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RESEARCH ARTICLE

DEVELOPMENT OF PAEDIATRIC PATIENT HANDOVER DOCUMENTATION (PPHD) TOOL TO AID HANDOVER PROCESS AMONG NURSES WORKING IN PAEDIATRIC CARE UNITS OF HOSPITALS

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ABSTRACT

Background: In the health care system, shift work is considered necessary and indispensable to ensure continuity of care in hospitals. Due to shift change of nurses, patient handover is a routine in nursing profession. During the shift change handover process, complete information related to the patient is transmitted amongst nurses. **Objective:** The study aimed to 1. develop Pediatric Patient Handover Documentation Tool. 2. establish the validity of Pediatric Patient Handover Documentation Tool.3. establish the reliability of Pediatric Patient Handover Documentation Tool. **Methodology:** The aim of this study was to develop and test the validity and reliability of Pediatric Patient Handover Documentation tool. It is a new tool developed to facilitate structured patient handover during nurse's shift change. The tool was developed using three rounds of Modified Delphi technique. According to the suggestions of 15 panelists included in the study, items were added, deleted and modified. The final tool consists of 86 items. Validity and reliability of the tool was established. **Results:** The content validity index of the newly developed tool was 1. The reliability of PPHD Tool was calculated by Cohen's kappa (k) with value being 0.95 and percentage agreement of 99.1 %. The values demonstrate good validity and reliability. **Conclusion:** The new PPHD Tool is a valid and reliable instrument for giving a quick handover without missing necessary information related to patients.

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INTRODUCTION

In the health care system, shift work is considered necessary and indispensable to ensure continuity of care in hospitals. The term 'shift work' generally refers to a way of organizing daily working hours in which different persons or teams work in succession to cover more than the usual 8-hours day, up to and including the whole 24 hours. Rotating and scheduling are the main characteristics of shift work (Ferri *et al*., 2016). During the shift change handover process, complete information related to the patient is transmitted amongst nurses. Handover serves various useful purposes like exchange of information, socialization, organization, education and debriefing (Blazin *et al*., 2020).Number of terms are used to describe the handoff process, such as handover, sign-out, cross-coverage and shift report. The term "handoff" is defined as "transfer of information (along with authority and responsibility) during transition in care across the continuum; and includes an opportunity to ask questions, clarify and confirm".

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The concept of handoff is complex and includes "communication between care providers about patient care, handoff records and information tools to assist in communication between care providers about patient care". The complexity and nuance of the type of information and communication methods, impacts the effectiveness and efficiency of the handoff as well as patient safety (Hughes RG, 2020). The Australian Commission on Safety and Quality in Health Care (ACSQHC) (2010) has defined clinical handover as the 'transfer of information and accountability from one healthcare provider to another when a patient has a change of location of care, or when responsibility for care shifts from one provider to another'. The Winnipeg Regional Health Authority (WRHA) in 2002 commissioned an external review that has made recommendations for various aspects of patient care in several areas and gave definition for shift-to-shift report as "Shift-to-shift report is an important information sharing process for ensuring and maintaining continuity and quality of safe patient care. It complies with legal and professional practice standards" (Delrue K, 2013). There are various approaches to shift handover, including written report, telephone recordings, verbal reports in nurse's room, nursing station or at the bedside of patient.

The main aim of handover report is that patient care will proceed with least possible disruption. During the handover process, there is always a risk that important information pertaining to the patient may be lost amongst useless information (Eva M C, 2007). Researches have shown that quality of handover is directly proportionate to the quality of care delivered in the following shift. Effective handover enables nurses to take over the care of patients and provide high-quality care specific to individual's needs (Anderson *et al*., 2014).Ineffective handoffs can contribute to gaps in patient care and breaches in patient safety, including medication errors, wrong-site surgery, and patient deaths(Hughes RG, 2020). Poor clinical handover has been associated with inaccurate clinical assessment and diagnosis, delays in diagnosis, medication errors, and decreased patient satisfaction. Thus, handover should be accurate, complete, specific, relevant, timely, up to date, subjective and objective (Davies Priestly, 2006). Even though handover during shift change is a routine practice among nurses; standard handover communication skills are not a part of formal nursing curriculum. The nurses learn these skills during daily practice and gradually become more expert. Effective patient handover has been identified as the key factor in the delivery of safe and best quality care. The 'American Committee of Safety' in 2005 recognized the importance of effective, complete and authentic handover communication and referred to its standardization as the second national safety goal. This goal laid stress on communication of updated and credible information about the patient. To achieve this goal various shift handover formats such as 'I PASS THE BATON' (Introduction, Patient, Assessment, Situation, Safety, THE, Background, Action, Timing, Ownership, Next), 'SHARQ' (Situation, History, Assessment, Recommendations, Questions), '5 Ps' (Patients, Precaution, Plan, Problems, Purpose), and 'SBAR' (Situation, Background, Assessment, Recommendation) were formulated and used across the world (Ferri P *et al*., 2016).According to Schroeder (2006), the specific component of shift report should include PACE (Patient problems, Assessment/Action, Continuing/Changes, Evaluation), and other researchers have suggested other templates such as SOAPIE (Subjective, Objective, Assessment, Plan, Intervention, Evaluation), ISOBAR (Identification of patient, Situation and status, Observations, Background and history, Assessment and Action, Responsibility and risk management). There is no standardized method of handover that all nurses acknowledge so therefore there is no commonality of practice. These formats enhanced the quality of handover in various hospitals worldwide (Malekzadeh *et al*., 2013).

Though in the past few years many handover styles have been developed like bedside handover, tape-recorded handover etc, there is no consensus regarding effective handover and how handover should be performed (Meibner, *et al*., 2007).A body of literature reflects four modes of handover: the verbal handover in station, tape recording, written handover, and handover at bedside. In practice, the method of handover depends on the patient, the shift (day, evening, or night shift), and the model of service delivery (team vs. case method) (Anderson J *et al*., 2014). Commonly verbal handover is the selected method of handover, be it at the bedside, nurses' station or ward office. In order to set a quality standard for each verbal handover, Currie (2002) proposed that each handover should be 'CUBAN': 'C' stands for Confidential, 'U' stands for Uninterrupted, 'B' stands for Brief , 'A' is for Accurate and 'N' stands for Nurse. Continuity in care is essential therefore the person who has looked after the patient should give the handover. Where 12-hour shifts take place, staff may not be on duty for more than two days at a time therefore continuity and more information may be needed. So, a structured approach to enable all staff to focus on handing over what is relevant, avoiding overload and passing on irrelevant information is recommended. The accuracy of content is a crucial factor in the provision of excellent nursing care (Hoban, 2003). Handover in this way must be disciplined and commence on time and staff members participating must have their information ready at the onset (S. Davies & MJ. Priestly, 2006). Though from olden times handoffs have taken place in various ways, structuring and standardizing this procedure has become need of the hour in order to ensure authentic information exchange for enhancing patient safety and delivery of highest quality care. As of now, there is no standardized procedure of giving handover (Maxson, Pamela M., 2012).

METHODOLOGY

After obtaining ethical clearance from institutional ethical committee of All India Institute of Medical Sciences, New Delhi the study was started. In the present study, Methodological research design using Delphi technique was adopted for the development of Pediatric Patient Handover Documentation (PPHD) Tool. Using Purposive sampling technique, 15 Multidisciplinary health care professionals (Doctors, Nurse Educators, Nursing Administrators and Clinical Nurses) were selected who participated in construction of PPHD tool. Three modified Delphi rounds were conductedto achieve sequential process of generating, categorizing, prioritizing and completing the content of PPHD Tool. Thereafter, tryout to check the reliability of PPHD Tool was done. The sample for tryout included nurses working in Paediatric Medicine Ward of a selected Government Hospital of New Delhi. Convenience sampling technique was used to select nurses.

The tool was developed under three phases: Under each phase following steps were taken for development of PPHD Tool.

PHASE 1- Preliminary Preparation: During this phase, the investigator developed the preliminary patient handover documentation tool for which following steps were followed:

Step-1: **Review of Literature**- Review of literature is an important component in development of tool in the research process. An extensive review of literature was carried out for the present study by referring/reviewing books, journals and internet. Literature related topatient handover process across the world and various tools or formats available internationally and nationally were searched and reviewed. Literature related to methodology of tool construction and standardization of tool was also reviewed.

Step-2: Items selection and pooling- An extensive list of items constituting the Patient Handover Documentation Tool (PPHD Tool) was prepared from literature review, discussion and guidance from research supervisor and nursing experts as well as from the investigator's personal experience in clinical area.

Step-3: Preparation of first draft- Relevant items were selected, pooled and organized in systematic sequence to formulate preliminary draft of tool. A blueprint of the Patient Handover Documentation Tool was prepared. Suggestions from the Research supervisor and personal experience of the researcher also played an important role in the preparation of tool.

PHASE 2- Validation of first draft and subsequent drafts
Step-1: Selection of Panelists –The panel selected for construction and validation of PPHD Tool included fifteen multidisciplinary health care professionals (Doctors, Nurse Educators, Nursing Administrators and Clinical Nurses). The panelists were selected based on inclusion and exclusion criteria. The sample of the panelist was heterogeneous and from all over India to ensure the entire spectrum of opinion and content regarding patient handover documentation tool. The panelists were informed about the study and its objectives. Thereafter written consent was obtained from the selected experts to participate in the study.

Step-2: Delphi Rounds: Delphi method has been defined as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem. About the topics that are not much explored or issues with no or very less evidence and where opinion is important, one can use Delphi technique. The Delphi technique is a method which comprises of obtaining a collective opinion from individual experts. The Delphi technique involves a panel of experts who are required to complete questionnaires in a series of rounds focusing on their opinions about the topic of focus. The experts involved in Delphi rounds are required to work towards mutual consensus on the topic of focus. Another characteristic feature of Delphi is the use of feedback to panelists. The responses of panelists may shift based on the analysis and summarization given to the experts by the group facilitator. To begin with Delphi survey, the researcher selects a group of experts called as panelists based on the topic under consideration. As soon as the panelists give consent about their participation in the survey, they are sent the questionnaire with detailed instructions to comment on each topic based on their personal opinion or experience. All the questionnaires are then sent back to the group leader who analyses the comments and prepares a detail report about the discussion. Thereafter each panelist is provided with the copy of the report and they are given the opportunity to put further comments. At the end of each round, when the researcher receives all the survey forms, he has to decide if further discussion rounds are required or if the results can be prepared and published. Multiple iterations may be required to achieve consensus, without the need of panelists meeting face-to-face. The process of response-analysis-feedback-response is repeated at least thrice until consensus is obtained however there are no hard and fast rules. According to Linstone "a suitable minimum panel size is seven" but the size of panel sizes has ranged from 4-3000. Thus the decision about the number of panelists and the number of rounds can be made on the basis of available time and resources. Thus, Delphi technique is the best way of seeking expert opinion from a geographically dispersed group of experts (Linstone, 1978). Three rounds are a commonly accepted approach, therefore 3 Modified Delphi rounds were done and for each round same panelists were repeated. All the panelists were requested to give their valuable suggestion pertaining to the items of the tool, using four-pointlikert scale (1 not relevant, 2 somewhat relevant, 3 relevant, 4very relevant.)

Step-3. Validity of Tool: Content validity was done by taking opinion from fifteen panelists. Experts were requested to rate the items on 4 point Likert scale. The content validity index of items (CVI) i.e CVI-i, content validity index for expert's i.e. CVI-e and general content validity index for the tool i.e CVI-total was calculated.

Lawshe ,C. (2020)criteria of CVI for inclusion, modification, deletion of items is as follows:

CVI score	Result / interpretation
<0.62	Delete
0.62-0.8	Desirable with modifications
0.9-1	No modifications

Content validity index of each item (CVI – i)

$$\frac{\textit{Number of experts agreeing on relevance of each item (values between 3 and 4)}}{\textit{Total number of experts}}$$

Content validity index for each expert (CVI – e)

$$\frac{\textit{Number of items scored between 3 and 4 by an expert}}{\textit{Total number of items}}$$

General content validity index for the tool (CVI – total) :

$$\frac{\textit{Sum of all experts' individual CVI}}{\textit{Number of experts}}$$

Content Validity of Tool after Delphi round -1: The first draft of PPHD Tool was prepared and submitted to 15 experts. For submission of PPHD Tool, the researcher met the panelists personally or sent the PPHD Tool via email. For obtaining suggestions from the panelists the researcher had prepared a 4-pointLikertscale, on which the panelists were requested to rate the items of the PPHD Tool. A score of 1 was given to 'not relevant', 2 for 'somewhat relevant', 3 for 'relevant' and 4 for 'very relevant' items of PPHD Tool. The investigator revisited the panelist after 2-3 days for taking suggestions. As per the suggestions of the all the 15experts, items were added, deleted and modified.

On the basis of Content Validity Index of Round I

- Total items were 100 from which 84 items were included in tool that were having CVI – I (1)
- 4 items were modified and added, that were having CVI – I (0.62-0.80)
- 12 items were deleted, that were having CVI – I of less than 0.62
- 14 items were added as per suggestions from panelists.
- Therefore, after round I total 102 items were included in Tool for round II.

On the basis of individual validity index for expert CVI –e of round I: Expert 9 had maximum CVI – e (0.96), expert 8 had CVI – e (0.92), expert 3 had CVI – e (0.91), expert 4 had CVI – e (0.90), expert 7 and 13 had CVI – e (0.89), expert2, 5, 10 and 15 had CVI – e (0.88) and expert 1, 6 and 11 CVI – e (0.87),expert 12 had CVI– e (0.86), and expert 14 had CVI – e (0.85).

On **the basis of total content validity index of round I**

- CVI – Total = 13.31/15 was 0.89
- After this round second draft of tool was prepared.

Content Validity of Tool after Delphi round -2: The second draft prepared after completion of first delphi round consisted of 102 items. This second draft was again circulated to all the same 15 experts and they were again requested to rate each item on4 point likert scale. After thorough discussion and suggestions from the panelists and rating on each item, the tool was further modified.

On the basis of Content Validity Index, of Round II

- Total items were 102 from which 63 items were included in tool that were having CVI – i (1)
- 14 items were modified, that were having CVI - i (0.62-0.8),
- 25 items were deleted CVI - i (>0.62). It was also calculated by the same formula as stated above.
- 9 items were added as per suggestions from panelists.
- Therefore, after round II total 86 items were included in Tool for round III.

On the basis Individual validity index for each expert CVI-e, of round II

- Expert 8 had maximum CVI – e (0.92), expert 9 had CVI – e (0.90), expert 6 had CVI – e (0.88), expert 3,7and 10 had CVI – e (0.86), expert 4had CVI – e (0.84) , expert 15 had CVI – e (0.81), expert 14 had CVI – e (0.79), expert 2 and 13 had CVI – e (0.78) and expert 1 had CVI – e (0.77),expert 5 had CVI – e (0.76), expert 11 had CVI – e (0.75) and expert 12 had CVI – e (0.74).

On the basis of total content validity index, of round II

- CVI – total = 12.3/15 was 0.82
- After this third draft was prepared as per the suggestion of the experts.

Content Validity of Tool after Delphi round- 3: The prepared third draft had86 items. This third draft was again circulated to all the same 15 experts and they were again requested to rate each item on 4-point likert scale. Following are the findings of third Delphi round

On the basis of Content Validity Index of Round III

- The third draft of PPHD Tool had 86 items and all 86 items were included in final tool as all the items were having a CVI – i (1)
- No items were added, deleted or modified in the tool.

On the basis of individual validity index for expert CVI –e of round III

- All Experts had maximum CVI – e of (1).

On the basis of total content validity index of round III

- CVI – total = 15/15 was 1.

Step-4: Modification: As per the expert's opinion after each Delphi round and on the basis of CVI, modifications were made in the tool drafts.

Modification after Delphi Round I

- 4 items were modified and added, that were having CVI – I (0.7)

Modification after Delphi Round II

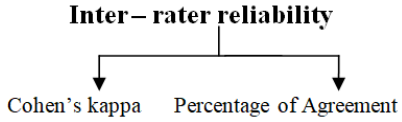
- 14 items were modified, that were having CVI - i (0.7),

Modification after Delphi Round III: After third Delphi round, no item was added, deleted or modified. The group of panelists converged to 100% consensus on the items of the PPHD Tool. Only the items were repositioned to give final shape to the PPHD Tool. The final tool had 86 items.

PHASE 3: Decision Making

Step -1: Reliability of PPHD Tool and Try Out

The reliability of an instrument relates to accuracy and consistency of the instrument in measuring a particular characteristic or construct.Inter-rater reliability of PPHD Tool was calculated.



Cohen's kappa Percentage of Agreement: To assess the reliability of the PPHD Tool, data was collected by the researcher and a co-observer trained by the researcher.The co-observer was researcher's colleague having similar level of education and experience, as the researcher. Patient Handover process between nurses during shift change were observed. The observers tried to ensure that they did not influence the patient handover process in any way. So, both the researcher and co-observers observed the handover process silently and did not prompt or provide feedback unless patient safety was being directly compromised. The handover process using PPHD Tool was assessed by using a checklist containing all items of PPHD Tool.

Inter-rater reliability of PPHD Tool was calculated by using Cohen's kappa coefficient 'k' and Percentage Agreement. So, it was assumed that the raters may agree about 90% and if margin of error is 20% then a sample size of 31 was required. 31 handover process were observed by two raters to establish inter-rater reliability of PPHD tool. These 31 handover observations were made in three different shifts- morning, evening and night duty shift. 21 nursing officers working in Pediatric care area of a selected tertiary level hospital were observed.10 nursing officers and 20 handover processes were observed during morning shift, 6 nursing officers and 6 handover processes were observed during evening shift and 5 nursing officers and 5 handover processes were observed during night shift. During the handover process, each nurse giving handover was observed by the researcher (Rater 1) and one co-investigator (Rater 2) who was trained for observation. Based on the observations Cohen Kappa and Percentage

agreement was calculated to establish the reliability of PPHD Tool (Wynd *et al*., 2003)

Cohen's kappa (k) is calculated by formula:

$$\kappa = \frac{p_o - p_e}{1 - p_e} = 1 - \frac{1 - p_o}{1 - p_e},$$

where:

P_o = the relative observed agreement among raters.
P_e = the hypothetical probability of chance agreement

Criterion measures of Cohen's Kappa

Strength of Agreement	Kappa Statistic
Poor	< .40
Fair	.40-.59
Good	.60-.74
Excellent	.75-1.00

Cohen's kappa value came out to be 0.95 that indicates excellent reliability.

$$\frac{Total\ number\ of\ Agreement}{Total\ number\ of\ items.} \quad X\ 100$$

Percentage Agreement: The percentage agreement was calculated by formula:

The percentage agreements came out to be 99.1% hence, the tool was found to be highly reliable. With this step the formation of PPHD Tool was completed. All the above steps were based on conceptual model ie modified evidence-based model known as 'Practitioner oriented model' given by Stetlar, 2001.

RESULTS

The results of the study show that Pediatric Patient Handover Documentation Tool is a valid and reliable tool for performing patient handover among nurses during shift change. The content validity index of the newly developed tool was 1. The reliability of PHD Tool is calculated by Cohen's kappa (k) value is 0.98 and percentage agreement is 99.1 %. The figures demonstrate high validity and reliability.

DISCUSSION

Based upon findings from the analysis of data and review of literature, discussion is done according to the objectives. Literature was searched and items were pooled together to prepare a preliminary draft of tool, to be sent to all panelists for delphi round 1. This phase is similar to that reported by Kaur *et al*., 2012. In this study Phase I was preliminary preparation of nursing checklist in which literature was reviewed and different items related to nursing management pre, during and post ECT were selected and pooled together in the form of a tool. Consensus was obtained from the 15 panelists in 3 modified Delphi rounds and content validity index was calculated after each round. These methods are similar in the study by Bala *et al*., 2012. The preliminary Nursing Evaluation Tool (NET) was further refined by using the Delphi technique. In this study, items were included in tool according to content validity index (CVI) of each item as rated by experts on 4-pointlikert scale, after 3 modified Delphi Rounds. Similar type of study was done by Kumar *et al*., 2012 in which, on the basis of expert opinion necessary changes were made and tool was modified. In the present study, reliability of PPHD Tool as calculated by Cohen's kappa came out to be 0.95 (k = 0.95) and percentage agreements came out to be 99.1%. Kaur *et al*., 2012 reported similar use of Cohen's kappa statistics.

Limitations: The present study is limited to 15 Panelists and three delphi rounds.

Conclusion

It can be concluded that the prepared PPHD Tool is a valid, reliable instrument that is quick and easy to use in the Hospital setting.

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Conflict of Interest: The authors declare no conflict of interest.

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