Effects of Lumbar Puncture Educational Video on Parental Knowledge, Perceived Risks and Consenting Acceptability

Mohamad-Hani Temsah[1], Ayman Al-Eyadhy[1], Fahad Alsohime [1], Khaled Alhasan[2], Fahad Bashiri[1], Hashim Bin Salleeh [2], Gamal Hasan[3], Ali Abdu Alhboob[2], Narjes Al-Subaie[2], Abdullah Al-Wehaibi [2], Omar Mohamad Hani Temsah[4], ALI SOMILY[2], and Fahad Al-Zamil[1]

[1]King Saud University College of Medicine
[2]King Saud University
[3]Assiut University
[4]Alfaisal University

July 2, 2020

Abstract

Objectives: To assess a newly developed educational video about lumbar puncture (LP), in the parents' native language, tailored to their social background, and whether it facilitates their consent for LP. Methods: The randomized, controlled trial was conducted at outpatient pediatric clinics at a teaching hospital, Riyadh, Saudi Arabia. The conventional arm used LP verbal explanation. The second group utilized a standardized video with similar information. Parents' knowledge, perceived LP risks, and willingness to consent were measured, before and after the intervention. Results: We enrolled 201 parents, with similar baseline characteristics. Both groups had an increase in knowledge scores, with Wilcoxon signed-rank test showing significant knowledge gains (Verbal Explanation: W=2693, n=83, P<0.001, and Video: W=5538, n=117, P< 0.001). However, the conventional verbal counseling resulted in more consistent knowledge gain (SD=14.5) as compared to the video group (SD= 18.94). The video group reported higher perceived risk (Mean 8.2, SD 3.59) than the verbal group (mean 7.12, SD 2.51). The less-educated parents perceived higher LP risk after watching the video (P< 0.001). Conclusions: LP video education in parents' native language is as effective as conventional verbal education for the informed consent, with the additional advantage of reproducibility and more illustrations. While videos could facillitate remote procedural consenting process during infectious disease outbreaks; however, this should be followed by direct verbal interaction with parents, to ensure their full understanding and address any further concerns.

Introduction:

Despite all the progress in the diagnostic modalities, lumbar puncture (LP) remains a cornerstone diagnostic, therapeutic, and anesthetic procedure. When suspecting Central Nervous System (CNS) diseases such as infections, LP usually is the method of choice to confirm it or rule it out.

However, the procedure for LP presents a source of anxiety and fear to patients and their relatives, leading to refusal of the procedure on many occasions which may compromise or delay the patients, accurate management.[1] Moreover, the lack of a Cerebrospinal Fluid (CSF) sample for analysis and cultures in CNS infections, for example, may lead to unnecessary use of multiple broad-spectrum antibiotics and other antimicrobials as empirical therapy, which might be associated with side effects, increased cost and development of antimicrobial resistance.

Obtaining informed consent to perform LP could be considered more challenging as compared to other

common invasive medical procedures. LP refusal was reported by some studies[1] as well as requiring more time and effort to get consent than other more risky and painful procedures in the emergency department.[2] This could be related to people's misconceptions about LP and inadequate communication tools and skills when consent is sought. Previously, specific criteria were suggested for appropriate informed consent for LP, including risks and benefits, alternatives to the procedure, explanation of the procedure, and a signature of a witness.[3]

The use of videos to present information seeking consent is not a new approach, starting in the 1970s,[4] and it was used to get consent for diagnostic procedures.[5-7] Nowadays, this tool may have much broader applications in the current era of modern online video streaming and advanced technology tools.

In the present study, we aimed to assess a newly developed educational tool that could help in facilitating LP consenting, with the use of instructional video, with simple terminology in the parents' native language, and tailored to their social background and beliefs.

Method:

Study design and population

This was a prospective interventional study that was conducted at the outpatient pediatric clinics at a university teaching hospital in Saudi Arabia. The study included only parents, aged 20 years or older, and who are fluent Arabic (native language) as the primary language of the studied educational tools. Participants were selected by convenient sampling while visiting the pediatric clinics, and each subject was randomly assigned to either conventional arm group or video-guided group. Subjects who were approached in weeks 1, 2, 7, and 8 of the study and were allocated to the conventional arm group, while the subjects involved in the second video-based arm group were approached in the other period (weeks 3-6). Noteworthy, none of them were scheduled to have LP on them or their siblings.

The conventional arm was the verbal explanation (Appendix I) that is being given on a routine basis for parents of children undergoing LP in the pediatric emergency department. In contrast, in the second video-based arm group, we utilized a standardized video on this group that contains the same information as the conventional arm, with streaming of graphic depictions (https://www.youtube.com/watch?v=Q2gm_-iL5ZQE&t=95s or the shortcut: https://bit.ly/2mG12q0).

The verbal and video-recorded information were standardized as per the multiprofessional discussions between the pediatric intensive care (PICU), the pediatric infectious disease (PID), the pediatric neurology, and the pediatric emergency department (ED) teams within our institution.

Assessment measures:

Subjects were asked to respond on a questionnaire, to explore their baseline knowledge on LP as a diagnostic procedure. The questionnaire was generated after careful review of the literature and a panel of experts from relevant specialties, namely the PICU, ED, pediatric neurology, and PID team members, who reviewed the quality and content of each tool going to be used. The final version of the used tool was tested to ensure clearance and appropriateness for the targeted population in this study.

The respondents were asked to answer a knowledge test with either true, false, or do not know, on six questions pre and post each educational method (Appendix II). The questions were: LP is used to diagnose meningitis, blood tests are good alternatives to LP for diagnosing meningitis, computerized brain tomography (CT) scan can be an alternative to LP for the diagnosis, a physician can diagnose meningitis without the aid of LP, LP poses more risk to patients than the disease itself, and neonates can undergo LP if they needed one. The correct answers were rated with 10 points each, and incorrect answers were assigned zero, so the maximum possible score was 60. The knowledge score best correct answers were based on experts' careful evidence review of the epidemiological consequences of LP in both adults and children.[8-9]

Additionally, the respondents were asked to answer seven questions that tapped Perceived Risk of LP complications pre and post-education on a 0-4 Likert-like scale (coded as zero uncertain, 1 Never, 2 sometimes,

3 often, and 4 very often). This questionnaire included the followings: LP can have very severe side effects, LP can lead to Paralysis, LP can lead to enuresis, LP can lead to sterility, LP can lead to scoliosis, LP can Lead to meningitis, general anesthesia is needed to obtain LP in children, and lastly, LP can lead to chronic back pains. The maximum possible score is equal to 7 items x 4= 28, and the uncertainty was coded with zero. The summative analysis was utilized to compute a total knowledge score (out of 60 possible correct answers) and total perceived risk (also out of a maximum of 28 points).

Results:

The study included 201 subjects; they were 118 (58.7%) males and 83 (41.3%) females. All of them completed the pre-interventional and post-intervention questionnaire (Appendix II). A comparison of their socio-demographic characteristics is shown in Table 1. We found there is no significant differences between the two groups regarding gender, age groups, nationality, and educational level.

Table 2 shows the differences in lumbar puncture knowledge and risk perceptions pre- and post-education. Within the verbal explanation counseling group, the mean for the self-reported knowledge for LP showed significantly higher post-education scores compared to the pre-education scores (45.78 14.58 versus 20.72 $\pm$ 18.1 with $p < 0.001$). Similarly, within the video guided counseling group, there were significantly higher post-education mean scores for the self-reported knowledge of LP (42.46 $\pm$ 18.94 versus 19.32 $\pm$ 18.3 with $p < 0.001$). On the other hand, the mean score for LP risk perception showed significantly higher pre-education mean scores (6.5 $\pm$ 4.51 versus 8.2 $\pm$ 3.59) with $p < 0.001$).

Table 3 shows a comparison of pre-and post-education mean scores of lumbar punctures consenting and perceived risks in both groups. Responses of both groups regarding the question related to their previous consent for LP for themselves or their siblings did not show any significant differences. However, answers to the question of LP can have serious side effects showed significant more answers for strongly agree and agree in the post-education video-guided counseling group compared to the verbal counseling group [9 (7.6%) versus 2 (2.4%) and 34 (28.8%) versus 10 (12%) respectively, with p-value 0.016 for both]. On the other hand, the answers with disagreeing showed significantly more answers in the pre-education group [41 (49.4%) versus 41 (34.7%) with p-value 0.016].

Discussion:

Obtaining informed consent to perform LP could be considered more challenging compared to other common procedures, and it has been reported to be refused by many patients.[1] With retrospective charts review, it was found that many important points were not adequately documented on the consent forms.[3] This may imply that parents were not making real, informed decisions. They have also recommended using alternative methods, like video, when informing parents about procedures. This is especially important in emergency settings when the same, sufficient information is urgently needed for proper consenting of patients and relatives. Using such digital media may be more relevant during the infectious disease outbreaks, such as with the current COVID-19 pandemic. *Nicol et al.* reported the need to minimize face-to-face contact during the pandemic by utilizing digital tools, such as adopting electronic informed consent.[10] Many hospitals have recently changed their standard operating procedures during the COVID-19 outbreak,[11] with the process for obtaining appropriate procedural informed consent from patients has been revised to decrease the risk of transmitting infection. Moreover, a video with details on the LP procedure gives the parents the possibility to watch it again, at their own pace.

Refusal of LP has been reported in some studies, and the refusal rate was ranging from 24 to 44%.[1] The main reasons for refusal were fear of paralysis, painful nature of the procedure, and fear of death. Other possible reasons that were fewer common causes for refusal included scoliosis, developmental delay, and epilepsy. Moreover, it was reported that 21% of parents who refused LP felt that the procedure was unnecessary, and two families in the same study doubted motives behind the request of consent.[1]Patients or their families' misconceptions about the procedure and inadequate communication tools and skills utilized when the consent is sought might have impacted their reluctance to give consent for LP. Informed consent about any medical procedure implies proper communication in the same person's terminology and language, so the participant

is aware of the procedure's risks and benefits.

In the current study, we reported a significant increase in the number of parents who agree to consent after both ways of interventions (verbal explanation and video-guided counseling) in the parents' native language. Similar to our findings, videos have been reported to be useful for education in various medical disciplines.[5, 12-13] A prospective randomized study on the use of videos for preoperative education of patients undergoing regional anesthesia found that those who watched a video before the procedure had significantly less anxiety than those who received verbal education only.[5] Patients with closed ankle fracture viewing video-recorded information before giving consent for ankle fracture surgery demonstrated an overall increased understanding of the risks, benefits, alternatives, and postoperative treatment compared to patients who received information verbally.[14] However, some reported that using video-guided counseling leads to more comprehension and understanding of the procedure, while others reported no significant differences compared to conventional counseling methods.[5-7] This variation in results could be caused by differences in the quality and content of videos in relation to the targeted procedure, the counselors' communication skills, and the cultural and socio-demographic characteristics of the targeted population.

Noteworthy, that while Arabic is the native language is Saudi Arabia, the health care system uses English as the official communication among various healthcare providers and in the medical health records. Moreover, some of the health care providers within Saudi Arabia, who might be responsible for counseling parents, are not of native Arabic origin with relative Arabic language difficulties that might create a communication barrier between the health care provider and the parents. Providing such educational videos in Arabic, with English subtitles, can bridge the gaps of some communication difficulties among parents and healthcare workers, as well as providing appropriate knowledge about such medical procedures. Moreover, video consent has the potential to minimize the time required for prolonged counseling by physicians, especially in busy services like the emergency department. Instead, brief counseling after the videos may be sufficient, without sacrificing knowledge. *Epstein et al.* had also reported more change in attitude in the video group as compared to the audio group about the Cardiopulmonary resuscitation (CPR) procedure, as patients saw in the video of the aggressive nature of CPR, but not in the narrative arm.[15]

Differences in the results between studies could be attributed to many factors such as the procedure itself, the educational material content and context, the situation for the watcher, and cultural believes among different levels of education and socioeconomic status.

Conventional verbal explanation in our study showed a more consistent effect when it was done with constant information with a more consistent gain of knowledge, in comparison to video-guided education that is presenting the same information, in which the gain could be more widely dispersed. This difference could be attributed to the various factors related to educational video's content and audio-visual effects. It also suggests that while the video method can be useful, the need for the individualized approach is still warranted for these parents.*Joseph et al.* demonstrated that while the informed consent using an educational video ensured good comprehension in most of their participants; however, additional educational sessions were advisable for some participants.[16] The healthcare provider-patient interaction before LP is an integral part of counseling because adequate patient's informed consent necessitates the ability of the patients or their families to directly discuss their concerns regarding the indications, alternatives, and complications of any medical procedure they undergo.

Video education in parents' native language was demonstrated to be an equally effective method for education regarding lumbar puncture as verbal explanation counseling. However, the video guided counseling and education has the additional advantage of reproducibility, which is training-dependent and might be subjected to human errors in verbal explanation counseling.[6]

In terms of overall comprehension, the current study showed a statistically significant increase in knowledge score following the two methods (verbal and video-guided education), and both were equally effective in educating parents, regardless of their educational level. However, the observed difference in the change in knowledge scores between those two groups was not statistically significant. *Dunbar et al.* recently described

that using the educational video about LP resulted in a significantly higher parental understanding of the procedure.[17] In our study, the equal effect on knowledge score in both arms might be attributed to having different study team operators in the verbal explanation method with different potential, aptitudes, and vocal skills.

Our finding that people with less knowledge perceived higher risk for LP after watching the video-guided education could be due to the demonstrated animation of the anatomical positioning and procedure explanation with needle insertion in the back of the patients. Other research demonstrated that while videos standardized the educational message, and maybe particularly useful with low literacy populations, however, additional educational sessions may be necessary for some participants with lower educational level.[16] *Dunbar et al.,* on the other hand, demonstrated contradictory findings to our study, with more parental comfort with the LP procedure after watching the adjunctive educational video.[17] This paradoxical negative effect could be minimized by supplementing the video with a one-to-one counseling session for the parents to clarify any worrying scenes, contents, and questions that may arise after viewing the demonstration. Alternatively, providing a disclaimer at the beginning of such educational videos, highlighting the potential graphical contents of the video, and emphasizing the availability of individualized counseling after the video. Furthermore, educational videos should be piloted among the targeted audience so that the content can be modified based on their feedback. Arnold reported that parents had increased understanding of retinopathy of prematurity (ROP) after watching a short educational video, and this instrument decreased face-to-face education time for the treating physician and appeared to improve the consent process for treatment.[18]

The combination of both video and phone verbal explanation could prove to be successful and tailor the counseling to the specific needs and understandings of the parents. Such an approach is needed during the COVID-19 pandemic and other infectious outbreaks, where the remote informed consenting process is intended to reduce the possibility of transmissible disease.[10-11] Healthcare providers may adopt such educational videos, incorporated as an online link provided both as a character string and a quick response (QR) code, into the procedural electronic consent. These may be obtained in a manner like the telephonic consent process. Future studies to evaluate these video-integrated, remote informed consenting processes during the pandemic are warranted.

Study Limitation:

While this is the first study to explore the potential effect of educational video in the native language of participants on their knowledge and risk perception for lumbar puncture, however, one limitation is the survey-based questionnaire nature of the study among parents who are not actually consenting for LP, so that may not be similar to the actual situation when consent for LP is needed. Hence, our findings warrant future research among actual patients' parents undergoing LP consenting process.

Conclusion:

Video education in parents' native language about lumbar puncture is as effective as conventional verbal education for the informed consent, with the additional advantage of reproducibility and more clear illustration that can give parents better insight. Such videos could be utilized for the remote procedural consenting process during infectious disease outbreaks; however, this video should be followed by direct verbal interaction with the parents, to ensure their full understanding and address any further concerns to obtain informed consent for LP.

Acknowledgments : None

Conflict of interest statement for all authors: Nothing to declare

References:

1. Narchi H, Ghatasheh G, Al Hassani N, Al Reyami L, Khan Q. Why Do Some Parents Refuse Consent for Lumbar Puncture on Their Child? A Qualitative Study. Hosp Pediatr 2012;2(2):93-8.

2. Easton RB, Graber MA, Monnahan J, Hughes J. Defining the scope of implied consent in the emergency department. Am J Bioeth 2007;7(12):35-8.
3. Patel PB, Anderson HE, Keenly LD, Vinson DR. Informed consent documentation for lumbar puncture in the emergency department. West J Emerg Med. 2014;15(3)):318-24.
4. Barbour GL, Blumenkrantz MJ. Videotape aids informed consent decision. JAMA 1978;240(25):2741-2.
5. Jlala HA, French JL, Foxall GL, Hardman JG, Bedforth NM. Effect of preoperative multimedia information on perioperative anxiety in patients undergoing procedures under regional anaesthesia. Br J Anaesth 2010;104:369–74.
6. Armstrong AW, Alikhan A, Cheng LS, Schupp C, Kurlinkus C, Eisen DB. Portable video media for presenting informed consent and wound care instructions for skin biopsies: a randomized controlled trial. Br J Dermatol 2010;163(5):1014-9.
7. Rossi MJ, Guttmann D, MacLennan MJ, Lubowitz JH. Video informed consent improves knee arthroscopy patient comprehension. Arthroscopy 2005;21(6):739-43.
8. Schulga P, Grattan R, Napier C, Babiker MO. How to use... lumbar puncture in children. Arch Dis Child Educ Pract Ed 2015;100(5):264-71.
9. Johnson KS, Sexton DJ. Lumbar puncture: Technique, indications, contraindications, and complications in adults. 2019 UpToDate Available at https://www.uptodate.com/contents/lumbar-puncture-technique-indications-contraindications-and-complications-in-adults?search=lumbar%20puncture%20complications%20adults&source=search_result&selectedTitle=1˜150&usage_type=default&display_rank=1 Last accessed March 12, 2020.
10. Nicol GE, Piccirillo JF, Mulsant BH, Lenze EJ. Action at a Distance: Geriatric Research during a Pandemic. J Am Geriatr Soc. 2020 Mar 24. doi: 10.1111/jgs.16443. [Epub ahead of print]
11. Vanderbilt University Medical Center. Coronavirus (COVID-19) Information for Employees and Patients. https://www.vumc.org/coronavirus/updated-standard-operating-procedure-obtaining-procedural-informed-consent-during-covid-19-pandemic Accessed on 27-4-2020"
12. Katz ML, Heaner S, Reiter P, van Putten J, Murray L, McDougle L, Cegala DJ, et al. Development of an educational video to improve patient knowledge and communication with their healthcare providers about colorectal cancer screening. Am J Health Educ 2009; 40:220–8.
13. Gimeno-Garcia AZ, Quintero E, Nicolas-Perez D, Parra-Blanco A, Jimenez-Sosa A. Impact of an educational video-based strategy on the behavior process associated with colorectal cancer screening: a randomized controlled study. Cancer Epidemiol 2009;33:216–22.
14. Rossi M, McClellan R, Chou L, Davis K. Informed Consent for Ankle Fracture Surgery: Patient Comprehension of Verbal and Videotaped Information. Foot Ankle Int 2004;25(10):756-62.
15. Epstein AS, Volandes AE, Chen LY, Gary KA, Li Y, Agre P, Levin TT, et al. A Randomized Controlled Trial of a Cardiopulmonary Resuscitation Video in Advance Care Planning for Progressive Pancreas and Hepatobiliary Cancer Patients. J Palliat Med 2013;16(6):623-31.
16. Joseph P, Schackman BR, Horwitz R, Nerette S, Verdier RI, Dorsainvil D, et al. The use of an educational video during informed consent in an HIV clinical trial in Haiti. J Acquir Immune Defic Syndr 2006;42(5):588-91.
17. Dunbar M, Paton G, Singhal A. An Educational Video Improves Consent in Pediatric Lumbar Puncture: A Randomized Control Trial. Pediatr Neurol. 2019:S0887-8994(19)30032-3.
18. Arnold RW. A Video Educational and Consenting System for ROP. J Pediatr Ophthalmol Strabismus 2012;49(6):382.

Table 1: Comparison of sociodemographic characteristics, knowledge of lumbar puncture, and perceived risks among the studied groups (Total number = 201)

Variables	Verbal Explanation Counseling N=83	Video-Guided Counseling N=118	P-value
Gender: (number and %)	**Gender: (number and %)**	**Gender: (number and %)**	**Gender: (number and %)**

Variables	Verbal Explanation Counseling N=83	Video-Guided Counseling N=118	P-value
Male	49 (59.1%)	69 (58.47%)	0.527
Female	34 (40.9%)	49 (41.53%)	
Age groups (years): (number and %)	**Age groups (years): (number and %)**	**Age groups (years): (number and %)**	**Age groups (years): (number and %)**
20-30 years	31 (37.35%)	39 (33.05%)	0.597
31-40 years	38 (45.78%)	51 (43.22%)	
41-50 years	9 (10.84%)	21 (17.79%)	
>50 years	5 (6.03%)	7 (5.93%)	
Nationality: (number and %)			
Arab expatriates	11 (13.25%)	8 (6.78%)	0.089
Saudi's	72 (86.75%)	110 (93.22%)	
Education: (number and %)			
Primary and secondary	37 (44.58%)	52 (44.07%)	0.528
Higher education	46 (55.42%)	66 (55.93%)	

P significant if < 0.05

Table 2: Differences in lumbar puncture knowledge and risk perceptions pre- and post-education (Total number = 201)

Verbal Explanation Counseling (Number = 83)	Verbal Explanation Counseling (Number = 83)	Verbal E
	Pre-education	**Post-edu**
Score of LP knowledge: [mean (SD)]	20.72 (18.1)	45.78 (14.
Score of LP risk perception: [mean (SD)]	6.81(4.7)	7.12(2.51)
Video Guided Counseling (Number = 118)	**Video Guided Counseling (Number = 118)**	**Video G**
	Pre-education	**Post-edu**
Score of LP knowledge: [mean (SD)]	19.32(18.3)	42.46(18.9
Score of LP risk perception: [mean (SD)]	6.5(4.51)	8.2(3.59)

LP: Lumbar puncture

P significant if < 0.05

Table 3: Comparison of pre-and post-education in both groups in relation to lumbar puncture consenting and perceived risks (Total number = 201)

Questions	Verbal Explanation Counseling N=83	Video Guided Counseling N=118	P-value
Would you consent for LP to be done for you or your sibling? (number and %)	**Would you consent for LP to be done for you or your sibling? (number and %)**	**Would you consent for LP to be done for you or your sibling? (number and %)**	**Would you consent for LP to be done for you or your sibling? (number and %)**
Undecided	4 (4.8%)	7 (5.9%)	0.372
No, will never	0	3 (2.5%)	

Questions	**Verbal Explanation Counseling N=83**	**Video Guided Counseling N=118**	**P-value**
Yes	79 (95.2%)	108 (91%)	
LP can have serious side effects? (number and %)	**LP can have serious side effects? (number and %)**	**LP can have serious side effects? (number and %)**	**LP can have serious side effects? (number and %)**
Strongly agree	2 (2.4%)	9 (7.6%)	0.016
Agree	10 (12%)	34 (28.8%)	
Undecided	19 (22.9%)	22 (18.6%)	
Disagree	41 (49.4%)	41 (34.7%)	
Strongly disagree	11 (13.3%)	12 (10.2%)	

P significant if < 0.05