What is the evidence regarding the use of telephone triage protocols during nurse video consultations?

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Executive summary

- An evidence scan was conducted across the PubMED, MEDLINE, EMBASE, and CINAHL databases to evaluate the state of the evidence regarding the use of telephone triage protocols during nurse video consultations.

- No research studies were identified which directly examined the use of telephone triage protocols for nurse video consultations.

- Twelve studies were found that indirectly inform this question.

- Five of these studies were quantitative and investigated the role of visual information on nurse consultations. This evidence showed that visual information did not impede the nurse consultation process and one study revealed an improvement, when visual information was available, from 54.2% to 67.9% in the proportion of paediatric triage decisions that matched the 'gold standard' decision determined by an expert panel.

- Three quantitative studies evaluated the efficacy of video-conferencing technology for health-care programs conducted in cardiac and psychiatric contexts. None of these studies reported any difference between the efficacy of the programs conducted via video-conference and face-to-face.

- A further four qualitative studies reported that nurses considered the availability of visual information during triaging to be valuable, and thought that the absence of visual information in telephone triage was a limitation. Nurses also reported that having a visual connection with the caller would allow them to see the physical characteristics of an illness or injury and to determine the reliability of the caller as an informant and develop good rapport and trust with them.

Background

The Centre for Health Systems and Safety Research, University of NSW, was commissioned to undertake an evidence scan to address the question "What is the evidence regarding the use of telephone triage protocols during nurse video consultations?" Using the search strategy outlined below we present a summary of evidence which both directly and indirectly informs this question.

Methods

Table 1 shows the search strategy used to conduct the evidence scan across four databases: PubMED, MEDLINE, EMBASE, and CINAHL. The evidence scan was conducted in July 2013.

Table 1. Keywords used for database searches.

PubMED	MEDLINE and EMBASE	CINAHL
• Telephone triage video • Telephone triage visual • Telephone health advisor • Telephone advice video • Telephone health advice video • Telephone video • Telehealth • Nurse triage • Out-of-hours triage • After hours triage • After-hours triage	1. telehealth.mp. or Telemedicine/ 2. Videoconferencing/ or video communication.mp. 3. webcam.mp. 4. camera.mp. 5. video.mp. 6. mobile phone.mp. or Cellular Phone/ 7. Remote Consultation/ or videophone.mp. 8. telecare.mp. 9. video call.mp. 10. Hotlines/ or Triage/ 11. Emergency Medical Service Communication Systems/ or Emergency Medical Services/ or dispatcher.mp. 12. triage.mp. or Triage/ 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 14. 10 or 11 or 12 15. 13 and 14	1. (MH "Telehealth") OR "telehealth" 2. (MH "Telemedicine") OR "telemedicine" 3. (MH "Videoconferencing") OR "videoconferencing" OR (MH "Telenursing") 4. "video communication" 5. "webcam" 6. "camera" 7. "mobile phone" 8. "cell phone" 9. "videophone" 10. (MH "Remote Consultation") OR "remote consultation" 11. "telecare" 12. "videocall" 13. (MH "Telephone Information Services") OR "hotline" 14. (MH "Triage") OR "triage" 15. "nhs direct" 16. (MH "Emergency Medical Service Communication Systems") OR "Emergency Medical Service Communication Systems" OR (MH "Emergency Medical Services") 17. "911" 18. "dispatcher" 19. (S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12) 20. (S13 OR S14 OR S15 OR S16 OR S17 OR S18) 21. (S19 AND S20)

Results

No research studies were identified in this evidence scan which directly examined the use of telephone triage protocols for nurse video consultations. However, a number of studies which provide valuable information related to this question were identified.

Table 2 summarises five quantitative studies, using a range of study designs which investigated the effects of visual information during nurse consultations, usually by comparing one group who had visual information with a second group with no visual information. The studies were conducted in Australia (n=1), New Zealand (n=1), and the

USA (n=3), and measured differences between comparison groups in term of the quality of the nurse consultation process using measures including (a) level of agreement between nurse triage decision and a 'gold standard' triage decision, (b) inter-rater agreement between nurses, (c) clinician confidence in their diagnostic decision, (d) patient self-efficacy, (e) patient satisfaction, and (f) medication compliance.

None of the studies found that the availability of visual information interfered with the nurse consultation process. Two studies did not find any differences, in patient self-efficacy, satisfaction, or medication compliance, between patients whose post-hospital discharge home-based nurse consultations were conducted over the telephone and those who were contacted by video-conference.[1, 2] The findings of one study suggest that the visual information available in a face-to-face triage context facilitated triage nurses' ability to detect patients who eventually required admission for a serious illness, but tests of statistical significance of this difference were not performed.[3] Two studies found that providing diagnosing clinicians with a text-based case history and photographs of the patient's illness or injury improved clinician competency compared to when only the text was provided without photographs.[4, 5] When ED triage nurses could see the photographs, inter-rater agreement between the triage decisions made by the entire triage nurse cohort was greater (Cohen's kappa: adult=0.54; paediatric=0.58) than when they could not (Cohen's kappa: adult=0.43; paediatric=0.40). Similarly, the proportion of triage decisions that matched the 'gold standard' triage decisions determined by an expert panel was higher (adult=64.5%; paediatric=67.9%) with the photographs than without (adult=56.6%; paediatric=54.2%).[4] Lastly, diagnosing clinicians' own confidence in their diagnostic decision increased by 33% (from 2.9 to 3.9 on a 0 to 5 Likert scale) when they were shown the photographs.[5]

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Table 3 summarises three quantitative studies that evaluated the impact that video-conferencing technology could have on the quality of health-care programs that are usually delivered face-to-face or over the telephone. The studies were conducted in the USA (n=2) and Canada (n=1). One study assessed the impact of a video-conferencing intervention in a cardiac-care setting.[6] The researchers found that the video-conferencing intervention was equivalent to the telephone intervention and they were both better than the usual care program. The other two studies assessed the impact of video-conferencing on the delivery

of psychiatric care and found that quality of care delivered via video-conferencing was equivalent to when patients experienced face-to-face consultations.[7, 8]

Table 4 summarises the findings of four qualitative studies exploring common themes derived from content-analyses of audio-recorded telephone interactions and interviews with nurses' regarding their opinions and perceptions of face-to-face, telephone, and video-conferencing triage. These studies were conducted in the USA (n=1), the UK (n=1), Australia (n=1) and Norway (n=1).

A common theme emerging when triage nurses considered telephone triage was their concern for having to make triage decisions without visual information available to them. Nurses thought that visual information was useful to see the characteristics of the illness and injury, but also to determine the reliability of the caller as an informant, and in the development of good rapport and trust with the caller.[9] Nurses reported that they had to often change their communication strategies, including asking more detailed questions to compensate for the lack of visual information. Although not a study of telephone triage nurses, whose role revolves around assessing symptoms described by patients, it is worth considering a study evaluating the role of visual information in simulated telephone-nurse-assisted cardiopulmonary resuscitation (CPR).[10] In that study, where experienced telephone nurses guided secondary school students through a CPR simulation using either telephone or video-conferencing technology, the nurses quickly adapted to having visual information when it was provided. The nurses reported that they asked fewer questions than had been necessary in audio-only calls because they could visually confirm what was happening in the remote location (e.g. that the patient was in the correct position and CPR was being applied correctly). The nurses in this study wondered whether looking at the video footage of the CPR scene, while also monitoring the progress of the ambulance and giving the caller CPR instructions, could lead to information and task overload and hamper adherence to protocols. It should be noted, however, that the task requirements for these telephone nurses were considerably more demanding than would be the case in a standard telephone or video-conference triage context.

A number of studies assessing the effectiveness of video-conferencing technology reported that there were occasional technical issues with the equipment. Some of the issues included lack of resolution to clearly evaluate symptoms,[6] lag between the video footage and audio stream,[1] and visual and aural interference when there was excessive movement or

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background activity in the remote location.[10] On rare occasions, technical issues with the video-conferencing equipment required that some planned video-conferencing sessions were replaced with telephone consultations.[2] It should be noted that the video-conferencing equipment used in all of the reported studies was relatively primitive (video resolution between 176x144 and 352x288 pixels transmitted over data connections between 33.6kbps and 384kbps) compared to the video quality found in present-day consumer video-conference and mobile phone devices, and widely available ADSL internet connections and 3G mobile phone networks. However, the presence of technical issues with the video-conference equipment in the reported studies highlights the importance that nascent technology used in health-care settings must meet some standards for reliability.

Table 2. Quantitative research examining the influence of visual information on the quality of telephone health consultations.

Author (Country)	Year	Main comparison	Aim	Key finding
Wakefield et al.[1] (USA)	2008	Telephone vs Video-conference	• Compare communication and interaction style, using content-analysis of audio-recordings, of nurses providing home-based care for heart-failure management using either telephone or video-conference. • Compare patient's ratings of satisfaction with the home-based care they had received via telephone or video-conference. • Telephone calls were conducted using standard telephone equipment • Video-conference calls were conducted using a 5" screen with 176x144 pixel resolution and 10-15 frames per second over a 33.6kbps standard telephone line.	• Differences in communication and interaction styles were found between telephone and video-conference. When nurses contacted patients by telephone, compared to video-conference, nurses asked more open-ended questions, gave more back-channel responses (e.g. "uh-huh", "really?!") that are markers for giving attention, made more friendly jokes, and checked more frequently that patients had understood; however, nurses gave fewer compliments and showed less 'partnership' when communicating over the telephone. • There were no significant differences, between the two groups, in the the level of satisfaction that patients reported. • The video-conference equipment used in the study was quite primitive and was associated with audio lag. The researchers noted that video-conference conversations were less freeflowing than telephone conversations.
Wakefield et al.[2] (USA)	2009	Telephone vs Video-conference	• Compare self-reported levels of patient self-efficacy, satisfaction, and medication compliance, at 90- and 180-days post-discharge, between heart-failure patients who received a post-discharge management program intervention that was administered via nurse telephone calls or via nurse video-conference calls, and a usual care control group. • Telephone calls were conducted using standard telephone equipment	• There were no significant differences in any of the three measures (patient self-efficacy, satisfaction, medication compliance) between the three groups. • On average, 2.6 (out of 14 possible video-conference contacts per patient; a rate of 18.6%) video-conference contacts had technical difficulties and the consultation had to be conducted by telephone call.

Author (Country)	Year	Main comparison	Aim	Key finding
			- Video-conference calls were conducted using a 5" screen with 176x144 pixel resolution and 10-15 frames per second over a 33.6kbps standard telephone line.	
Salk et al.[3] (USA)	1998	Telephone vs Face-to-face	- A 2 (Face-to-face vs Telephone) x 2 (Protocols available vs unavailable) x 2 (Vital signs information available vs unavailable) study of the quality of nurse triaging in an ED. - Test three hypotheses: (1) the level of agreement between face-to-face and telephone triaging would be higher when protocols were available; (2) the level of agreement between face-to-face and telephone triaging would be higher when vital signs information was available; and (3) having vital signs information would influence telephone triage decisions more than face-to-face triage decisions. - Compare the sensitivity, of telephone triage and face-to-face triage, to detecting patients with serious illnesses.	- There is no evidence that the availability of protocols or vital signs information improved the agreement between face-to-face and telephone triage decisions. - Nurses doing face-to-face triage tended to be better, than nurses doing telephone triage, at identifying patients who eventually required admission for a serious illness (but no significance testing conducted). Visual cues may be especially valuable in the detection of acute or serious illness. - Face-to-face and telephone triage are not necessarily equivalent in process. Rather than hindering the process of triage, the evidence suggests that visual cues (available during face-to-face triage) are valuable during the triage process. - Triage nurses' use of protocols may interfere with the natural interviewing and decision making processes.

Considine et al.[4] (AUS)	2004	Text-based case history (paper presentation) vs Text-based case history WITH brief text-based	- Compare ED nurse triage performance between conditions where only a text-based case history was provided on paper and when the text-based case history was provided on a laptop computer with a photograph of a moulage model showing the illness/injury. Performance was measured by:
			   o Comparing nurse triage decisions to a 'gold standard' determined by a panel of experts; and
			   o Measuring the inter-rater agreement between ED triage nurses.
				- ED nurse triage performance during adult triage decisions was better, as indicated by higher agreement with the expert panel decisions when they were able to see the photograph of the moulage model (64.5%) compared to when they could not (56.6%). A similar pattern was evident during paediatric triage decisions (67.9% with the photo vs 54.2% without the photo).
				- ED nurse triage performance during adult triage decisions was better, as indicated by higher inter-rater agreement when they were able to see the photograph of the moulage model (Cohen's kappa=0.54) compared to when they could not

Author (Country)	Year	Main comparison	Aim	Key finding
		presenting complaint WITH still photograph of appropriate moulage model of illness/injury (laptop presentation)		(kappa=0.43). A similar pattern was exident during paediatric triage decisions (kappa=0.58 with the photo vs kappa=0.40 without the photo). • This suggests visual information (from the photograph) was valuable when making triaging decisions.
Jayaraman et al.[5] (NZ)	2008	Text-based case history vs Text-based case history WITH one/two still photographs of actual illness/injury.	• Compare doctors' and nurses' confidence in their diagnosis of primary cases when they were given only a text-based case history of the patient with when they had also seen one or two photographs of the illness/injury. • Compare the value of low-quality (mobile-phone quality, 176x220 pixels) and high-quality (on CD-ROM) photographs of the illness/injury in doctors' and nurses' confidence in their diagnosis.	• Participants (doctors and nurses) were more confident of their diagnostic decision after having seen both the text-based case history and photographs (Mean score for low-quality photographs group=3.9 on 0-5 Likert scale) compared to when they had only seen the text-based case history (Mean score for low-quality photographs group=2.9 on 0-5 Likert scale), an average improvement of 33%. • Visual information (from the photographs) was potentially valuable when making triaging decisions. • There was no difference between the low quality (mobile phone photo group) and high quality (CDROM photo group) in the degree to which they improved doctors' and nurses' confidence in their diagnosis.

Table 3. Quantitative research that informs the issue of whether video-conference communication negatively affects general and psychiatric health care consultations.

Author	Year	Main comparison	Aim	Key finding

Jerant et al.[6] (USA)	2001	Video-conference vs Telephone vs Usual outpatient care	• Patients with a primary admission diagnosis of Congestive Heart Failure (CHF) were recruited as they were discharged from hospital.
			• Patients were randomly allocated to one of the three groups receiving different patient management programs
			  o scheduled video-conference home-based nurse consultation
			  o scheduled telephone home-based nurse consultation
			  o usual care as prescribed by primary care provider
			• Compare the outcome measures, over a 180-day period, as measured by:
			  o Mean number of CHF-related hospital admissions, length of stay, and financial cost.
			  o Mean number of all-cause hospital admissions, length of stay, and financial cost.
			  o Mean number of CHF-related ED admissions and financial cost.
			  o Scores on Medical Outcomes Study SF-36 and Minnesota Living with Heart Failure questionnaires (MLHFQ).
			• The video-conference equipment operated over a standard telephone line (implies very low resolution and frame rate).
				• There was no difference between telephone and video-conference intervention groups on any of the outcome measures.
				• CHF-related ED admission financial costs were significantly less in the telephone and video-conference groups compared to the control group.
				• A high rate (76%) of technical problems was recorded for video-conference consultations; inadequate resolution was reported in 64% of cases; although the technical problems were considered severe in only 4% of encounters.

Author	Year	Main comparison	Aim	Key finding
Kobak[7] (USA)	2004	Video-conference vs Face-to-face	• Assessing the psychometric properties and inter-rater reliability of the Hamilton Depression Rating Scale (HAMD). • The HAMD questionnaire was originally developed for use in a face-to-face context. • This study compared the psychometric properties of the HAMD questionnaire when it was administered via video-conference to when it was administered to the same subjects face-to-face. The agreement between the two scores was compared to another set of subjects who were each administered the HAMD questionnaire twice in a face-to-face context. • The video-conference equipment used up to 352x288 pixel resolution video and operated over a 384kbps ethernet connection.	• Correlations were high between individual and total scores for face-to-face administration and video-conferencing administration. • No differences between the psychometric properties, as measured by inter-rater agreement or internal consistency, of face-to-face and video-conference administration of the HAMD. • Only 33% of participants reported that the video-conferencing equipment interfered in any way with their ability to communicate with the interviewer. • 91% of participants thought that using video-conference was a useful way to receive psychological evaluation when other contact methods were limited. • 71% of participants said they would like to be interviewed by video-conference again.
O'Reilly et al.[8] (Canada)	2007	Video-conference vs Face-to-face	• Patients referred by their general practitioner for psychiatric consultation were randomly assigned to have follow-up consultations delivered via video-conference or face-to-face. • Compare the clinical outcomes for patients whose monthly follow-up psychiatric appointments (up to four months) were conducted via video-conference to patients who had face-to-face follow-up appointments. • Compare the patient satisfaction the two groups had with the service they had received. • The video-conference equipment used a 68.5cm screen, up to 352x288 pixel resolution, and operated over a 384kbps ISDN connection.	• All results support the conclusion that clinical outcomes were no worse for the patients who had video-conference consultations compared to those who had face-to-face consultations. • The two groups also expressed similar levels of satisfaction with the service.

Table 4. Qualitative research exploring common themes found in nurses' opinions and perceptions of face-to-face, telephone, and video-conference triage.

Author	Year	Main comparison	Aim	Key finding

Pettinari & Jessopp[9] (UK)	2001	Expected issues with telephone triage vs Actual issues with telephone triage	• Qualitative analysis of semi-structured interviews to assess the interactional practices of telephone triage nurses at NHS Direct (UK).
			• Interviews conducted immediately before triage nurses were to commence their first six-month period of telephone triage duties and again after having spent six-months doing telephone triage.
				• Nurses expected that lack of visual cues would pose a serious challenge in doing telephone triage. Three main issues identified:
				  ○ Determining the sick patient's condition
				  ○ Determining the callers reliability as an informant
				  ○ The nurses ability to build a rapport/trust-relationship with the caller.
				• At the six-month follow-up interview, nurses reported having experienced many of the issues they had expected. However, building of trust was less of an issue than anticipated.
				• Nurses' assessments were hindered by an inability to see patient symptoms and having to rely on the patient's description. Nurses' own descriptions focused on the physical aspect of patient's illness/injury.
				• Nurses had to compensate for the absence of visual information during interactions, often by having to do more detailed questioning than would have been necessary in face-to-face triage.
				• Nurses had to modify their interactional style because empathic and rapport-building strategies that work in face-to-face encounters (e.g. 'comforting by silence') do not work over the telephone. If the nurse did not 'take their turn' in a telephone conversation it could be interpreted as lack of caring, while the patient in a face-to-face encounter could see that the nurse is still attending to the patient.

Author	Year	Main comparison	Aim	Key finding
Johnsen & Bolle[10] (Norway)	2008	Telephone vs Video-conference	• Compare emergency hotline telephone nurse opinions and issues encountered after having done five simulated telephone-nurse-assisted CPR calls using telephone and five calls using video-conference via a mobile phone.	• Telephone nurses were surprised at how quickly they adapted to having the image in the videocalls, and how they became reliant on it. • Telephone nurses found they saved a lot of time by not having to ask questions because they could see the position of the simulated patient and how the CPR was being conducted. It was also easier to recognise if the caller had misunderstood telephone nurses' instructions. • Video and audio quality in videocalls was not always clear, especially when there was a lot of movement or background sound. • Some telephone nurses were concerned that, in real world situations, callers would see their faces and it would be difficult to remain anonymous. • Regularly seeing video images of catastrophic incidents and patient injuries could make it more psychologically difficult for telephone nurses to remain emotionally detached. • Telephone nurses thought that having video images may give them too many things to focus on (the audio, the events in the video, the call protocol, keeping track of the ambulance) and that it would be more difficult to follow the protocol with this extra information.
Jelinek & Little[11] (AUS)	1996	n/a	• One-hundred text-based descriptions of patient presentations at EDs were used to assess the inter-rater reliability of 115 ED triage nurses.	• Although the study did not formally measure the utility of visual cues, many participating nurses complained about the difficulty in triaging scenario patients without visual and verbal cues that would normally be available in triaging scenarios, but were not available in the text-based descriptions of the patient presentations at EDs.

Author	Year	Main comparison	Aim	Key finding
Demiris et al.[12] (USA)	2005	Video-conference vs Face-to-face	• Compare the frequency with which different themes were discussed, using content-analysis of audio-recordings, of dermatology consultations that were conducted using video-conference or face-to-face.	• The video-conference consultations included most of the same important patterns of interactions that were found in face-to-face consultations. Small talk was significantly more frequent in the video-conference consultations, but there were no other significant differences in the frequency with which other themes were discussed. • The researchers conclude that themes of communication video-conference and face-to-face consultations were comparable. • Technical issues, such as asking to adjust the camera or volume, were discussed in 8/54 (14.8%) of video-conference consultations.

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