



FEASABILITY AND IMPACT OF VIDEO SIMULATION BASED, ONLINE MODULE BASED ON PEDIATRIC TRANSPORT FOR LOW RESOURCE SETTINGS

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INTRODUCTION

In India as in most low resource settings, there exists a tiered system of healthcare, with differential resource allocation ^{1–3}, and urban/metropolitan clustering of medical resources, necessitating requirement of transport. Pediatric transport medicine remains a neglected aspect of pediatric curriculum. Hence, there was a felt need for development of a module which can train doctors especially paediatricians on the aspects of safe pediatric transport Here we describe the development, implementation, and postintervention results of a novel pediatric transport module, based on video based simulation, that was prepared to introduce the basics of a vast topic, prepared with no funding, whose delivery was planned and executed using distance learning.

MATERIALS AND METHODS

PRIMARY OBJECTIVE

2. Baseline data (contd): Among the participants, majority had been junior doctors (with 40.8% had < 5 years' experience in pediatrics alone), while majority had < 5-year experience in pediatric intensive care (60.3%). Participants were predominantly paediatricians (49.7%(224)), while 35.3%(159) were from Pediatric intensive care background. The participants were from all parts of the country (23.5% north India, 10.2%, south India, 47.0% east India, and 19.3% from west India. 13.7% participants had undertaken some training on pediatric transport albeit as a small part of another course as PALS, IAP ALS, PFCCS etc. However, none had undertaken an exclusive pediatric transport related course.

RESULTS

3. Comparison of the TLM an feasibility of the video simulation : All the three formats lecture, small group discussion and video-basedsimulation, were widely accepted by the participants, based on their respective topic content (96.7% Vs, 95.5 % Vs 97.3%, P 0.140), topic relevance (96.9% Vs 95.6% Vs 96.7%, p 0.292), allocated time (94.1% Vs 93.4% Vs 93.7%, p 0.804), and mode of presentation (96.2% Vs 94.2% Vs 95.8%, p 0.095)

3. Cognitive assessment via pre-test and post-test : It was assessed based on pre-test and post-test questionnaires administered pre and post the module. It was observed that a pre-test score (median(IQR) of 46.7(36.7-56.0) was observed Vs 65.20 (53.30-76.70) (p<0.001). The module had good post hoc power as well. We considered participants <40% of overall score as not passed, and \geq 40% as having passed. 71% (n=320) passed the pre-test, while 97.1% passed the post test (n=370).

4. Knowledge, affective and practice questionnaire analysis.

Most participants stated that pediatric transport should be a mandatory part of curriculum 96.3%), while all participants (100%) stated that they

1. To assess the impact of online training on pediatric transport on knowledge, attitude and practices of clinicians, using questionnaire.

SECONDARY OBJECTIVE

- 1. To assess and compare the TLMs: telesimulation based sessions with didactic lectures and PowerPoint based lectures.
- 2. To assess the impact of online sessions on local practice and attitude of the clinicians, by means of a survey.

METHODS

- **1. Planning for the module** : Critical care modules normally involve training of cognitive, affective and psychomotor domains. Hence, a module with video-based-simulation, and small group discussion . christened "Transport of Sick Kids' module: Task module" and rolled out under the banner of Indian academy of pediatrics
- **Development of book :** A 368-page instructor manual was developed, to be provided as a resource material to the potential instructors.
- **3. Module structure :** The module was designed to include 4 didactic lectures, 3 case based discussions and 3 video based simulation sessions. The module was organised to have on an average 40-50 participants per module. Standardised presentations were made with contributions from national and international experts, for each of the lectures, small group discussions and video-based-simulation sessions, and non-modifiable presentations were then distributed to the future instructors for subsequent sessions.
- 4. Development of video-based-simulation content: To enable a better learning experience, simulation was needed for the participants to gain in all the aspects of bloom's taxonomy from remembering to creating ¹⁴, and assessment from knows to performs ¹⁵. However in distance learning mode, with no funding for a low resource setting, sessions had to be developed based on video-based simulation.
- 5. Video-Based Simulation for the purpose of this study is being defined as situation tests in which participants respond to a video simulations of realistic job situations of pediatric transport scenarios, of a preassigned case, and then made to respond to various points of discussion on each video as preassigned teams with debriefing. ^{16–} ^{20.} In the study the debriefing and assessment was done on the plus-delta concept, in various videos.
- 6. The simulation sessions were designed to bring all the pediatric transporting concepts together and make the students undertake a scenario from receiving a patient to bundling up for transport to higher centre, including transport via land (ambulance). Nearly 60 different videos of 2-5 minutes each in high definition were shot, were edited, and conglomerated into evolving scenarios. Three simultaneous simulation sessions of 20-30 minutes each, were run at each time in breakout rooms of 10-15 participants each.

would recommend the module to their colleagues. Participants stated that it led to improvement in practices they have made standardised transport bag for inter-hospital transfers (49.5 Vs 66.4%, P 0.002) as well as for intra-hospital transfers (55.4% Vs 86%, p<0.001). The participants were more amenable to use checklist prior to transport (63.9 Vs 97.2%, p 0.008), had started allocating roles prior to transport (79.5% Vs 97.2%, p <0.001), and securing seatbelts prior to ambulance starting (74.6% Vs 91.6%, p <0.001).

The module appeared to have some positive impact on the knowledge, attitude and practices of the participants as assessed by pre /post-test, and by pre-test KAP and follow up KAP questionnaires. After the module participating delegates had a significant self-reported confidence in transporting a sick child (p < 0.001), a child with covid (p < 0.001). There was an improvement in self -reported practices at their respective centres, including use of checklist, moments of handover, using transport bags for intra and interhospital transfer, role assignment prior to transport. These changes were persistent even 1 week after the module.

| Table 1: BASELINE PARAMETERS (n=451) | | | |
|--------------------------------------------------------------------------------------------------|-------------|--|--|
| Number of years of experience in general pediatrics ¹ | | | |
| < 5 years | 40.8% (184) | | |
| 5-10 years | 19.5%(88) | | |
| >10 years | 39.7%(179) | | |
| Number of years of experience in Pediatric intensive care ² | | | |
| < 5 years | 60.3%(272) | | |
| 5-10 years | 20%(90) | | |
| >10 years | 19.7%(89) | | |
| Part of India belongs to | | | |
| North | 23.5% (106) | | |
| South | 10.2%(46) | | |
| East | 47.0% (212) | | |
| West | 19.3%(87) | | |
| Affiliation | | | |
| Corporate sector | 17.5%(79) | | |
| Government sector hospitals/Medical colleges | 54.3%(245) | | |
| Public private model-based hospitals and medical colleges | 13.5%(61) | | |
| Private practice | 14.6%(66) | | |
| Number of transfers per month from centre | | | |
| Table 2: Results for the participant feedback to individual sessions (Based on type of sessions) | | | |
| | | | |

| | | (N=259 Participants, 2849 res | sponses) | | | |
|-----------------------------------|----------------------|------------------------------------------|-----------------------------------|------------------------|---------|--|
| | | PowerPoint based lecture Sma (n=1295) | Small group discussion (n=777) | Video based simulation | Dyalua | |
| | | | | (n=777) | r Value | |
| Topic content ³ | 4/5 (Good/very good) | 1252(96.7%) | 742(95.5%) | 756(97.3%) | 0.140 | |
| | 1-3(Not good) | 43(3.3%) | 35(4.5%) | 21(2.7%) | | |
| Topic relevance ³ | 4/5 (Good/very good) | 1255(96.9%) | 743(95.6%) | 751(96.7%) | 0 202 | |
| | 1-3(Not good) | 40(3.1%) | 34(4.4%) | 26(3.3%) | 0.292 | |
| Allocated time ³ | 4/5 (Good/very good) | 1219(94.1%) | 726(93.4%) | 728(93.7%) | 0 904 | |
| | 1-3(Not good) | 76(5.9%) | 51(6.6%) | 49(6.3%) | 0.804 | |
| Mode of presentation ³ | 4/5 (Good/very good) | 1246(96.2%) | 732(94.2%) | 744 (95.8%) | 0.095 | |
| | 1-3(Not good) | 49 (3.8%) | 45(5.8%) | 33 (4.2%) | 0.055 | |

- **4.** Ethics: The study was approved by IEC vide registration number F.1/IEC/MAMC/(84/02/2021/No.394), dated: 9/06/2021, and was further registered on CTRI vide registration number CTRI/2021/07/034689.
 - Consent was taken digitally on the electronic form, while taking pre-test for taking part in the module.
- 5. Sample size calculation: The questionnaires were pre-validated in a pilot study was organized on paediatricians across the country, mainly from south and north India, and the questionnaire was administered to them. The participants, for this pilot study were either general paediatricians, or subspecialists from pediatric intensive care ,pediatric emergency etc. The pre and post-test responses were recorded and analysed. Based on the responses, the following sample size was calculated, with an observed difference [mean (SD)] between pre-test and post-test (55.8(20.5) Vs 73.8(23.1)] of 18 points, was observed. With power of 95%, a sample size of 78 was calculated. However, since there was a priori plan for a subgroup analysis for paediatricians with <5 years, 5-10 years and >10 years of experience. Hence to account for that, we tried to attain the sample size of 78 X 3 = 235. Since the questionnaire were build into the module, hence as the module rolled out, the responses were recorded sequentially. A information sheet and consent was built into each questionnaire. Feasibility was assessed by acceptability, demand, and comparison to current distance education methods (viz. case-based discussion and power-point based lectures).



¹Total (N=259 participants, 2849 responses; 5 PowerPoint based lectures (259X 5) : Total 1295 responses; Similarly for three small group discussion and three video-based-simulation sessions 259 X 3=777 responses). ²All results in n(%). ³ Likert scale 5 point(5 being the best rating, 1 being worst) :4/5 Vs 1-3

| Parameter | Grading | | Follow up | P value |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|-----------------------|---------|
| | | Pre test ¹ | (1 week) ¹ | |
| General pediatric experience | < 5 years | 176 (45.7%) | 72 (67.3%) | <0.001 |
| | 5-10 years | 68 (17.7%) | 15(14.0%) | |
| | >10 years | 141 (36.6%) | 20(18.7%) | |
| Have you started or will you be allocating roles between the transporting team members during intra-hospital transport? | No / negative response | 67 (20.5%) | 7 (6.5%) | <0.001 |
| | Yes / positive response | 260 (79.5%) | 100 (93.5%) | |
| Have you started securing or will you ensure securing seatbelts during ambulance transfers? | No / negative response | 83 (25.4%) | 9 (8.4%) | <0.001 |
| | Yes / positive response | 244 (74.6%) | 98 (91.6%) | |
| Would you stand in the ambulance , during ambulance transfers? | No / negative response | 253 (77.4%) | 84 (78.5%) | 0.461 |
| | Yes / positive response | 74 (22.6%) | 23 (21.5%) | |
| Do you think any specific expertise is needed to transport a sick child? | No / negative response | 14 (4.3%) | 3 (2.8%) | 0.361 |
| | Yes / positive response | 313 (95.7%) | 104 (97.2%) | |
| How confident are you in transporting a sick child? | No / negative response | 93%(305) 14%(15) | | <0.001 |
| | Yes / positive response | 7%(23) | 92(86%) | |
| Are you aware of the components of a safe pediatric transport | No / negative response | 109 (33.3%) | 8 (7.5%) | <0.001 |
| | Yes / positive response | 218 (66.7%) | 99 (92.5%) | |
| | Yes / positive response | 293 (89.6%) | 105 (98.1%) | |
| How important do you think safe transportation practices are in pediatrics ? | No / negative response | 57 (17.4%) | 19 (17.8%) | 0.521 |
| | Yes / positive response | 270 (82.6%) | 88 (82.2%) | |

Clockwise : 1. Study flow. 2. Baseline parameters. 3. Comparison of the three instruction teaching learning methods: Video simulation , power point based didactic learning and small group discussion in break out rooms. Comparison between pre and post test scores (cognitive domain). 4. Comparison of attitude and practice questionnaire prior to the module and after 1 week of the module

CONCLUSIONS

A novel approach is needed to ensure maximum dissemination, reproducibility, and assessment of response. Simulationbased training can be a way to acquire these necessary skills and bridge the gap to higher-quality transport care.

On the basis acceptability, demand, and comparison to current distance education methods (viz. case-based discussion and power-point based lectures), and improvement in scores on pre test and post test, improvement and persistence of practices as assessed by KAP questionnaire administered before the module and 1 week prior, such video-based simulation modules are feasible and the need of the hour for complex fields, that need to be disseminated to the grass roots.

RESULTS (contd...)

Over 900 delegates participated in the module over the course of an year from across India, via online mode. Of these 451 filled the pre-test questionnaire, and 382 the post-test questionnaire. 108 participants completed the 1 week affective and practice domain based follow up questionnaire. Since the questionnaire was built into the module, and the consent was being taken prior to undertaking it, the questionnaire was continued even beyond the completion of sample size, till the completion of the module

Though these are no substitute for hands-on clinical experience, but given the problems of available resources in settings like India, available manpower to ensure content delivery is uniform and standardised. Modules which are based on elearning, with modified video based simulation, may serve to bridge the gap. Online learning enabled participation of resource faculties from across the globe, who lent their expertise to sessions held at distant locations across India.

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