Heart, Lung and Circulation (2022) ■, ■–■
1443-9506/22/$36.00
https://doi.org/10.1016/j.hlc.2022.10.004

REVIEW

Use of Videos by Health Care Professionals for Procedure Support in Acute Cardiac Care: A Scoping Review

Jacqueline Colgan, RN, MN [a,b,*], Sarah Kourouche, RN, PhD [a], Geoffrey Tofler, MBBS, MD,[a,c], Thomas Buckley, RN, PhD[a,c]

[a]Faculty of Medicine and Health, The University of Sydney, Sydney, NSW, Australia
[b]Cardiology, Critical Care, Central Coast Local Health District, NSW, Australia
[c]Royal North Shore Hospital, Sydney, NSW, Australia

Received 26 May 2022; received in revised form 14 September 2022; accepted 5 October 2022; online published-ahead-of-print xxx

Background Cardiology procedures are often life-saving and time-critical, but some are so infrequent that health care staff may have rarely encountered them in practice or need to refresh their skills rapidly. Videos demonstrating procedures have the potential to assist health care professionals and support safe patient care. This scoping review explores the research literature involving the use of video by health care professionals in hospitals.

Aim To identify what is known from research regarding the use of video to support clinical procedures in hospitals or health care facilities.

Method The Joanna Briggs Institute Scoping review methodology guided our systematic search of peer-reviewed evidence related to video use to support procedures in a hospital or health care facility. Data sources included the electronic databases: ProQuest, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline, Excerpta Medica dataBASE (EMBASE), Scopus, and PubMed.

Findings Seventeen (17) studies that met the inclusion criteria were included in the review, all published between 2012 and 2022. Since 2005, YouTube has become the dominant platform for publishing or sourcing videos related to clinical procedures. Studies to date can be summarised under five themes: 1) video content and purpose, 2) target audience, 3) video hosting site—internal websites versus YouTube, 4) curated versus original 'homegrown' video content, and 5) video development process.

Discussion/ Conclusion Research on the development and utility of videos to support clinical procedures is emerging, with the ability to host videos on platforms such as YouTube becoming more accessible in recent years. All videos were designed to enhance health care professionals' existing knowledge and skills within their scope of practice. The available literature suggests that video can be a valuable clinical resource for both simple and skilled procedures. Video resources can help clinicians perform or assist with rare procedures, providing 'just in time' patient safety prompts and information.

Keywords Clinical procedure • Clinical support • Video

*Corresponding author at: Jacqueline Colgan, Clinical Nurse Consultant Cardiac Services, Central Coast Local Health District, Gosford Hospital, NSW, Australia; Email: jacqueline.colgan@health.nsw.gov.au; Twitter: @jackie_colgan

Please cite this article in press as: Colgan J, et al. Use of Videos by Health Care Professionals for Procedure Support in Acute Cardiac Care: A Scoping Review. Heart, Lung and Circulation (2022), https://doi.org/10.1016/j.hlc.2022.10.004

Introduction

Rare procedures in cardiology are challenging; they are often time-critical, lifesaving and carried out with limited resources [1]. In a recent Australian study, one such procedure, pericardiocentesis, has been reported at an average of 30 per annum across four locations in a single tertiary referral hospital [2]. Rare procedures such as pericardiocentesis may be infrequent for individual medical staff, but at such low prevalence, nurses, due to their larger workforce, may go several years without assisting with this procedure [2].

Health care organisations support their staff during rare procedures with manuals containing standard operating procedures (SOPs) [3,4]. Organisations create these written documents to improve employee adherence to evidence-based practices, legislative requirements, and professional standards [5]. However, written procedures can become long documents, reducing their usefulness in urgent clinical scenarios [6].

When faced with an urgent procedure not recently encountered, health care professionals will access whatever information is available, which is increasingly online videos [7–13]. This is likely as video has already been recognised as effective in undergraduate health care instruction and clinical skills training in the classroom or simulation environment [14,15]. A study of 506 American physicians identified that they spent up to 3 hours per week watching online videos, nearly half of those demonstrations of medical procedures [16,17]. Further, a study from Scotland reported that using a 3-minute YouTube video to provide a clinical practice update to a heart failure team was feasible and effective [18]. Despite the ubiquity of YouTube videos, little is known about their adoption in hospitals within procedure manuals, or video use by health care professionals of instructional or clinical support videos in the workplace.

This scoping review aimed to identify and describe evidence regarding the use of video to support clinical procedures in a hospital or health care facility. The review was conducted to inform the development and evaluation of procedure videos to support nurses in an acute cardiology care environment. For this review, a clinical procedure video is defined as a digital recording of an image or set of images [19] that depict clinical procedures or processes to support patient care in a hospital or health care facility.

The specific review question was: "*What is known from peer-reviewed research publications about video use by health care professionals to support practice or procedures in a hospital or health care facility?*"

Method

A scoping review was conducted using the Joanna Briggs Institute Scoping review methodology [20] to identify and map the literature types encompassing the use of video by health care professionals in acute health care settings. A scoping review methodology allows a broad review and knowledge synthesis of the available literature [21]. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed and reported against the PRISMA Extension for Scoping Reviews (PRISMA-ScR) Checklist and Explanation (Supplementary File 1) [22].

Studies were included if they reported using videos in human studies for procedures, supported by health care professionals in the clinical setting. Studies were excluded if they involved animals, reported video use in undergraduate or classroom education, or reported video use for patient education. Studies reporting outcomes of video implementation with mixed professional groups were included in the review, and outcomes related to individual professional groups were identified where possible.

Search Strategy

A systematic search of the following databases was conducted in March 2022 to source original research publications: ProQuest, CINAHL, Medline, Excerpta Medica dataBASE (EMBASE), Scopus, and PubMed. Boolean operators were used with a combination of the keywords. Formal grey literature repositories were not searched as they were not expected to produce results with enough evaluation detail. The search terms used included combinations of the following terms: clinical procedure*, mental rehearsal, clinical support, video*, Vimeo, just in time, video recording, and YouTube. A hand search was also conducted on all reference lists and first/last author publication lists. Reference lists of retrieved articles and the corresponding author publications were hand searched for potentially relevant articles. No language or time limits were applied.

Screening and Eligibility

Title and abstract screening were completed in the web-based software platform Covidence (www.covidence.com). Articles from the search were collated, and duplicates removed. Primary screening of titles and abstracts was performed by the first author (JC) to exclude non-relevant manuscripts based on inclusion and exclusion criteria. Full-text articles were then retrieved and reviewed for relevance to the review aim. Nine (9) conference papers were retrieved and reviewed but excluded due to incomplete data for the data extraction matrix table. All four authors assessed, appraised, and agreed upon full-text papers. The data extracted by the first author (JC) was added to Pollack et al.'s [23] recommended matrix table to identify the evidence from each study (Table 1). A summary of the search is available in Figure 1.

Charting, Collating, and Summarising Studies

As Bradbury Jones et al. (2021) recommended, a patterning table was developed to assess the prominence of themes in the included literature (Supplementary File 2). The patterning chart was then used to evaluate each study, using the Patterns, Advances, Gaps Evidence for Practice and Research recommendations (PAGER) framework [24]. This framework is

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Table 1 **Data extraction table [23].**

Author	Context	Aim	Methodology & Sample	Outcomes & Key Findings
Davis et al. (2012) [32]	Florida, USA.	To evaluate chest tube insertion performance after viewing a 3-minute mobile learning module.	Observational intervention vs control study. 128 participants (44 residents, 42 medical students, 42 Army personnel). Pre-questionnaire. The intervention group viewed a learning module on Apple iPod Touch then assessed placing a chest tube on a task simulator against a skill checklist.	Across all groups, the intervention participants scored better on the skills checklist vs control (11.09±3.09 versus 7.17±3.56, $p<0.001$, Cohen's D=1.16). Participants who had placed fewer than 10 chest tubes (9.7±3 vs 6.6±3.9, $p<0.001$) performed significantly better with the video.
Rowse et al. (2014) [24]	Minnesota, USA.	To assess the effect of a video on residents' FNA skills.	Observational study of 32 residents-PGY-2,3,4. Evaluated performing the FNA procedure 1 week after viewing a video on a skills checklist to a maximum score of 24. The results were compared against residents who did not have access to the video.	21 residents had access to the video. Scores were higher (mean=15.8, range: 10–24 [SD not reported]) than residents who had no access to the video (range: 4–18, mean=11.4 [SD not reported]). Half the residents who had access to the video did not view it and scored lower.
Liu et al. (2014) [30]	California, USA.	To examine the effect of viewing a 70-second video on how to apply a topical anaesthetic cream to a mannequin for a procedure.	Pre/post-test study. 30 RNs who completed a questionnaire and performed a skill pre and post-watching a 70-second video on YouTube. Inaccurate skill application was considered anything less than 100% measured by a template.	Significant change in comfort post-video (27% vs 23%, $p<0.01$) and coverage area (25% vs 82% $p<0.01$). RNs who were inaccurate prior were more likely to be accurate after watching the video (18% vs71% $p<0.01$). 7% of nurses watched the video twice. All RNs felt that having more JITT videos for nursing procedures and tasks would be helpful.
Phillips et al. (2016) [25]	Massachusetts, USA.	To study the effect of a stereotactic core breast biopsy procedure video to standardise and improve residency teaching.	Observational pre/post-test study of 30 residents PGY-2,3,4,5. Pre: knowledge test and an instructional video. The "closed book" test had 42 video and non-video content (20 control) questions. Post: After 1.5 weeks and without prior notice, residents sat the same test again.	Video increased the score of the video-content questions compared with 0% on the control questions (30.7% vs 0% $p<0.001$). 90% of residents believed that the video was helpful and just right in the level of difficulty and length.

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Table 1. **(continued).**

Author	Context	Aim	Methodology & Sample	Outcomes & Key Findings
Kandler et al. (2016) [35]	Zurich, Switzerland.	To study if an exemplar video would result in greater adherence to an RSI standard protocol.	Pre and post study of 345 HCW staff (57% nurses, 43% medical practitioner) observations of the effect of an educational video on anaesthetic team RSI practice. 425 (202 pre and 223 post) anaesthesia procedures were observed.	480 views within the study period exceeded staff numbers by 39%. The odds for the failure of adherence to safety-critical tasks after the video was introduced were reduced, with the odds ratio of 0.34 (95% CI 0.27–0.42, p<0.001). Video reduced non-adherence rates in 3 categories - clinical performance, medication, and omission errors.
Wang et al. (2016) [31]	California, USA.	To examine the effect of viewing a JITT video on residents' skill at applying a volar splint.	Randomised control trial comparing the pre/post effect of a 3-minute video on a skill. 30 Paediatric residents completed a questionnaire and were taught and assessed the skill. Post: residents repeated the questionnaire, the intervention group watched the video, and both groups were reassessed.	Over 90% of participants had no experience with splinting. Despite this, over 60% obtained 100% on the initial assessment. During a reassessment, the JITT group had higher scores, which was statistically significant (2.86 vs 4.73; 95% CI: 1.00–3.00). The JITT video group took longer to complete the procedure but had statistically improved splint success.
Walsh et al. (2017) [27]	Washington, USA.	To describe the development of an EM 52 procedure video-based curricula.	Survey 36 EM residents who viewed videos and participated in the program 2 years after curriculum introduction.	75% RR and 85% found videos easily accessible and helpful. 80% found the role of the instructor helpful in skill mastery. Exposure to the video curricula led to increased competence and confidence.
Yuminaga et al. (2017) [37]	New South Wales, Australia.	To provide an evaluation of the Seldinger technique for IDC insertion by NUT doctors and video media.	A prospective, multicentre observational study involving 115 patients and 57 doctors. This technique was either via bedside teaching by the urology registrar or video media.	93% of cases had successful IDC placement by a NUT doctor. 38% of the study cases were out of working hours, and using the video led to an 88% reduction in hospital transfers. No complications of IDC insertion by NUT doctors were reported following the use of video.

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Table 1. (continued).

Author	Context	Aim	Methodology & Sample	Outcomes & Key Findings
Phillips et al. (2017) [26]	Massachusetts. USA.	To describe a follow-up study using a previously developed video from Phillips et al. (2016) involving four institutions.	The video was emailed to 45 radiology residents PGY 2,3,4,5, and 6 in four institutions in this follow-up study. The residents were then asked to complete an anonymous breast imaging knowledge survey.	Over 80% of respondents felt that the video helped their understanding of procedure planning or technique. 60% thought it aided patient safety, and 69% felt increased confidence. Resident feedback has led to suggestions for other videos.
Poon et al. (2017) [29]	Ohio, USA.	This pilot study aimed to describe the otology/neurotology videos and obtain residents' feedback on the videos.	15 Residents (PGY 2–5) were recruited to view at least three surgical videos and complete a questionnaire about the video's usefulness, effect on self-efficacy, and feedback suggestions.	88% of residents watched an average of 3.8 videos. The videos were rated highly useful compared with existing resources such as textbooks. (8.0±0.3 vs 5.0/10; p=0.002). The rating of the videos on self-efficacy scores averaged 7.2±0.3/10 across all groups. Residents fed back suggestions for refining the video, such as adding extra clinical information and using subtitles.
Jyot, A et al. (2018) [28]	Minnesota. The USA.	To describe how learners used an educational website as an adjunct to the surgical curriculum.	A retrospective review of surgical website 6 months post introduction used by 257 HCWs. Website access data was analysed (Piwik, Matthieu Aubry, New Zealand) visits, page views, actions, bounce rate, and duration of usage.	257 users accessed the website in 18 months, 33% general surgical residents and 67% other staff. The most popular time of the day was 8 to 9 PM with 6,358 views (13%), and Thursday was the most popular day with 17,907 views (37%).
Wolfensberger et al. (2019) [36]	Zurich, Switzerland.	To evaluate the educational impact and user satisfaction of an edutainment video.	Randomised control trial of 363 HCWs comparing three arms (1:1:1) viewing an edutainment video, reading an SOP, or a no-intervention group on knowledge of infection control practices. Participants were assessed at three time points: randomisation, one month and three months post.	The 3 groups consisted of approx. 65% nurses, 25% physicians and 10% other health care professionals. The video group had higher knowledge scores across all 3-time points. TP 1 and TP3, the video group had higher scores than SOP and the no-intervention group (TP1-85.4% vs 81.3% vs 79.6% p<0.001 and 0.001; TP3 86.3% vs 83% vs 82.7% p=0.036 and 0.048). The video group was most likely to recommend that other HCWs watch the video and had fewer dropouts.

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Table 1. **(continued).**

Author	Context	Aim	Methodology & Sample	Outcomes & Key Findings
Posner et al. (2020) [39]	Ottawa, Canada.	To create video resources for staff in the COVID-19 pandemic.	A descriptive study on videos for patient care processes in pandemic PPE. This study reported total YouTube views.	In 72 days, over 12,000 views of 19 clinical videos and nearly 10,000 views of 4 patient-centred videos.
Beam et al. (2020) [34]	Omaha, USA.	This study compared 2 N95 respirator training methods.	Randomised control trial with 62 HCWs on N95 donning and doffing pre and 3 months post: 1. viewing a video on N95 donning and doffing alone versus 2. viewing a video on N95 donning and doffing plus viewing and rating a video of own performance donning and doffing N95 (reflective practice).	48 HCW in the final analysis. Both groups' scores deteriorated over time, but the RP group was still significantly higher at the follow-up than they were at the pre-test [paired t (23)=6.12, p<0.001].
Bonz et al. (2021) [7]	Connecticut, USA	To compare the efficacy of a locally developed video of emergent SBT insertion compared to usual preparation.	Randomised control trial of 32 EM residents comparing JITT procedure by any media (control group) or the JITT locally made a video (intervention group) before SBT insertion on a task trainer.	Local video was associated with reaching a passing score (12.5% vs 62.5%: OR=11.7, 95% CI=9.9–13.5). The local video group was favoured when adjusting for PGY, with a significant difference in final checklist scores between the two groups (mean difference=12.8, 95% confidence interval [CI]=7.6–18.0).
Patel et al. (2021) [38]	Kent, UK.	To assess the effectiveness of using a lecture and a clinical skills video on how to manage nasal fractures.	Pre -the post-test study of 12 ENT trainees completed a questionnaire and were evaluated on confidence at three intervals: 1. baseline 2. post a lecture 3. post-viewing an instructional video	After both the lecture and video intervention, there was a statistically significant improvement in performing nasal fracture manipulation independently (1.25±1.96 vs 6.83±1.33 vs 8.58±0.79 p<0.01) Baseline vs Video Effect Size 1.41.
Herstein et al. (2022) [33]	Nebraska, USA.	This study compared 2 N95 respirator training methods.	Randomised control trial of 62 HCW on N95 donning and doffing pre and post: 1. viewing a video on N95 donning and doffing alone versus 2. viewing a video on N95 donning and doffing viewing plus viewing and rating a video of own performance donning and doffing N95.	Scores were significantly higher on the post-test for the reflective practice intervention (3.4 to 4.9 vs 3.9 to 8.2 p<0.05). Years of experience and frequency of N95 respirator use did not predict pre or post-scores.

Abbreviations: CI, confidence interval; EM, emergency medicine; ENT, ear nose and throat; FNA, fine-needle aspiration; HCW, health care worker; IDC, indwelling catheter; JIT, just in time; JITT, just in time training; NUT, non-urology trained; PGY, postgraduate year; PPE, personal protective equipment; RCT, randomised controlled trial; RR, response rate; RSI, rapid sequence induction; TP, time point; SBT, Sengstaken-Blakemore tube; SOP, standard operating procedure.

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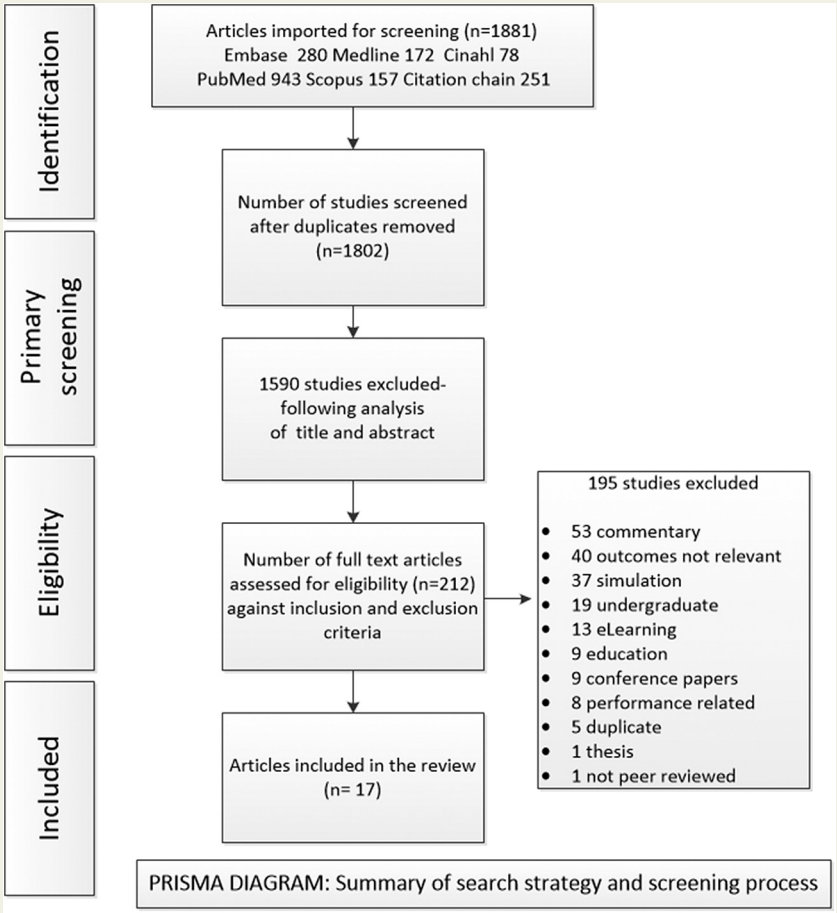

Figure 1 PRISMA diagram depicting the systematic method followed to identify and screen articles.

recommended to report scoping review findings, identify research gaps and plan for future projects (Table 2).

Findings

Scoping Review

The results of the systematic search and screening are outlined in the PRISMA diagram (Figure 1). With 17 publications meeting the inclusion criteria for this review (Table 1), of which 70% were from the United States of America (n=12) [13,25–35], 12% were from Switzerland (n=2), [36,37], and single studies from Australia [38], United Kingdom [39] and Canada [40].

Sixteen (16) studies were initiated by medical practitioner-led teams [13,25–34,36–40], with one study from a nurse-led team [35]. Ten (10) studies evaluated videos exclusively targeting medical practitioners [13,25–27,29,30,32,33,38,39], seven focussed broadly on health care professional teams [28,33–37,40] and one study focussed exclusively on nurses as participants [31]. Of the studies reporting on health care professionals, they included infection prevention and control [34,35,37,40], anaesthetic procedures [36] emergency medicine [28] and chest drain insertion [33]. Twelve (12) studies provided their videos as links or supplementary materials, and these were viewed by the first author [25–30,34–38,40].

All studies were published between 2012 and 2022, with 60% in the latter 5 years. Twelve (12) manuscripts reported descriptive studies on video development, user feedback and implementation [25–31,33,36,38–40]. Five (5) reported randomised controlled trials (RCTs) measuring video's effectiveness on clinical skills [13,32,34,35] and knowledge [37].

Key Themes and Patterns

Analysis of the papers identified five themes: 1) video content and purpose, 2) target audience, 3) hosting site—internal websites versus YouTube, 4) curated versus original 'home-grown' video content, and 5) video development process (Supplementary File 2). The practice and research implications of the synthesis of these studies are presented in Table 2.

Video Content and Purpose

Rare Procedures

Investigators began video creation to address concerns about reduced experience or skill development opportunities. In 10

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Table 2 **PAGER Framework: Practice and research implications [24].**

	Pattern	Advances	Gaps	Evidence for Practice	Research Recommendations
1	Video content and purpose	Emerging evidence of the acceptability and effectiveness of video as a clinical skill instructional tool. Video use can assist staff in rare procedures and give them a clinical advantage. Video is helpful for socially distanced instruction.	Need for a framework to determine video's place in the workplace learning structure. Lack of research on the outcomes of video use in patient care.	Support to develop clinical skills and rare procedure video libraries. Video procedures are an alternative resource when face-to-face instruction is not possible. Video can raise the capabilities of both experienced staff and those in training.	Developing a framework or taxonomy for instructional video development and use. Developing research to examine health professionals' critical thinking and patient safety using video procedures.
2	Target audience	Video use spreads beyond its intended target audience - suggesting it is acceptable to health care staff.	Limited research from nursing and allied health professionals.	Developing collaboration – between hospitals and health disciplines to reduce costs and increase access to procedure videos.	Expanding research on the longer-term results of video use. Research to identify opportunities for video to support nursing, allied health professions and other health care professionals.
3	Curated vs original 'homegrown' video content	Health care professional-led video development is feasible.	Limited evidence on key features of clinical procedure videos.	Institutions can use existing research processes to create robust development and review methods for shared video resources.	Setting standards for health professionals' video.
4	Video development	76% of investigators created their videos.	Limited reporting about steps in developing videos and patient consent processes. Need more evidence on factors that should influence video length.	Improving staff capabilities in video development. Collaboration to increase access to content experts. Organisational endorsement processes for video development should be developed based on alignment with best practices and peer review.	Developing research into point-of-care health care videos, e.g., determining the optimal features.
5	Hosting site - internal websites vs YouTube	Health care organisations are supporting video development and use. Health care organisations support open internet access to approved websites.	Hosting health care videos on YouTube may create privacy concerns, which health care staff will need guidance to navigate.	The use of YouTube increases the reach of video compared to internal websites. YouTube allows sharing of health care videos across organisations. Organisational endorsement processes for video hosting need to be developed based on alignment with best practices and peer review.	Research to investigate barriers and facilitators to video use. Development of privacy and consent guidance surrounding clinical procedure videos hosted on public platforms.

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studies (58%), investigators created or collated videos to support health care professionals with procedures considered 'rare' or infrequent [13,25–28,32,33,35,38,40]. The 'rareness' of exposure was due to assorted reasons such as rapid practice changes [34,35,40], specialty training [28,38], frequency of rotations [26,27], scarcity [13,33], and working hours restrictions [25]. Video offered investigators the chance to demonstrate rare procedures safely and was considered an adjunct to clinical experience [26].

Agreed Model of Local Practice

To a certain extent, in all studies, videos were intended to act as a visual representation of an agreed local model of practice. Some investigators detailed the review methods to ensure their self-developed videos were not ambiguous, e.g. a Delphi process [36], expert panel review [13] or used video filming as a real-time test for SOPs, modifying as needed [40]. Studies used video to create a 'shared mental model' of a procedure for their department [36] or just in time learning before undertaking both simple techniques such as the correct application of local anaesthetic cream [31] or skilled procedures, for example, insertion of chest drains or a Sengstaken-Blakemore tube (SBT) [32,33].

Video was used in a study conducted in 2020 to address the new challenge of training staff in locally agreed patient management processes in the coronavirus disease 2019 (COVID-19) pandemic [40]. The investigators used video to support the rapid upskilling of inexperienced staff, as social distancing requirements led to constraints on teaching class sizes and locations. The authors stated that one of their aims was to share learnings with health care colleagues locally, and globally for various COVID-19 patient scenarios, and they published their videos on YouTube [40].

Target Audience and Video Content

Ten (10) studies created videos exclusively for medical practitioners [13,25–27,29,30,32,33,38,39], though the videos were often viewed by other health care professionals [29] or the public if posted to YouTube [37,38,40]. Eight (8) studies were aimed to support medical residents in United States hospital-based vocational training programs [13,25–28,30,32,33], such as emergency medicine [13,28,31–33], surgery [25,29,30], and radiology [26,27]. The videos developed for residents included fine needle aspiration (FNA) procedures [25], stereotactic breast biopsy procedures [26,27], emergency medicine procedures [13,28,32], otolaryngology [30], and general surgery procedures [29]. Additional reasons researchers gave for using video included offering residents asynchronous learning opportunities before and after clinical experiences [29], standardised education [26,27] and emerging evidence supporting the educational benefits of video [13,30]. A study from the United Kingdom in 2021 designed for ear, nose and throat postgraduate trainees consisted of a video on managing nasal fractures as a virtual clinical teaching method during the COVID-19 pandemic [39].

Rare procedures crossed over to the residency programs' videos, with investigators using video to support residents preparing for potential time-critical 'eye, limb, and life-saving' procedures required for their training but rare in practice [13,28,33]. One study from Australia evaluated a video targeting experienced medical practitioners undertaking a rarely performed skilled procedure - difficult IDC insertion [38] (Available:https://www.youtube.com/channel/UCOXawC480ITy99LI81nROyw/videos).

The studies of other health care professionals used video as a means to support best practices. Seven (7) research studies reported using videos to help health care team members other than solely medical practitioners [28,34–37,40]. A single study was aimed at nurses on the application of local anaesthetic cream [31]. The video topics ranged from team-based procedures such as emergencies [28], anaesthetic techniques [36] to infection control practices [34,35,37,40]. Two (2) studies arose from the same institution [36,37] but used video for two different purposes. In a study examining the effect of a video on the performance of an anaesthetic procedure, over half of the study participants were nurse anaesthetists—certified or students [36].

The studies on infection control included participants other than medical staff [34,35,37,40]. A study from Switzerland reports that three-quarters of study participants were nurses, nursing assistants, midwives, or allied health staff—registered as other professions, e.g., radiographers and therapists [37]. A study from the USA, reported in two papers, investigated two different video uses for health care professionals (nursing, environmental services, respiratory therapy, radiology, and patient-care technicians) to aid the correct application of N95 respirator masks [34,35].

Curated Versus Original 'Homegrown' Video Content

Investigators commonly created their videos; in 12 studies, the investigators reported making their clinical skills videos [13,25–27,29–33,36–38,40]. In contrast, three studies [28,34,35] searched online for publicly available clinical skill videos deemed high quality by investigator review processes. An emergency medicine study required 52 videos, the curated list was published on the department's intranet site, and for some procedures, one or two alternate videos uniform resource locator (URLs) were published [28]. Final selections came from academic institutions in the USA, YouTube, *New England Journal of Medicine*, Centre for Disease Control, or other online resources.

Original videos were either procedure re-enactments or live procedure recordings. Videos were filmed according to steps documented in SOPs [13,26,27,33,36,38,40], a skill assessment tool [25], a performance checklist [13] or prospectively chosen live surgical operations [29,30]. One (1) study reported creating surgical videos with overlaid imaging to aid understanding [30]. Four (4) studies described their video development processes to ensure practices depicted were standardised and unambiguous [13,30,33,36].

Two (2) study teams collaborated with professional media companies. The oldest study, conducted in 2012, related to

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chest tube insertion [33]. The authors created the content, including a script and images, which were converted into multimedia presentations with a professional voiceover and amination [33]. The module was designed to be viewed on an iPod Touch, a portable media player, and intended to be considered just before a procedure. The other study, conducted in 2016, related to infectious disease control. They created an 'edutainment' video, defined as a mix of education and entertainment [37]. Using humour as a central emotional feature to enhance learning, the video was a 'mash-up' video of flight safety and infection control instructions featuring hospital staff as cabin crew [37] (Available: https://youtu.be/a8J3goPQSyw).

Video Development Process

Details of video development were provided in four studies. However, even the professionally developed video, required investigator input for screenplay [33,37] and acting [37]. Poon et al. [30] estimated that video creation took between 10–12 hours, with most of the time spent on editing, for between 5 to 10 minutes of content. Posner et al. [40] used a 360-degree 4K digital camera, and Poon et al. [30] used a Stryker 1,488 high-definition camera head/box, an endoscopic camera system that can produce still and video images in the surgical field during procedures [41], Wang et al. [32] used FLIP MINO HD camcorder and FLIPVIDEO software (Pure Digital, San Francisco, CA, USA), and Phillips et al. [26] used an iPad application (Explain Everything, Ridgefield, CT, USA and Wrocław, Poland).

Whether created or curated, there was considerable variation in the overall length of videos tested, ranging from 42 seconds [28] to 21 minutes [26,27]. When grouped in topic areas, rare procedure videos ranged from 60 seconds to 21 minutes [13,25–28,31,33,38], and live or re-enacted procedures (an agreed model of local practice) ranged from 4 to 18 minutes [29,30,32,36,39] and infection control practices ranged from 2 to 16 minutes [34,35,37,40]. One (1) study reported positive feedback from participants on using a timestamp feature, allowing viewers to jump to the desired segment [30].

Hosting Site—Internal Websites Versus YouTube

Studies that reported hosting sites for videos (during the study period) included either internal restricted websites [26,29,36,37], a local network drive [30] or YouTube [28,31,32,38,40]. Communication methods to disseminate the videos were not always reported in studies. Studies used email with varied success rates, for one study conducted in 2014, a senior faculty investigator emailed the video YouTube link to residents with 50% viewing success [25]. Two (2) studies by the same team [26,27] got more than 75% of residents participating in their studies viewing their video via a download link.

The videos from Posner et al. [40] were initially hosted on a Virtual Reality platform, (WondaVR, Paris, France) but were later posted on the author's YouTube channel (Available at: https://www.youtube.com/user/gdposner/featured). The authors state this was to promote the use and access of the videos [40]. The Mayo Clinic investigators reported that videos were the most popular content among their surgical website content [29]. Website analytics demonstrate that only a third of the users were residents despite the website being specifically created for them. The remaining users were staff consultants, medical students, researchers, and allied-heath staff [29].

Outcomes From Studies to Date

All videos were intended to enhance clinical skills and knowledge, but not all studies reported these outcomes. Three (3) studies examined the effect of video on knowledge assessed on investigator-developed questionnaires [26,27], including one RCT [37]. In the RCT, the group exposed to a video on infection control reported higher knowledge scores at 1- and 3-month post-intervention [37]. In the other two studies, video exposure was associated with higher knowledge scores, and this was only in content related to video [26,27].

Of the studies assessing skill development, this was measured against a skills checklist or assessment [13,31–36]. Investigator developed tools were used in two single studies reporting increased self-reported confidence [39] and self-assessed capability following exposure to the skill video [30]. Eight (8) studies (47%) measured individual skill performance and reported improvements following exposure to their video intervention by medical practitioners [13,25,32,33,42], nurses [31] and mixed groups of health care professionals [34,35]. Three (3) of these studies were RCTs [13,32], with one study reported in two papers [34,35]. Kandler [36] reported statistically significant improvements in skill performance of a team procedure against a checklist. Within skill performance, two studies address videos to support skilled procedures—insertion of a Sengstaken-Blakemore tube and application of a volar splint. Both demonstrate statistically significant improvement in skills following the video intervention [13,32].

Beam et al. [35] and later Herstein [34] introduced a novel use of video comparing two methods of use—watching an exemplar skill video only or, in addition, watching and critiquing a recording of the participant's own skill performance (reflective practice). A checklist was then used to self-assess skill performance which was higher in the reflective practice group than video alone [34,35].

Three (3) studies assessed the effect of video on skill performance over time. All studies demonstrated higher retention of the skill—N95 application at 3 months, [35] and anaesthetist procedures at 5.9 months [36]. The RCT using video for splinting reported improved skill performance up to 12 months post-intervention [32].

Discussion

In this scoping review, 17 research studies reported on the use of videos to support clinical procedures in a hospital or

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health care facility. Results suggest this is an evolving area of practice and research, as all studies are from the last decade, and nearly a third are from the previous 2 years. Five (5) themes emerged from our review: 1) video content and purpose, 2) target audience, 3) video hosting site—internal websites versus YouTube, 4) curated versus original 'home-grown' video content, and 5) video development process.

A central theme from this scoping review is that it appears acceptable and feasible for health organisations or their staff to create or curate video playlists. There are practical and financial implications of video development, such as seen in the study of emergency care procedures requiring up to 52 video procedures that make curation a sensible option [28]. Video production involves content experts, who may not be available at every hospital for every sub-specialty [28].

Since 2005, YouTube has become the dominant publishing and viewing platform to publish or source videos, used by more recent studies [38,40]. When considering videos featured in this review posted on YouTube, the viewing numbers suggest the reach was well beyond the intended audience. Video viewing figures need to be interpreted with caution—as the number of views may denote popularity, not necessarily quality [43]. Several authors cite concerns about the quality of publicly available videos with specific examples in clinical skills, injection techniques, and cardiopulmonary resuscitation [8,43–50].

Using video to support health care professionals may enhance critical aspects of clinical skill performance—knowledge, skill, capability, and confidence. Our findings indicate that videos were designed and successfully used to increase procedural skill levels, and not necessarily as a cheat-sheet or step-by-step guide. When video was used in a study from Australia to address difficult indwelling urinary catheter (IDC) insertion, estimated to occur up to three times a week [51], this improved skill performance and reduced hospital transfers [38]. While video increased skill levels among staff with limited experience [13,25–27,31–33], it also increased existing skills [13,33–35,37,38,40] and enhanced procedure standards [36].

In this review, the research can best be understood using two concepts: *video for clinical skill acquisition or reacquisition* [13,25,28–36,38] or *video for clinical education/instruction or re-education/instruction* [26,27,37,39,40]. It can be challenging to separate the two concepts, and some studies reviewed were a mixture of both [26,27,29,30,33,36,38,39]. All videos were included as they were developed to support health care professionals in the hospital or health care setting. It is unclear if the study videos were designed to be their first learning and what theory or skill acquisition participants had undertaken before the video.

Developers must consider the video focus and target audience to guide development and decide if it should be purely procedural (how) or be integrated with extra educational information (how plus why) [52]. Surgical video guidelines may offer some guidance for video development [53]. Our review did not find evidence of the optimum video length, but this likely depends on the video's content and purpose.

The findings from the review suggest that video may be a valuable addition to an organisation's clinician support resources. It is worth noting the relative recency of studies, indicating there could be rapid growth in this field of practice. This is an area for further research, examining the best types of videos—instructional step-by-step videos or longer videos with integrated explanations tailored to the video's purpose. In addition, researchers need to explore whether video users' knowledge and skill increase translate to sustained improvements in clinician performance.

The review was conducted to inform the development and evaluation of procedure videos to support nurses in acute cardiology care. Findings indicate no published literature on video use in the cardiology context. Therefore, this represents an opportunity for the cardiology community to create clinical skill resources.

Limitations

While our review focusses on the research literature, it is possible that videos are being used in clinical practice and not reported. This review has attempted to write about video use in a hospital or health care facility, excluding educational or classroom use of video. It has been challenging to separate those concepts in some studies, and studies were included if classroom use of video supported postgraduate health care staff in their workplaces. The strength of our review is that we used clearly defined inclusion and exclusion criteria and methodology, including the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews [22], to ensure consistency in reviewer agreement, data extraction, and synthesis.

Conclusion

Although there is limited evidence regarding the impact of video on improving skill performance and knowledge, the initial findings from studies to date are encouraging. Video resources to support health care staff appear accepted and valued. Video can support clinicians in performing procedures, potentially benefiting both staff and patients. Research is required on the acceptability, utility, and effect of video from both a patient and staff perspective.

Funding

JC was supported by a Central Coast Local Health District Emerging Researcher Grant.

Ethical Statement

Ethics approval was not required for this review of the literature.

Conflict of Interest

None declared.

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Acknowledgements

The authors acknowledge the assistance of Librarian Tess Aitken with the literature search strategy.

Appendices

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.hlc.2022.10.004

References

[1] Branzetti JB, Adedipe AA, Gittinger MJ, Rosenman ED, Brolliar S, Chipman AK, et al. Randomised controlled trial to assess the effect of a just-in-time training on procedural performance: a proof-of-concept study to address procedural skill decay. BMJ Qual Safe. 2017;26(11):881–91.

[2] Ramachandran J, Pender P, Assad J, Wang A, Faour A, Leung D, et al. Pericardiocentesis over 3 years at a tertiary referral Australian hospital. Eur Heart J. 2022;43(Supplement_1):ehab 849. 112.

[3] Shestopalova T, Gololobova T. Standard operating procedures as a trend in ensuring healthcare safety. Health Risk Analysis. 2018;(2):129–37.

[4] Manias E, Street A. Legitimation of nurses' knowledge through policies and protocols in clinical practice. J Adv Nurs. 2000;32:467–1475.

[5] Boogaerts M, Grealish L, Ranse K. Policy and practice: exploring tensions to develop practice. Practice Development in Health Care. 2008;7(1):49–57.

[6] Aakre CA, Maggio LA, Fiol GD, Cook DA. Barriers and facilitators to clinical information seeking: a systematic review. J Am Med Inform Assoc. 2019;26(10):1129–40.

[7] Celentano V, Smart N, Cahill RA, McGrath JS, Gupta S, Griffith JP, et al. Use of laparoscopic videos amongst surgical trainees in the United Kingdom. Surgeon. 2019;17(6):334–9.

[8] Curran V, Simmons K, Matthews L, Fleet L, Gustafson DL, Fairbridge NA, et al. Youtube as an educational resource in medical education: a scoping review. Med Sci Educ. 2020;30(4):1775–82.

[9] de Jong A, Donelle L, Kerr M. Nurses' use of personal smartphone technology in the workplace: scoping review. JMIR mHealth uHealth. 2020;8(11):e18774.

[10] Diston MTW, Karen. In the moment"–Supplemental Education Tools Provide "Just-in-time" Clinical Support. Dynamics of Critical Care; September 21-23; Quebec City, Quebec, Canada, 2014.

[11] Jamu JT, Lowi-Jones H, Mitchell C. Just in time? Using QR codes for multiprofessional learning in clinical practice. Nurse Educ Pract. 2016;19:107–12.

[12] Weiss RL, Kennell J, Lakdawala L, Anzio N, Klamut KA, Lucas W, et al. Nursing professional development specialist's role in adapting education, onboarding, and Just-in-time education during the COVID-19 pandemic. J Nurs Prof Dev. 2021;37(3):143–6.

[13] Bonz JW, Pope JK, Wong AH, Ray JM, Evans LV. Just-in-time clinical video review improves successful placement of Sengstaken-Blakemore tube by emergency medicine resident physicians: a randomized control simulation-based study. AEM Educ Train. 2021;5(3):e10573.

[14] Holland A, Smith F, McCrossan G, Adamson E, Watt S, Penny K. Online video in clinical skills education of oral medication administration for undergraduate student nurses: a mixed methods, prospective cohort study. Nurse Educ Today. 2013;33(6):663–70.

[15] Sharpnack PA, Goliat L, Baker JR, Rogers K, Shockey P. Thinking like a nurse: using video simulation to rehearse for professional practice. Clin Simul Nurs. 2013;9(12):e571–7.

[16] Google Research. From screen to script: the doctor's digital path to treatment. New York, NY: Manhattan Research: Google; 2012.

[17] Hersh W. Information retrieval: a biomedical and health perspective: Springer; 2020 27 December 2021. Available from: https://link.springer.com/book/10.1007/978-3-030-47686-1.

[18] Rayner S, Marlow G, Leslie SJ. YouTube: a solution to increased dissemination of guidelines? Med Educ. 2017;51(5):550–1.

[19] Merriam-Webster. Merriam-Webster.com Dictionary Springfield, Massachusetts 2021. https://www.merriam-webster.com/.

[20] Peters MD, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. JBI Evid Synth. 2020;18(10):2119–26.

[21] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8(1):19–32.

[22] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467–73.

[23] Pollock D, Davies EL, Peters MD, Tricco AC, Alexander L, McInerney P, et al. Undertaking a scoping review: a practical guide for nursing and midwifery students, clinicians, researchers, and academics. J Adv Nurs. 2021;77(4):2102–13.

[24] Bradbury-Jones C, Aveyard H, Herber OR, Isham L, Taylor J, O'Malley L. Scoping reviews: the PAGER framework for improving the quality of reporting. Int J Soc Res Methodol. 2021:1–14.

[25] Rowse PG, Ruparel RK, AlJamal YN, Abdelsattar JM, Heller SF, Farley DR. Catering to millennial learners: assessing and improving fine-needle aspiration performance. J Surg Educ. 2014;71(6):e53–8.

[26] Phillips J, Brook A, Tseng I, Sharpe RE Jr, Fein-Zachary V, Slanetz PJ, et al. Educational videos: an effective tool to improve training in interventional breast procedures. J Am Coll Radiol. 2016;13(6):719–24.

[27] Phillips J, Sharpe R, Majmundar Sheth M, Fein-Zachary V, Slanetz PJ, Mehta TS, et al. Video-based teaching of image-guided breast interventions: stereotactic core biopsy using a prone table. MedEdPORTAL. 2017;13.

[28] Walsh R, Bass J, Gorbatkin C, Bothwell J. 52 Procedures in 52 weeks: an innovative curriculum for emergency medicine residents. West J Emerg Med. 2017;18(1):12.

[29] Jyot A, Baloul MS, Finnesgard EJ, Allen SJ, Naik ND, Gomez Ibarra MA, et al. Surgery website as a 24/7 adjunct to a surgical curriculum. J Surg Educ. 2018;75(3):811–9.

[30] Poon C, Stevens SM, Golub JS, Pensak ML, Samy RN. Pilot study evaluating the impact of otology surgery videos on otolaryngology resident education. Otol Neurotol. 2017;38(3):423–8.

[31] Liu DR, Hao A, Wang VJ. Just-in-time training for nurse administration of anesthetic cream application. J Nurs Educ Pract. 2014;4(1):143.

[32] Wang V, Cheng YT, Liu D. Improving education: just-in-time splinting video. Clin Teach. 2016;13(3):183–6.

[33] Davis JS, Garcia GD, Wyckoff MM, Alsafran S, Graygo JM, Withum KF, et al. Use of mobile learning module improves skills in chest tube insertion. J Surg Res. 2012;177(1):21–6.

[34] Herstein JJ, Gibbs SG, Kupzyk KA, Beam EL. Using a critical safety behavior scoring tool for just-in-time training for N95 respirator use. Workplace Health Safe. 2022;70(1):31–6.

[35] Beam EL, Herstein JJ, Kupzyk KA, Gibbs SG. A simulation approach to measure critical safety behaviors when evaluating training methods for respirator education in healthcare workers. Am J Infect Control. 2020;48(8):869–74.

[36] Kandler L, Tscholl DW, Kolbe M, Seifert B, Spahn DR, Noethiger CB. Using educational video to enhance protocol adherence for medical procedures. Br J Anaesth. 2016;116(5):662–9.

[37] Wolfensberger A, Anagnostopoulos A, Clack L, Meier M-T, Kuster SP, Sax H. Effectiveness of an edutainment video teaching standard precautions–a randomized controlled evaluation study. Antimicrob Resist Infect Control. 2019;8(1):1–10.

[38] Yuminaga Y, Kam J, Louie-Johnsun M. Multi-centre, prospective evaluation of the Seldinger technique for difficult male urethral catheter insertions by non-urology trained doctors. BJU Int. 2017;120:21–7.

[39] Patel ST, Shah S, Sood RP, Siddiqui Z, McKay-Davies I. The implementation of virtual clinical skills teaching in improving procedural confidence in ENT trainees. Adv Med Educ Pract. 2021;12:965.

[40] Posner G, Maniate J, Dale-Tam J, Endres K, Corral J. Virtual reality videos for training and protocol dissemination during a pandemic. MedEdPublish. 2020;9.

[41] Stryker. Camera systems. 2018. Available from: https://www.stryker.com/us/en/portfolios/medical-surgical-equipment/surgical-visualization/camera-systems.html.

[42] Yuminaga Y. IDC insertion with Seldinger technique. 2015. Available from: https://www.youtube.com/channel/UCOXawC480ITy99LI81nROyw/videos

[43] Helming AG, Adler DS, Keltner C, Igelman AD, Woodworth GE. The content quality of YouTube videos for professional medical education: a systematic review. Acad Med. 2021;96(10):1484–93.

[44] Barry DS, Marzouk F, Chulak-Oglu K, Bennett D, Tierney P, O'Keeffe GW. Anatomy education for the YouTube generation. Anat Sci Educ. 2016;9(1):90–6.

[45] Camm CF, Russell E, Ji Xu A, Rajappan K. Does YouTube provide high-quality resources for patient education on atrial fibrillation ablation? Int J Cardiol. 2018;272:189–93.

[46] Duncan I, Yarwood-Ross L, Haigh C. YouTube as a source of clinical skills education. Nurse Educ Today. 2013;33(12):1576–80.

Please cite this article in press as: Colgan J, et al. Use of Videos by Health Care Professionals for Procedure Support in Acute Cardiac Care: A Scoping Review. Heart, Lung and Circulation (2022), https://doi.org/10.1016/j.hlc.2022.10.004

[47] Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information on YouTube: a systematic review. Health Informatics J. 2015;21(3):173–94.

[48] Rangarajan K, Begg K, Somani B. Online digital media: the uptake of youtube-based digital clinical education (DCE). Am J Distance Educ. 2019;33(2):142–50.

[49] Yaylaci S, Serinken M, Eken C, Karcioglu O, Yilmaz A, Elicabuk H, et al. Are You Tube videos accurate and reliable on basic life support and cardiopulmonary resuscitation? Emerg Med Australas. 2014;26(5):474–7.

[50] Özsaban A, Bayram A, Durgun H. Youtube videos as an educational resource for ventrogluteal injection: a content, reliability and quality analysis. Nurse Educ Today. 2021;107:105107.

[51] Villanueva C, Hemstreet GP III. The approach to the difficult urethral catheterization among urology residents in the United States. Int Braz J Urol. 2010;36:710–7.

[52] Cheung JJ, Kulasegaram KM, Woods NN, Moulton C-A, Ringsted CV, Brydges R. Knowing how and knowing why: testing the effect of instruction designed for cognitive integration on procedural skills transfer. Adv Health Sci Educ. 2018;23(1):61–74.

[53] Celentano V, Smart N, McGrath J, Cahill RA, Spinelli A, Obermair A, et al. LAP-VEGaS practice guidelines for reporting of educational videos in laparoscopic surgery: a joint trainers and trainees consensus statement. Annals Surg. 2018;268(6):920–6.

Please cite this article in press as: Colgan J, et al. Use of Videos by Health Care Professionals for Procedure Support in Acute Cardiac Care: A Scoping Review. Heart, Lung and Circulation (2022), https://doi.org/10.1016/j.hlc.2022.10.004