintosh-style and 0.51 for hyperangulated VL versus DL.	Broad support for VL, with heterogeneous populations, devices, and time measurements; not an emergency-RSI pooled estimate.
Kriege et al. (2024) [5]	Multicenter RCT; 1000 adults undergoing operating-room RSI for elective, urgent, or emergency surgery. McGrath MAC versus Macintosh DL.	First-pass success 94.0% versus 71.6%; adverse events 2.6% versus 12.2%.	Strong evidence for operating-room RSI; mixed urgency prevents an emergency-only effect estimate.

Reference	Population / Intervention / Comparison	Outcomes	Main conclusions
Prekker et al. (2023) [6]	DEVICE RCT; 1417 critically ill adults in 17 EDs/ICUs. VL versus DL.	First-attempt success 85.1% versus 70.8%; severe complications 21.4% versus 20.9%.	Improved procedural success without demonstrated reduction in severe complications; indirect surgical evidence.
Ruetzler et al. (2024) [9]	Cluster crossover RCT; 8429 surgical procedures in 7736 adults; 85% elective. Hyperangulated VL versus DL.	More than one attempt: 1.7% versus 7.6%; device-defined failure: 0.27% versus 4.0%.	Fewer attempts with VL; procedure-level analysis and device-change failure definition require careful interpretation.
Chauhan et al. (2026) [10]	RCT; 76 adults undergoing emergency surgery, 38 per group. VL versus Macintosh DL during RSI.	First-attempt success 86.8% versus 63.2%; improved glottic views with VL.	Directly relevant emergency-surgery population; small sample limits assessment of uncommon harm.
Lava Kumar et al. (2026) [11]	RCT; 172 adults with normal airways undergoing operating-room RSI. Trained novice residents used C-MAC or Macintosh DL.	First-attempt success 93% versus 67%; fewer adjunct maneuvers with VL.	Supports VL in trained residents; emergency-surgery-specific effect not established.
Tire et al. (2026) [12]	Multicenter RCT; elective noncardiac RSI. Analyzed groups: McGrath VL 193, DL 201.	First-attempt success 86.5% versus 87.6%; median intubation time 35 versus 30 seconds.	No observed success advantage; elective setting and nonsignificance do not establish universal equivalence.
Kriege et al. (2023) [13]	EMMA RCT; 2092 elective surgical patients without predicted difficult airway. McGrath versus DL.	First-pass success 94% versus 82%; no significant adverse-event difference.	Supports Macintosh-style VL in elective anesthesia; indirect evidence for emergency RSI.
Lascarrou et al. (2017) [14]	MACMAN RCT; 371 adults in seven ICUs. Video versus direct laryngoscopy.	First-pass success 67.7% versus 70.3%; no significant difference. More severe complications with VL in post hoc analysis.	A better view does not ensure success; complication signal is post hoc and setting dependent.
Sulser et al. (2016) [15]	RCT; 147 analyzed ED RSI patients. C-MAC versus DL, used by three experienced anesthesia consultants.	First-attempt success 73/74 versus 73/73; similar intubation time; better video views.	Selected patients and very high DL success limit additional benefit and generalizability.
Sanguanwit et al. (2021) [16]	RCT; 158 ED patients. Video laryngoscopy, 78 patients, versus DL, 80 patients.	First-attempt success 73.1% versus 58.8%, P=0.060; better glottic views with video.	Numerical trend with statistical uncertainty; does not establish definitive first-pass superiority.

CI, confidence interval; DL, direct laryngoscopy; ED, emergency department; ICU, intensive care unit; RCT, randomized controlled trial; RR, risk ratio; RSI, rapid sequence intubation; VL, videolaryngoscopy. Outcomes retain each study's definitions; supporting populations are distinguished from emergency surgical RSI.

5 LIMITATIONS OF THE EVIDENCE AND THIS REVIEW

The evidence most directly restricted to emergency surgery remains smaller than the broader surgical and critical-care literature. Lack of operator blinding, different definitions of attempts, variable adjunct use, and exclusions of anticipated difficult airways complicate comparison, while low frequencies of aspiration and mortality limit conclusions about those outcomes. Accordingly, a general pattern of improved first-pass performance should not be interpreted as proof of equivalent benefit across devices, operators, and physiological conditions.[4,10,12]

This review used focused searches and purposive selection, so relevant studies may have been missed despite targeted retrieval of major trials and guidelines. It did not calculate a pooled emergency-surgery effect or conduct formal risk-of-bias grading, and some recent evidence was assessed primarily through PubMed abstracts. Its conclusions are therefore a reasoned clinical synthesis whose strength depends on the setting-specific primary studies rather than an exhaustive quantitative estimate.

6 CONCLUSION

Videolaryngoscopy improves first-attempt intubation success in several randomized surgical and emergency-care studies, including a large operating-room rapid sequence trial and a smaller trial limited to emergency surgery. The magnitude of benefit varies, and an elective rapid sequence trial published in 2026 found similar success with both techniques. For many adults requiring emergency surgical intubation, a familiar videolaryngoscope is a reasonable preferred initial device, provided the operator can deliver the tube effectively and has a clear alternative plan.[5,10,12]

Evidence for fewer severe physiological complications, aspiration, or deaths is less consistent than evidence for procedural success. Preoxygenation, circulatory preparation, airway suction, suitable adjuncts, capnographic confirmation, and timely rescue remain necessary components of safe rapid sequence intubation. The most defensible practice is to choose and prepare the technique most likely to achieve an uncomplicated first attempt in the individual patient, supported by training and review of local outcomes.[3,6,24]

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