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REVIEW ARTICLE **Open Access**

Integrating Video Feedback into Medical Education: A Pathway to Enhanced Clinical Competence.

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Abstract

Background:

Feedback is a crucial component of medical education, traditionally delivered verbally or in writing. However, video feedback presents a modern alternative that allows learners to review clinical encounters, assess their non-verbal communication, and track progress over time.

Aim of the study:

This review examines the benefits of video feedback compared to traditional methods, focusing on its application among medical students and other healthcare professionals.

Methods:

A systematic search identified 68 studies across various healthcare settings, highlighting the effectiveness of video feedback in improving learning outcomes, clinical skills, and self-assessment.

Results:

Video feedback enhances clinical performance, communication, and confidence while encouraging self-reflection and peer collaboration. It aligns with the Situated Learning Theory, fostering learning within authentic clinical environments. Despite its advantages, challenges like resource allocation, technical issues, and ethical concerns like patient confidentiality persist. To address these, a 12-step framework is proposed for integrating video feedback into medical curricula.

Conclusion:

While video feedback offers significant improvements, it should complement rather than replace traditional feedback methods.

Recommendation:

Future research should focus on standardising its use and evaluating its long-term impact on medical education and patient care.

Keywords:

Video feedback, Medical Education, Clinical skills, Communication, Healthcare professionals.

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Introduction:

Feedback plays a vital role in medical education, driving improvement among healthcare professionals.1 Traditional feedback methods, primarily verbal, often suffer from subjectivity and are not always retained by learners.2 Video feedback, an innovative approach, utilises video recording and playback technology, enabling learners to objectively review and enhance their clinical skills. It provides a valuable tool for learners to review and improve their clinical skills, communication, and decision-making.3 Unlike traditional methods, video feedback allows in-depth analysis and continuous improvement. This review primarily aims to evaluate the effectiveness of video feedback in medical education by focusing on learning outcomes, clinical skills, and the overall learner experience compared to traditional methods. The secondary aim is to synthesize evidence by identifying key trends and limitations, and offering practical insight for implementing video feedback. This review discusses the potential of video feedback in medical education, covering its advantages, challenges, and real-world applications based on selected research studies. Ethical aspects, implementation strategies, and future directions are also considered to provide a comprehensive understanding of video feedback's role in transforming medical education.

Methodology:

This study systematically evaluates existing literature to determine whether video feedback in medical education enhances learning outcomes, clinical skills, and the overall educational experience compared to traditional feedback methods. The secondary objective is to synthesize the available evidence, identifying key trends, strengths, and limitations, and to offer insight into the practicality of video feedback in medical education. The research question guiding this review is: Does implementing video feedback in medical education improve learning outcomes and clinical skills development compared to traditional feedback methods?

To address this, in May 2023, we conducted a literature review on video feedback in medical education, utilising the PubMed database and Google Scholar. This search focused on studies in English published in peer-reviewed journals till 2023 to encompass the most current research. My search terms included "video feedback," "medical education," "clinical skills," and "feedback methods" targeting titles or abstracts. Medical Subject Headings (MeSH) terms were used for database search optimisation. They could be called types of selected studies included). Articles falling under reviews, opinion pieces, and editorials were excluded. Titles, abstracts, and full texts were screened systematically to identify relevant articles. Furthermore, the cross-references of these articles were screened for additional eligibility.

Results:

The initial search on PubMed using the specified terms: ((("Video feedback"[Title/Abstract] OR "Video-based feedback"[Title/Abstract] OR "Video assessment"[Title/Abstract] OR "Video evaluation"[Title/Abstract] OR "video recording"[Title/Abstract] OR "Formative Feedback"[Title/Abstract] OR "Constructive Feedback"[Title/Abstract] OR ("Feedback"[MeSH Terms] OR "video recording"[MeSH Terms] OR "Videotape Recording"[MeSH Terms] OR "Teaching Materials"[MeSH Major Topic] OR "Formative Feedback"[MeSH Terms] OR "Tape Recording"[MeSH Terms] OR "Educational Technology"[MeSH Terms])) AND ("Traditional teaching methods"[Title/Abstract] OR "Conventional assessment"[Title/Abstract] OR "Standard feedback"[Title/Abstract] OR "Traditional education"[Title/Abstract] OR "Conventional evaluation"[Title/Abstract] OR "Oral feedback"[Title/Abstract] OR ("education, medical"[MeSH Terms] OR "education, medical, graduate"[MeSH Terms] OR "education, medical, undergraduate"[MeSH Terms] OR "Teaching"[MeSH Terms] OR "Curriculum"[MeSH Terms] OR "Educational Measurement"[MeSH Terms])) AND ("Clinical skills improvement"[Title/Abstract] OR "self-assessment"[Title/Abstract] OR "Error reduction"[Title/Abstract] OR "Increased self-awareness"[Title/Abstract] OR "Higher motivation"[Title/Abstract] OR "Confidence building"[Title/Abstract] OR ((((((("Clinical Competence"[MeSH Terms] AND "Academic Performance"[MeSH Terms]) AND "Communication"[MeSH Terms]) AND "self-assessment"[MeSH Terms]) AND "Learning"[MeSH Terms]) AND "Motivation"[MeSH Terms]) AND "Self-Concept"[MeSH Terms])) AND ("Medical students"[Title/Abstract] OR "students, medical"[MeSH Terms] OR ("Health Personnel"[MeSH Terms] OR "Health Workforce"[MeSH Terms] OR "Professional Competence"[MeSH Terms] OR "Clinical Competence"[MeSH Terms] OR "education, professional"[MeSH Terms] OR ("Healthcare professionals"[Title/Abstract] OR "Trainees"[Title/Abstract])))) AND ((1000/1/1:2023[pdat]) AND (english[Filter])) yielded 337 articles. (Figure 1)

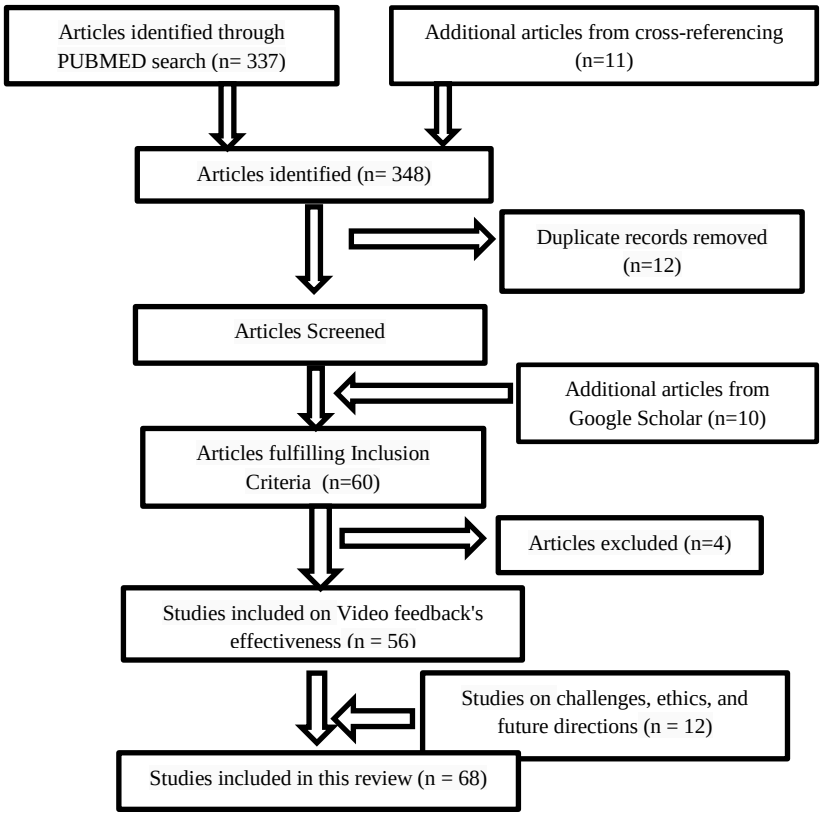

Fig. 1: Selection Process for Articles on Video Feedback in Medical Education

A total of 11 additional articles were identified through cross-referencing. After removing 12 duplicates in Mendeley and retrieving ten additional articles from Google Scholar, the total number reached 346. Between May and July 2023, titles and abstracts were screened, resulting in 60 articles meeting the inclusion criteria. Subsequently, a detailed full-text review excluded four articles as irrelevant, leaving 56 studies focusing on the effectiveness of video feedback in medical education. In addition, 12 articles discussing challenges, ethical considerations, and future directions were included, resulting in 68 reviewed papers. This comprehensive dataset integrates sources from PubMed, Google Scholar, and cross-referencing. The article selection process is detailed in Figure 1.

Risk of Bias Assessment

The risk of bias in the studies was assessed using the Cochrane Risk of Bias tool for randomised controlled trials (RCTs) and the ROBINS-I tool (Risk of Bias in Non-randomized Studies of Interventions) for observational and non-randomized studies. These tools assess methodological aspects like randomisation, blinding, confounder adjustment, and measurement validity. Studies with robust designs were rated Low risk, while those with methodological weaknesses were rated Moderate or High risk. Most studies (39) were classified as Moderate risk, reflecting some limitations, while eight were Low risk due to strong methodologies, and five were High risk due to significant flaws.

Video Feedback in Medical Education

Feedback is an integral part of medical education, traditionally relying on methods such as oral feedback from instructors and direct observation. Clinical educators provide feedback during ward rounds, lectures, or small-group sessions. Written evaluations are often used to assess learners' clinical performance. These conventional approaches, while valuable in many aspects, have inherent limitations. Feedback usually depends on the individual instructor's perspective, which could vary widely. Additionally, time constraints limit feedback sessions and are rarely recorded for future reference. Learners had to rely solely on their memory of the feedback received.

Video feedback has been a valuable tool in medical education since the late 1970s, first introduced by Freer et al. and Maguire et al. (1978).4,5 It has since evolved into a practical method for addressing the limitations of traditional teaching. Recording clinical encounters allows learners to analyse their performance and objectively gain insights for improvement. Video feedback offers several advantages, including assessing non-verbal communication, clinical skills, and patient interactions. Moreover, it promotes self-directed learning and allows learners to revisit their experiences, facilitating a deeper understanding of their strengths and weaknesses. With the widespread availability of smartphones and video recording devices, video feedback has become more practical and affordable. This shift represents a significant evolution in medical education, enhancing the quality and effectiveness of feedback mechanisms.

Situated Learning Theory as the Framework

Situated Learning Theory highlights the importance of real-life situations and social interactions in effective learning.6 It suggests that people learn best when actively participating in meaningful activities with others. Video Feedback provides learners with realistic experiences in clinical settings. Learners can reflect on and improve their decision-making and communication skills through recorded interactions with patients. This promotes deep learning and self-regulation.
Additionally, video feedback encourages collaboration among learners, instructors, and peers. By sharing insights and feedback, learners work together to overcome challenges and create a supportive learning environment. Integrating Pendleton's Feedback model into video feedback further enhances constructive criticism. Learners start by identifying their strengths, which the facilitator or group reinforces. They then pinpoint areas for improvement and collaborate to develop their skills. Feedback discussions help refine skills and support continuous development.

Effectiveness of Video Feedback in Medical Education

Video feedback has been extensively researched for its effectiveness in enhancing clinical skills, communication, and medical education. Findings from studies conducted between 1978 and 2022, spanning various educational and training contexts, including medical education, clinical skill development, Cardio Pulmonary Resuscitation (CPR) quality improvement, and emergency management, are compiled in Table 1. These studies employ diverse research designs, such as experimental, observational, randomised controlled trials, pre-post designs, qualitative analyses, and mixed-methods approaches. They were conducted globally, in countries such as the United States, United Kingdom, Canada, Australia, Switzerland, Thailand, South Korea, China, Brazil, Taiwan, and others, showcasing a broad international perspective. Sample sizes varied significantly, ranging from small-scale studies with fewer than 30 participants to large-scale trials involving over 300 participants, ensuring a comprehensive exploration of video feedback's efficacy. Participants included a spectrum of healthcare professionals across diverse medical specialities, including medical students, nursing students, residents, nurses, physicians, surgeons, healthcare workers, and specialists, enhancing the generalizability of the findings. The settings in which these studies took place were equally diverse, encompassing academic medical centres, university hospitals, trauma centres, primary care clinics, simulation centres, and more, capturing the multifaceted nature of medical education and clinical practice. Data collection methods also varied, with some studies involving in-person interactions such as simulations, clinical skills training, bedside teaching encounters, and surgical procedures observation. In contrast, others utilised video recordings for remote feedback and assessment, demonstrating the versatility and adaptability of video feedback in different educational contexts.

Table 1: Effectiveness of Video Feedback in Healthcare and Medical Education: A Review of Studies (1978-2022)

Sl No	Author, Year, Institution	Study Design	Methodology	Participant	Findings	Assessment Criteria	Risk of Bias	Application
1	Freer, C.B. et al 1978 [4], University of Glasgow, UK	Exploratory study	Videotaped student-patient interviews analyzed using structured protocols for skill assessment	7 third-year medical students	Identified strengths and weaknesses in history-taking; highlighted the lack of psychosocial inquiry	Lack of randomization; structured protocols used	High	Using videotape recordings to improve history-taking skills and identify teaching gaps
2	Peter Maguire et al 1978 [5], Department of Psychiatry, University of Manchester	Experimental	Compared three feedback methods (television, audiotape, tutor feedback) for interviewing skills. Pre- and post-training interviews rated using validated scales.	48 medical students	Feedback groups improved information elicitation. Television and audiotape groups showed better technique improvements, favouring television.	Randomization and blinding done; Validated scales used;	Low	Television and audiotape feedback enhance medical students' interviewing skills.
3	Calhoun et al. 1986 [12], University of Michigan Medical School, Michigan	Experimental Study	Students participated in examination sessions in groups. Each took on the roles of physician, patient, and camera operator for video recording. Evaluations were based on checklists. Students with scores two standard deviations below mean had to retake examination.	236 Medical Students	Flexibility in scheduling and evaluation allows faculty to review recordings at their convenience. Provided students with immediate feedback through peer and self-assessments.	Checklist used for evaluations; no randomization	Moderate	Clinical Examination Assessment
4	Paul et al.[17], 1998 United Arab Emirates University	Observational Study	Students underwent clinical skills training through seminars, tutorials, and bedside teaching, and were divided into four groups. Their interactions with patients and parents videotaped. Teacher assessments focused on proficiency in clinical skills, including history-taking, interviewing, and physical examination techniques.	27 Sixth-year medical students in Paediatric Clerkship	73% valued self-observation for skill development, 80% acknowledged positive impact and desired more recorded consultations, 75% believed self-critique improved their self-awareness and evaluation abilities	Convenience sampling, Limited generalizability, Awareness of being videographer might influence behaviour	Moderate	Clinical Skill Development
5	Byrne et al. [19] 2002, Four hospitals in UK	Experimental (controlled trial)	Two groups of subjects underwent five simulations with or without self-review using videotapes. Performance was assessed based on problem-solving time and mental workload, using anaesthetic chart errors as a secondary measure.	32 Anaesthetist	Trainees exposed to videotape feedback had a shorter time to solve the problem, and fewer chart errors, but these differences were not statistically significant.	Randomisation done, small sample size, and lack of explicit blinding	Moderate	Anaesthesia Simulation Training

6	Scherer et al. [20], 2003, University of California, USA	Pre-post design	Trauma resuscitations were recorded and reviewed for six months. Team members initially received verbal feedback for three months, followed by three months of videotape reviews. Targeted behaviours were University of Toronto were then compared between the two groups.	38 Healthcare professionals in trauma resuscitation	Videotape review led to significant behaviour improvement and reduced time to disposition.	Non-randomized design. Single assessor and Lack of blinding	Moderate	Trauma Resuscitation Training
7	Roter et al. [21], 2004, Johns Hopkins School of Medicine, Baltimore, Maryland	Pre-post design	Exploration of the acceptability and effectiveness of video feedback in teaching communication skills to paediatric residents.	28 First year Paediatric Residents	Video feedback resulted in significant improvement in communication skills, including reduced verbal dominance, increased open ended questions and increased empathy.	Convenience sampling. Blinded coders and validated tools enhance reliability. Small sample size	Moderate	Communication Skills Training
8	Savoldelli et al. [22], 2006, University of Toronto, Canada	Randomized Control Trial	Participants randomly assigned to receive no debriefing, oral feedback, or videotape-assisted oral feedback.	42 Anaesthesia residents	Both forms of feedback resulted in significant improvement, and no difference observed between oral and video-assisted oral feedback.	Randomization and blinding clear; valid measures	Low	Anaesthesiology Simulation Training
9	Hamad et al. [23], 2007, University of Pittsburgh, USA	Comparative design.	Participants conducted a laparoscopic jejuno-jejunal anastomosis, with half undergoing video debriefing.	24 Third year Surgery Residents	Video debriefing significantly decreased technical errors during laparoscopic procedures.	Non-randomized design, no blinding, and small sample size	Moderate	Laparoscopic Surgical Training
10	Dine et al. [24], 2008, University of Pennsylvania School of Medicine, Philadelphia	Prospective Randomized Study	One group received real-time audio-visual feedback during the simulated cardiac arrest trials, while the other group performed Cardio-Pulmonary Resuscitation (CPR) without feedback.	80 Nurses	Debriefing improved compression depth, but real-time audio-visual feedback combined with debriefing significantly enhanced compression rate and depth compliance.	Randomization done and validated, objective metrics used. No blinding and Significant drop out	Moderate	CPR Quality Improvement
11	Ozcakar et al. [25], 2009, Dokuz Eylul University Faculty of Medicine, Turkey	Randomized Controlled Trial	Study group received both verbal and visual feedback by reviewing video recordings of their patient interviews, while control group received verbal feedback only.	52 Second year Medical Students	Self-assessment didn't significantly change, but assessor ratings improved significantly for videotaped interviews.	Randomization done. Structured tools mitigate potential bias. Assessors not blinded. Awareness of group assignments may influence participant performance	Moderate	Clinical Skill Teaching

12	Grant et al. [26], 2010, University of Alabama at Birmingham, Alabama	Pre- and post-test two-group quasi-experimental design	Participants in the treatment group engaged in Human Patient Simulator practice and guidance with videotape-facilitated debriefing, while the control group used oral debriefing alone.	40 Nursing and nurse anaesthetist students	Video-facilitated simulation feedback improved patient identification, team communication, and vital signs assessment	Randomisation and Blinding of assessors done. Low sample size	Low	Simulation-Based Training
13	Mpotos et al. 2011[27], Ghent University, Belgium	Non-inferiority Randomized Trial	Compared self-learning (video + voice feedback) and instructor-led Basic Life Support (BLS) skill training	120 pharmacy students	Non-inferiority of self-learning compared to instructor-led training	Randomisation done. Low statistical power and Lack of blinding	Moderate	Using self-learning stations for BLS skill acquisition
14	Ghosh et al. [28], 2011, Ireland	Clinical trial	Hand wash monitors used in a 28-bed surgical ward. Phase 1 established baseline practice for one week. Phase 2 provided real-time feedback for four weeks. Phase 3 included printed reports for five weeks. Phase 4 had no feedback for one week. Compliance with protocol was required for handwashing to be complete	Healthcare Professionals	Real-time video feedback significantly increased hand hygiene events and completion rates, promoting infection control practices.	Objective, computerized system (handwash monitor) minimizes observer bias. Absence of randomization, blinding, and control for confounding	Moderate	Infection Control Training
15	Henry et al. [29], 2011, University of Michigan, USA	Qualitative analysis of video elicitation interview transcripts	Investigation of implicit clues in doctor-patient interactions during health maintenance examinations.	18 Community-based primary care doctors	Non-verbal behaviors, accounting for 53% of doctor comments and 42% of patient comments were the most common tacit clues.	Snowball sampling can introduce selection bias and presence of a video camera could influence participant behavior	Moderate	Doctor-Patient Interaction Study
16	Hamilton et al. 2012[30], Washington University, USA	Experimental	Used video-assisted debriefing in high-fidelity trauma resuscitation simulations to improve team skills. Scenarios were evaluated using a reliable team evaluation metric.	11 surgical residents	Significant improvement in team function and leadership skills	Lack of randomization and allocation concealment. Small sample size. Assessors blinded	Moderate	Integrating video-assisted debriefing into surgical training curricula
17	Sawyer et al. [31], 2012, Tripler Army Medical Centre, Honolulu, Hawaii	Randomized Trial	Comparison of video-assisted debriefing to oral debriefing alone in improving neonatal resuscitation performance.	30 Medical Residents	Both groups showed improved neonatal resuscitation performance, with no significant difference between video-assisted and oral debriefing alone.	Randomisation and blinding of assessors done, Small sample size	Low	Neonatal Resuscitation Performance

18	Farquharson et al.[32], 2013, University of Sheffield, UK	Randomized Clinical Trial	Participants performing a surgical skill were recorded and received video and verbal feedback (group 1) or verbal feedback alone (group 2)	48 Surgical Trainees	Video feedback, combined with verbal feedback, significantly enhanced skills in instrument familiarity, needle handling, skin handling, and accurate apposition.	Randomisation, Allocation concealment and blinding of assessors done. Small sample size	Low	Surgical Skill Training
19	Ha 2014[33], Chung-Ang University, South Korea	Q-methodology	Assessed attitudes towards video-assisted debriefing (VAD)	44 nursing students	Identified three attitudes: VAD aids self-reflection, VAD can be tiring and humiliating, and VAD boosts confidence	Convenience sampling . Standardized Q-statements and structured sorting process used	Moderate	Customizing debriefing strategies based on student attitudes for nursing education
20	Grant et al. [34], 2014, University of Alabama, Alabama	Pre- and Post-test Quasi-experimental design	Comparison of video-assisted oral debriefing (VAOD) and oral debriefing alone (ODA) during high-fidelity simulations.	48 Nursing Students	VAOD and ODA were comparable in enhancing behaviors related to patient safety, communication, prioritization of care, and delegation.	Randomisation and Blinding of assessors done. Lack of allocation concealment	Low	Simulation-Based Training
21	Rizan et al. [35], 2014, School of Medicine, Cardiff University, Cardiff, UK	Qualitative Video ethnographic study	Investigation of feedback interactions between doctors and students in Bedside Teaching Encounters (BTEs).	12 BTE involving four general practitioners and four medical students	Teaching linguistic strategies for feedback management in BTEs to enhance learning by avoiding abrupt or ambiguous feedback.	Non-random sampling. Subjectivity in Conversation Analysis balanced by team coding and triangulation	Moderate	Bedside Teaching
22	Noordman et al.[36], 2014, Netherlands Institute for Health Services Research, Utrecht, The Netherlands	Pre-test/post-test control group design	Consultations were recorded at two time points and participants divided into control and video-feedback groups.	17 Practice Nurses	Nurses in the video-feedback group improved patient attention, physical exams, information clarity, and motivational interviewing.	Non-randomised allocation and lack of blinding, and small sample size	Moderate	Communication Skill Improvement
23	Shah et al. [37], 2015, Sinhgad Dental College & Hospital, Pune, India	Experimental Study	Participants randomly assigned to control (n=30) and experimental (n=30) groups. Both groups viewed a tooth preparation video, with the experimental group analyzing the control group's videotaped performance before their exercise	60 Dental Students	Video feedback improved self-evaluation and examiner evaluation scores, enhancing learning outcomes.	Randomisation and blinding done. Validated tools used	Low	Dental Skill Acquisition
24	Nesbitt et al. [38], 2015, Freeman Hospital, Newcastle upon Tyne, UK	Randomized Trial	Comparison of standard lecture feedback to individualized video feedback and unsupervised video-enhanced feedback	32 First and second year undergraduate medical students	Both video feedback methods outperformed traditional lecture feedback.	Randomization done, blinded assessment and validated tools used	Low	Surgical Skill Training

			in suturing task.					
25	Contreras et al. [39], 2015, Mayo Clinic, USA	Pre and post test	Participants of a surgical skills program self-recorded knot-tying assignments, which were reviewed and voiced-over feedback provided by a general surgeon	16 Medical Students	Voiced-over video feedback was perceived as useful and significantly improved students' confidence in knot-tying.	Self-selection and small sample size. Blinded assessment .	Moderate	Surgical Skill Training
26	Groener et al.[40], 2015, University of Heidelberg Medical Hospital, Heidelberg, Germany	Pilot Study using a Mixed-Method approach	Assessment of video-based on-ward supervision during clinical procedures.	9 Final Year Medical Students	Video-based supervision was enthusiastically embraced and significantly enhanced clinical skills and education when integrated with oral feedback.	Non-randomized recruitment, no blinding, small sample size & lack of objective outcome	Moderate	Clinical Procedure Supervision
27	Hulsman and van der Vloodt [41], 2015, Academic Medical Centre Amsterdam, Department of Medical Psychology, Amsterdam, The Netherlands	Observational Study	Students recorded history-taking consultations with simulated patients, marked and annotated videos on a web-based platform, and received peer feedback, which was then analyzed	25 Year Four Medical Students	Students annotated more negative than positive events, focusing on structuring consultations. Teaching specificity in self-evaluations highlighted.	Voluntary participation, no blinding, small sample size	Moderate	Communication Skill Assessment
28	Perron et al. [42] 2016, Faculty of Medicine, University of Geneva, Switzerland	Observational Study	Comparison of feedback formats in clinical skills training: direct observation with verbal feedback versus subsequent video-based feedback.	109 Medical Students	Video feedback promotes active student engagement in discussions about clinical reasoning, communication, and professionalism.	No randomisation, no blinding , small sample size.	Moderate	Clinical Skills Feedback
29	Spence et al. [43], 2016, The Clinical Skills Education Centre, Queen's University Belfast, Northern Ireland, UK	Randomized Controlled Trial	Investigation of the impact of video feedback versus verbal feedback on the Cardio-Pulmonary Resuscitation (CPR) performance.	138 Final year Medical Students	Video feedback significantly improved CPR performance and skill retention compared to verbal feedback.	Assessors not blinded, Significant drop out	Moderate	CPR Skill Training
30	Anantasit et al. [44], 2016, Division of Paediatric Critical Care Medicine, Ramathibodi Hospital, Bangkok, Thailand	Experimental Study	Focused on the improvement of paediatric CPR skills after a Paediatric Advanced Life Support (PALS) lecture and video-recorded feedback, with re-evaluation after six weeks	38 Paediatric Residents	High-quality CPR skills significantly enhanced. Half of them passed most psychomotor skills tests.	No Randomisation, Lack of blinding. No drop out	Moderate	Paediatric CPR Training
31	Hunukumbure et al. [45], 2017, Imperial College London, UK	Qualitative Study using Semi-structured interviews	Holistic feedback approach involving self-reflection and peer discussion based on video-recorded performances.	34 Third year Medical Students	Video-based self-reflection helped students identify mistakes. Peer videos facilitated learning and cognitive engagement.	Voluntary participation introduces selection bias. Thematic analytical framework used. High dropout rate	Moderate	Peer Discussions and Self-Reflection

32	Rossignol [46] 2017, College of Nursing, Seton Hall University, New Jersey, USA	Randomized Controlled Trial	Comparison of video-assisted debriefing to standard oral debriefing on stress responses and performance during simulations.	34 Nursing Students	No significant difference between video-assisted and oral debriefing in stress responses and performance. Improved performance over time.	Randomisation done, assessors not blinded, no drop out, small sample size	Low	Nursing Simulation Training
33	Jacobs [47], 2017, School of Nursing, Illinois Wesleyan University,USA	One group post-test design	Exploration of the benefits of high-fidelity simulation and video-assisted debriefing in obstetrical hemorrhage mock code training.	84 Nursing Staff	Simulation with video-assisted debriefing enhanced learning and improved evaluation of team communication during obstetrical hemorrhage training.	Convenience sampling Lack of blinded assessment No participant dropout	Moderate	Medical Emergencies
34	Oseni et al. [48], 2017, Shoklo Malaria Research Unit clinics, Mahidol University, Thailand and Kudjip Nazarene Hospital, Papua New Guinea	Pre-Post Study	Participants managed a simulated medical emergency scenario recorded on video, followed by video feedback, Objective Structured Clinical Examination (OSCE) scoring, and questionnaire assessments.	32 Rural Healthcare Workers	Video-assisted feedback significantly improved clinical knowledge, confidence, and teamwork among healthcare workers in low-resource medical facilities.	Convenience sampling, Lack of randomization, Lack of blinding of assessors and subjective scoring	Moderate	Medical Emergencies
35	Urquhart et al. 2018 [49], Ninewells Hospital, Dundee, UK	Video ethnography	Explored contextual influences on feedback in in clinical and workplace contexts,	142 individuals (104 students 19 teachers and 19 patients)	Highlighted the role of context in feedback	Purposive sampling, Lack of independent coding increases subjectivity	Moderate	Designing context-sensitive feedback mechanisms in medical education
36	Sweeney, Baker 2018 [50], Royal Bolton Hospital, UK	Mixed-methods	Participants viewed patient video interviews and discussed healthcare communication, evaluated via the Patient–Practitioner Orientation Scale (PPOS) and written feedback	48 medical students	Improved empathy and patient-centred attitudes	Lack of randomization, Participants' awareness of the study purpose, Reliance on self-reports and lack of blinded assessment	Moderate	Using video interviews for empathy training in medical students
37	Rammell et al. [51], 2018, Newcastle University, Medical School, UK	Prospective single-blinded randomized trial	The trial compared Direct Expert Feedback (DEF) to Unsupervised Video Feedback (UVF) for intravenous cannulation. Performances were evaluated at weeks 1, 4, and 7 by independent assessors.	42 Medical Students in preclinical years	DEF significantly improved performance, whereas UVF showed non-significant improvement. Video technology efficiently delivers feedback.	Randomization done, Blinded assessors and validated tools used, Minimal dropout	Low	Medical Skill Acquisition

38	Hoonpongsimanont et al. [52], 2018, Department of Emergency Medicine, University of California, USA	Interventional Study	First-person video captured via Google Glass™ to record patient encounters and presentations during emergency medicine clerkships	45 Fourth year Medical Students	Video recordings impacted students' perspectives on clinical skills.	Convenience sampling without randomization; Unblinded faculty assessments	Moderate	Clinical Skill Development
39	C.Skare et al. [53], 2018, Department of Anaesthesiology, Oslo University Hospital, Norway	Pre and Post interventional study	Impact of high-frequency short-duration deliberate practice training and video-based debriefing on neonatal resuscitation.	297 Positive Pressure Ventilation providers	Combined approach improved time to adequate spontaneous respiration and adherence to guidelines during real neonatal resuscitations.	Convenience sampling and lack of randomization, Lack of blinding	Moderate	Neonatal Resuscitation Performance
40	Knobel et al. [54], 2018, Department of Orthopaedics & Trauma Surgery, Universität Oldenburg, Germany	Retrospective analysis of training intervention	Assessment of the impact of monthly video-assisted team-based trauma simulation with video debriefing on resuscitation time and confidence.	190 Trauma Resuscitation Team Members	Significant decrease in resuscitation time and increased self-confidence among team members following video-assisted team-based training.	Non-randomized selection, Lack of blinding	Moderate	Trauma Simulation Training
41	Moroz et al. 2019 [55], New York University School of Medicine, USA	Qualitative study	Faculty workshops using resident-created video vignettes	23 faculty members	Improved feedback skills through shared mental models	Convenience sampling, reliance on qualitative data analysis increase subjectivity.	Moderate	Faculty development for meaningful feedback in medical education
42	Kam et al. [3], 2019, Pusan National University School of Medicine, Yangsan, South Korea	Questionnaire-based before and after study	Impact of personalized video feedback on medical students' perception of their clinical performance assessment scores.	103 First Year Medical Students	Video feedback increased students awareness of their performance scores and help them recognise strengths and weaknesses	Absence of a control group, Reliance on self-reported outcomes and lack of blinded assessment	Moderate	Clinical Performance Assessment
43	Ho et al. [56], 2019, Department of Emergency Medicine, Faculty of Medicine, University of British Columbia, Vancouver, Canada.	Mixed methods approach, using participatory action research	Assessment of the feasibility and acceptability of video-based peer feedback on clinical performance among rheumatologists.	5 Rheumatologists	Participants found video-based peer feedback accurate, convenient, and less intrusive than direct observation.	Purposive sampling, Peer familiarity and lack of blinding in feedback provision, Small sample size	High	Rheumatology Clinical Performance
44	Li et al. [57] 2019, Department of Anaesthesiology, West China Hospital of Sichuan University, China.	Randomized Controlled Trial	Assessment of pretraining video-assisted debriefing (VAD) using trainees' errors (TE) or simulated errors (SE) on basic life support (BLS) skills learning.	322 Third-year Medical Students	Both TE and SE pretraining VAD were equally effective in improving BLS skills in medical students. SE was preferred due to its perceived psychological safety advantage.	Randomization done, Blinded assessors and validated tools, No loss of participants	Low	BLS Skill Training

45	Donkin et al. [58], 2019, School of Health and Sport Sciences, University of the Sunshine Coast, Queensland, Australia	Mixed methods approach of quantitative and qualitative methods	Exploration of blended learning with video feedback and e-learning for teaching tissue morphology and technical procedures.	28 Medical Laboratory Science Students	Blended learning with video feedback and e-learning significantly enhances practical examination scores and final grades, improving skill acquisition.	Randomization done , Blinded assessors and standardized tools used, no missing data, Small sample size	Low	Lab Skills
46	Maher et al.[16], 2020, Royal College of Surgeons, Ireland	Mixed-methods exploratory study	Compared video podcast and typed solution feedback formats for pharmaceutical calculations.	53 first-year pharmacy students	Video podcasts offer step-by-step explanations and flexibility, while typed solutions provide quick verification. Students favoured combining both formats	Outcomes based on self-reported survey data, high non-response rate,	Moderate	Supports blended feedback strategies in pharmacy education.
47	Lai et al.2020 [59] , National Taichung University, Taiwan	Quasi-experimental	Two classes (50 students each) compared video annotation and YouTube for peer-assessment. Students recorded interactions, rated peers using a validated scale, and reflected on feedback. Peer comments were analyzed, and interrater reliability calculated	100 nursing students	Improved communication performance and feedback quality	Convenient sampling, No randomisation, Outcomes assessed using a validated scale	Moderate	Enhancing nursing education through video annotation-based peer assessment
48	Aukstakalnis et al. 2020 [60], Lithuanian University of Health Sciences, Kaunas, Lithuania	Observational	Analyzed trauma team performance using video recordings, measuring task times based on Advanced Trauma Life Support (ATLS) guidelines and team behavior using the Translatability and Validation of Non-Technical Skills (T-NOTECHS) scale, focusing on leadership, communication, and decision-making.	143 trauma team cases	Improved scores in cooperation and stress management	Single evaluator, lack of adjustment for confounders	Moderate	Trauma care quality improvement using video-based audits
49	Halim et al. [61], 2020, Barts Cancer Institute, Queen Mary University of London, UK	Randomized Controlled Trial	Comparing verbal feedback, video feedback, and self-assessment for improving laparoscopic suturing skills.	51 Surgical Trainees	Video feedback led to the most significant improvement in performance, particularly in global ratings.	Randomization & allocation concealment done, assessors blinded. No losses to follow-up	Low	Laparoscopic Surgical Training
50	Sadowski et al. [62], 2020, Department of Physician Assistant Studies, Mercer University, Atlanta, USA	One-group exploratory study	Introduction of three 15-minute video recordings of practicum examinations in a physician assistant	50 First-semester Physician Assistant Students	Students assessed their peers more favourably than themselves. Video	Convenient sampling, no control group, Non-blinding of participants	High	Clinical Examination Training

			course for self and peer assessment.		recordings improved self-awareness and motivation to practice.			
51	Dohms et al. [63], 2020, Center for Development in Medical Education, University of Sao Paulo, Brazil	Pre/post study with a control group	Assessment of video recording and debriefing with real patient consultations to assess communication skills among medical students.	54 First-year medical residents in primary care	Students perceived this method as effective for improving self-perceived empathy and communication skills.	Lack of confounder adjustment, rater subjectivity and a lack of standardization of outcome measurement	Moderate	Communication Skill Assessment
52	Patel et al. [64], 2020, School of Medicine, University of Nottingham, UK	Prospective Cohort Study	Assessment of an educational intervention using self-regulated learning-enhanced video feedback for improving prescribing competency.	18 Junior Doctors	Significant improvement in prescribing competency and self-efficacy among participants.	Lack of adjustment for confounding, subjective nature of self-reporting.	Moderate	Prescribing competency
53	Green et al. [65], 2020, Leicester General Hospital, Pilgrim Hospital Boston, and Queen Elizabeth Hospital Birmingham in UK	Non-Randomized Control Intervention Studies	Conducted three studies to improve junior doctor medicine prescribing and patient safety using personalized, structured, video-enhanced feedback and deliberate practice.	61 Foundation Year Doctors in Secondary Care in England	The intervention effectively improved prescribing and patient safety behavior, was cost-effective, and had the potential to reduce avoidable harm.	Lack of adjustment for confounders, no randomisation, subjectivity in outcome measurement	Moderate	Prescribing and patient safety behaviour
54	Van Dalen et al. [66], 2021, Amsterdam University Medical Centers, Amsterdam, The Netherlands	Pilot Study	Development of a model for video-assisted postoperative team debriefing in the Operating Room (OR).	35 surgical cases	Video-assisted debriefing model received positive ratings, enhancing debriefing process in the OR.	No control group, confounders not adjusted, Outcomes assessed subjectively	High	Surgical Team Training
55	Mitchell et al. [67], 2021, Undergraduate Department, Chelsea and Westminster Hospital, London, UK	Mixed Methods Study	Investigation of the use of video-assisted reflection in Objective Structured Clinical Examinations (OSCEs).	21 Medical Students	Video-assisted reflection significantly improved students' self-assessment, ability to act on feedback, and overall self-efficacy.	Participants were self-selected, Outcomes assessed using subjective self-reports, high dropout rate	High	OSCE Skill Improvement
56	Krause et al. [68], 2022, Periodontology and Preventive Dentistry, University Hospital Aachen, Germany	Observational Study	Evaluation of a communication education program for undergraduate dental students, including video recording patient consultations and feedback.	45 Third year Dental Students	Both groups found watching videos and receiving feedback beneficial for improving communication skills.	Randomisation done, no drop out or cross over, Outcomes assessed using self-reported questionnaire	Moderate	Communication Skill Training

Video feedback complements traditional feedback methods, and therefore effectively enhances the training of future healthcare professionals. It distinguishes itself through its objectivity and promoting self-assessment. This invaluable tool enhances clinical skills, aids self-improvement, and boosts confidence. Video feedback provides an unbiased evaluation of learner performance, encompassing clinical skills, communication, and non-verbal cues. Encouraging self-assessment, reflection, and critical thinking, it comprehensively evaluates clinical practice, and provides a holistic view of competence.

Additionally, video feedback alleviates anxiety and promotes self-awareness, empowering learners to evaluate their performance and enhance self-esteem. Its flexibility allows learners to revisit video-recorded encounters, facilitating a deeper understanding and long-term knowledge retention, enabling consistent progress tracking. Training healthcare

workers to handle emergencies is invaluable in real-world healthcare scenarios, boosting their confidence and teamwork. In summary, video feedback is essential in medical education, enhancing learning, confidence, and adaptability across various contexts, ultimately benefiting healthcare professionals and their patients.

Types of Video Feedback in Medical Education

Video feedback integration in medical education comprises various methods tailored to specific learning objectives and contexts. Three prominent types of video feedback offer diverse approaches to enhancing medical education:

1. Peer Feedback: This method involves medical students assessing and providing feedback on their peers' clinical performances through video recordings. Peer feedback is perceived as less shameful and equally effective as instructor feedback. It encourages a collaborative learning environment, making it valuable in settings with limited faculty resources.

2. Self-Assessment: Learners review their video-recorded performances, identifying areas for improvement. Feedback sessions help learners reassess their self-perceptions and skills, empowering them to learn and promote autonomy.

3. Expert Evaluation: Faculty or experienced clinicians assess learners' clinical encounters through video recordings, providing valuable insights and ensuring high-quality guidance.

These video feedback types complement each other, creating a comprehensive feedback ecosystem. The choice of method depends on learning objectives, available resources, and the stage of medical education.

Challenges, Emotions and Ethical Considerations in Video Feedback for Medical Education

Implementing video feedback demands resources, including recording equipment, storage, and technical support, which can strain budgets and logistics. Both educators and learners may find the process time-consuming. Resistance to the transition may arise, requiring effective communication and training to address concerns. Technical glitches, such as recording malfunctions, can disrupt the feedback process and create frustration. Practical interpretation of video feedback necessitates training for instructors and learners to extract meaningful insights and provide constructive feedback.

In medical education, emotions related to video feedback present a complex landscape. Lindon-Morris and Laidlaw highlight the tension between anxiety and self-awareness when learners review video-recorded clinical communication training. Peer feedback emerges as a solution to anxiety, offering a fresh perspective through performance comparisons. 7 Eeckhout et al. further the discussion, exploring video-recorded vocational training for general practice trainees, sparking a debate about patient comfort versus communication skills enhancement. 8 Schmidt notes reduced anxiety, especially during public oral presentations, as a benefit of video-based feedback. 9 Herrmann-Werner addresses shame, suggesting it diminishes with video feedback. 10 Lastly, Nilsen and Baerheim emphasise resilience and self-improvement through video feedback sessions. 11 Initially distressing, the feedback process ultimately bolsters self-esteem and confidence, emphasising the positive outcomes of video feedback in medical education.

Video feedback has generated debates regarding its preference over direct observation. While video feedback has effectively addressed communication skills and clinical reasoning, direct observation remains valuable for real-time feedback and immediate guidance. Patient confidentiality and privacy concerns are also prominent, necessitating ethical guidelines for recording patient interactions, including informed consent and secure storage. Out of consideration for modesty, specific physical examination skills, including female breast, gynaecological, male genitourinary, rectal, mental status, and children, may be omitted from testing, in line with the study by Calhoun et al. 12 The subjectivity of video feedback and the need for standardisation raises further questions about its implementation and quality. Balancing advantages and challenges is essential to maximise the benefits of video feedback in medical education.

Implementation of video feedback

Implementing video feedback in a medical institution is a structured process. The author has developed a ‘Framework for Implementing Video Feedback in a Medical Institution’, comprising twelve steps as shown in Figure 2. It begins with a needs assessment and stakeholder engagement. This progresses to resource allocation, technology selection, and emphasising ethical considerations. Curriculum integration, faculty and learner training, and structured implementation follow, ensuring ethical guidelines are maintained. Continuous evaluation, learner support, and dissemination of best practices are also essential components. Sustainability planning ensures the long-term use of video feedback. This structured framework guarantees a comprehensive and ethical integration of video feedback, benefiting both learners and faculty in medical education.

Fig. 2: Framework for implementing video feedback in a medical institution

Innovative Techniques in Video Feedback

Innovations in video feedback are changing the landscape of medical education. Sellitto and their team introduced the "video selfie" approach for clinical interview skill development. 13 Medical students record patient interactions, create informative highlight clips, and engage in enlightening peer discussions. Similarly, Flood et al. designed ‘video podcasts’ for feedback on pharmaceutical calculation assessments in Ireland. These podcasts offer clear and step-by-step guidance, enhancing comprehension. 14 Goolsby et al. raised the bar with patient-perspective video feedback in trauma training. ‘GoPro’ cameras on patient actors enable learners to critically evaluate their performance, especially in identifying subtle signs of shock. This innovative method and self-reflection improve learning satisfaction, especially among struggling learners. 15 Maher et al. demonstrated the advantages of a blended approach. They offered video podcasts and typed solutions for pharmaceutical calculation assessments. Learners appreciated the flexibility of video and the reliability of typed explanations, showing how these methods work together to enrich learning. 16 These innovations highlight the expanding possibilities of video feedback in medical education.

Future Directions and Recommendations

Video feedback in medical education offers significant potential for improving the learning experience and enhancing clinical skill development. Institutions should integrate this tool systematically into their curricula with clear objectives and educator training to fully benefit from it. Allocating equipment, storage, and support resources is essential to ensure accessibility. Establishing and communicating ethical standards concerning patient consent, privacy, and confidentiality is imperative. Continuous educator training promotes proficiency, supports research, and guides evidence-based implementations. Open communication between educators and learners encourages a two-way feedback culture. Leveraging technology, such as Artificial Intelligence (AI) and data analytics, can enhance feedback objectivity. Collaboration across disciplines and international partnerships enrich the learning environment, realising the full potential of video feedback in medical education.

Conclusion

In conclusion, this review highlights video feedback's transformative potential in medical education. It proves to be a powerful tool for enhancing clinical skills, communication, and overall medical training. Its objectivity, self-assessment capabilities, and adaptability are valuable. However, video feedback should complement, not replace, traditional feedback methods, creating a balanced learning environment. This approach recognises the value of face-to-face interactions and oral feedback while embracing video technology's advantages. By following best practices, adopting technological advancements, and fostering a feedback culture, institutions can maximise the benefits of video feedback, revolutionising how medical professionals are trained for healthcare delivery challenges.

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