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Designing an Intrahospital transport Appurtenance for critically ill patients admitted in selected units of hospital using Delphi technique

Richa Sharma[1], Dr.Prabha K. Dasila[2]
[1] *(Nursing, MGM New Bombay College of Nursing,, Navi Mumbai, India)*
[2] *(Nursing, MGM New Bombay College of Nursing, Navi Mumbai, India)*
Corresponding Author: Richa Sharma

Abstract: *Transport of intensive care unit (ICU) patients within the hospital has been associated with a high rate of potentially detrimental complications. The events of adverse incidents remain high and constitute a significant risk for the transport of critically ill ICU patients20. Intrahospital transport of critically ill patients is often necessary for optimal patient care and it is a challenging task21. Protecting critically ill patients from harm by constant monitoring and prompt intervention is a primary responsibility of nurses in the intensive care unit (ICU) 12. Our study aims to design an intrahospital appurtenance using Delphi technique to prevent and manage such potential problems occurring during intrahospital transport of critically ill patients. This descriptive survey was conducted in selected 10 hospitals to check the existing practices of intrahospital transport from ICU to diagnostic departments between February 2015 & February 2016. A total of 11 Delphi experts were included in the study. The difference in CV values between two rounds of Delphi ranged between -0.02 to 0.07 indicating a strong stability for each item included to design an intrahospital transport appurtenance. Henceforth the above study showed that to provide safe transfer and continue treatment during transport, an intrahospital transport appurtenance which can be mounted on a dedicated ICU beds would be valuable during the transport. Having such an appurtenance would be useful in day to day practice.*

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I. Introduction

Intrahospital transportation of patients within a hospital is carried out for the purpose of undergoing diagnostic or therapeutic procedures or transfer to a specialized unit[4]. The patient in the intensive care unit is more or less in a controlled environment. When patient has to leave from the secure surroundings connected to a sophisticated ventilator with monitoring devices and infusion pumps to diagnostic department, the situation becomes risky[5]. This is the period of instability and risk to patients, with the possibility of adverse effects by disconnecting such critically ill patients from equipments, shifting them to another stretcher and reducing the person and equipment around[2]. Thus, leads to complications related to technical failures, physiological changes, duration of transport, and with the team that performs it[6] . So, there is a need to improve the safety of transport and focus on standardized assessments, ensuring that appropriate providers accompanying the patient and creating contingency plans for any change in patient condition[23]. In India currently there is no such intrahospital transport appurtenance available in any of the hospital which can be mounted on patient's bed and carried along during the intrahospital transport and no previous study has documented the efficacy. The current study aims to design an intrahospital appurtenance to prevent and manage such potential problems occurring during intrahospital transport of critically ill patients.

II. Material And Methods

Quantitative research approach and the Delphi technique were used. The study was conducted in a tertiary care hospital, Navi Mumbai from February 2015 to February 2016. A group of eleven participants were identified as experts in the field, who agreed to be in the panel of this study. Delphi methodology was used to take their willingness to serve as a panel expert from February 2015 to February 2016.

Study Design: Descriptive survey with quantitative research design
Study Location: This was study done by selecting the Delhi experts working in critical areas
Study Duration: February 2015 to February 2016
Sample size: 11 Delphi experts

Sample size calculation: The experts from the hospitals which permitted for the study were contacted using snow ball sampling technique. Total 20 practitioners agreed to participate in the study as experts. The researcher then visited each eligible candidate, explained about Delphi methodology and asked for their willingness to serve as a panel expert. They were also informed that there would be two rounds of questionnaire distribution during the process for seeking opinions and one after the final design of intrahospital transport appurtenance. Finally a group of eleven participants were identified as experts in the field, who agreed to be in the panel of this study.

Subjects & selection method: The study population was drawn from experts in the panel were those who had more 2 years of experience in critical care units and currently working in critical care areas from February 2015 to February 2016. They were also informed that there would be two rounds of questionnaire distribution during the process for seeking opinions and one after the final design of intrahospital transport appurtenance. The selection of Delphi subjects, individuals are considered eligible to be invited to participate in a Delphi study if they have somewhat related backgrounds and experiences concerning the target issue, are capable of contributing helpful inputs, and are willing to revise their initial or previous judgments for the purpose of reaching or attaining consensus[71].

Inclusion criteria: (The selected experts in the panel were those who had more 2 years of experience in critical care units and currently working in critical care areas)

1. Registered nurses with GNM /BSc / MSc Nursing qualification
2. ICU intensivist with MBBS/ MD in medicine.
3. Anesthetist with MD in Anesthesia.
4. Willing to participate in all three rounds
5. Available at the time of study

Procedure methodology

After written informed consent was obtained, a well designed questionnaire was used to collect the data. . Delphi method was used to prepare the design (sketch) of Intrahospital Transport Appurtenance including phase 1, 2 & 3.

Phase 1 includes observed the existing intrahospital transport (from causality to Intensive care unit (ICU), ICU to CT scan department, and ICU to Operation theatre) practices in 10 hospitals using observation checklist including 5 items like availability of intrahospital transport appurtenance, written Transport Protocol, prior notification to the concern department, occurrence of life threatening issues, person accompanying the intrahospital transport. Based on the results of observations for existing practices, an open- ended questionnaire was prepared.

Second phase begins with the process of building consensus among the Delphi experts. This phase was carried out in two rounds. In Round 1, selection of the panel of experts was done with informed and written consent. The distribution of open ended questionnaire was done. After one week the questionnaire was collected and ranked based on the analysis of initial feedback given by the Delphi Experts. In Round 2, Based on the agreement of and importance value to intrahospital transport appurtenance in round one, the questionnaire was refined. The subsequent questionnaire with five point likert scale (items including, usefulness, convenience, cost effectiveness, size, and material of design) was prepared. The Delphi panelists ranked the items orderly and priority wise. The Delphi experts were given opportunity to change or expand the round one opinion. The Delphi experts were analyzed for agreement and importance of items.

Phase 3 aimed to focus on final consensus to design an intrahospital transport appurtenance. On the basis of agreement of opinionaire, round two was analyzed. Sketch of intrahospital transport appurtenance was prepared with the help of mechanical and biomedical engineer. A five point likert scale along with sketch of intrahospital transport appurtenance was distributed to seek opinion from Delphi experts.

Statistical analysis:

Data was analyzed using software package for statistical analysis**.** , Kappa analysis in order to fulfill the objectives of the study. Analysis of Opinion for agreement, importance ranking, and coefficient of variation (CV) for each item of IHTA and Kappa analysis for consistency within expert agreement was carried out. The

difference in CV values between two rounds ranged between - 0.02 to 0.07 indicating a strong stability for each item. The experts rated the design of IHTA with 82% to 100% agreement.

III. Result

Within expert agreement in importance ranking between the rounds was assessed using Kappa analysis. The highest value score was found for compartments (0.846), size (0.817) and design (0.68) of Intrahospital transport appurtenance. Its advantages (0.589) cost effectiveness (0.491) and use of material (0.421) and patient safety (0.356) were scored at the lesser values. A value for availability of accessory was found at the lowest.

Table no 1 shows distribution of Delphi Experts depicts that there were total 11 experts, out of which 64% of the experts were doctors and MD in Anesthesia and 36% nurses.

Table no 1: Distribution of Delphi Experts

n =11

f	%
4	36
7	64

Table no 2 shows that out of 10 hospitals visited during data collection, 40% (4) hospitals had written intrahospital transport protocol. All the hospitals practice prior notification to the concerned department. The incidence of life threatening issues like hypotension and arrhythmia occurred in 50 % hospitals. Mostly the nurses were the persons accompanying the patient 70 % along with physician were the persons accompanying the patient during an Intrahospital transport. It was also noted that only 3 hospitals had Intrahospital transport appurtenance in the form of bag i.e.10% (1) and, stainless steel tray 20%, placed near the nurses' station. 70% were found collecting all the equipments at the time of transport from the unit.

During an Intrahospital transport all the hospitals were found carrying Pulse oximeter, Ambu bag with mask and Oxygen cylinder; whereas 70% were found practicing transportation with cardiac monitor and Portable ventilator along with syringe pump, airway30%, Laryngoscope20%and only Endotracheal tube10%.

Table no 2 shows existing practices of intrahospital transport

n=10

Sr.No	Item	Yes		No	
		F	%	f	%
1.	Availability of written intrahospital transport protocol	4	40	6	60
2.	Prior notification to the concern department	10	100	-	-
3.	Occurrence of life threatening issues in the past	5	50	5	50
4.	Persons accompanying the patient during transport. If yes –	10	100	-	-
	4.1) Nurse	7	70	3	30
	4.2) Nurse and Physician	2	20	8	80
	4.3) Ward boy and Relatives	1	10	9	90
5.	Availability of intrahospital transport appurtenance If yes, specify the following:-	3	30	7	70
	5.1) Spacious	0	0	10	100
	5.2) Convenient to carry	1	10	9	90
	5.3) Placement : Near Nurses Station	3	30	7	70
	5.4) Form of equipage				
	i) Bag	1	10	9	90
	ii) Stainless steel tray	2	20	8	80

Table continued.....

Item No.	Item	Yes		No	
		f	%	f	%
5.5	**Accessories of Equipage**				
5.5.1	**Equipments**				
•	Endotracheal tube	1	10	9	90
•	Laryngoscope	2	20	8	80
•	Airways	3	30	7	70
•	Cardiac monitor	7	70	3	30
•	Portable ventilator	7	70	3	30
•	Pulse oximeter	10	100	00	00
•	Syringe pump	6	60	4	40
•	Oxygen cylinder	10	100	00	00
•	Ambu with mask	10	100	00	00
5.5.2	**Articles**				

•	Syringes	6	60	4	40
•	Kidney tray	2	20	8	80
•	ECG electrodes	4	40	6	60
•	IV cannula with tubing	7	70	3	30
•	Three way	5	50	5	50
•	Tourniquet	2	20	8	80
•	Adhesive tape	1	10	9	90
5.5.3	**Drugs**				
•	Adrenaline	6	60	4	40
•	Nor adrenaline	7	70	3	30
•	Atropine sulphate	8	80	2	20
•	Dopamine	6	60	4	40
•	IV fluids(NS, DNS, D5, RL)	7	70	3	30

Table no 3 : depicts that the items like ranked by the experts in round one were found changed in round two in their level of rank where as some items ranked by the experts remained at same rank in round one and round two.

Table no 3: Ranking of items based on opinion of experts for Intrahospital transport appurtenance in round one and two

n=11

Round I				Round II		
Rank	**Opinions**	**f**	**%**	**Rank**	**Opinions**	**f**
1	Compatible	11	100	1	Carries all Equipment	11
2	Easy to accommodate	11	100	2	Convenient	10
3	Convenient	10	91	3	Light weight	11
4	Carries all equipment	11	100	4	Easy to accommodate	11
5	Light weight	10	91	5	Compatible	11
1	Drugs	11	100	1	Portable monitor	11
2	Ventilator	7	64	2	Portable ventilator	11
3	Monitor	7	64	3	Pulse oximeter	11
4	Oxygen cylinder	11	100	4	AMBU with mask	11
5	Pulse oximeter	11	100	5	Emergency drugs	11
6	Ambu bag	11	100	6	Oxygen cylinder	11
7	Patients file	8	73	7	Patients file	8
1	Less than one fourth size of patient's bed	5	45	1	Less than one fourth size of patient's bed	5
2	One fifth size	3	27	2	One fifth size	4
3	No comments	3	27	3	No comments	2

Item	Round I				Round II			
	Rank	**Opinions**	**f**	**%**	**Rank**	**Opinions**	**f**	**%**
Compartments	1	3 compartments	4	36	1	4 compartments	11	100
	2	4 compartments	6	55	2	3 compartments	0	0
	3	5 compartments	1	9	3	5 compartments	0	0
	4	2 compartments	0	0	4	2 compartments	0	0
Advantages	1	Safe transport	11	100	1	Safe transport	11	100
	2	Easy to maintain	10	91	2	Easy to maintain	11	100
	3	Lesser incidence of adverse event	8	73	3	Lesser incidence of adverse event	10	91
Cost effectiveness	1	Cost effective for hospital	8	73	1	Cost effective for hospital	11	100
	2	Patient safety is important	9	82	2	Patient safety is important	11	100
Patient safety	1	Need for speedy transport	10	91	1	Need for speedy transport	11	100
	2	Effective monitoring of patient	10	91	2	Effective monitoring of patient	11	100
	3	Less chances of disconnection of equipments	8	73	3	Less chances of disconnection of equipments	10	91

Table no 4 illustrates that there was an increase in agreement for design of intrahospital transport appurtenance from 52.7% in round one to 74.6% in round two. Similarly mean values increased from 3.55 to 3.89 and SD decreased from 1.1 to 0.94 in round two. The rank level also reduced from level six to five in round two**.** The Coefficient of variation was less than one in both the rounds.

Table no 4 illustrates Agreement and importance values for Design of Intrahospital

			Round 1	**Round 2**
Agreement		Strongly Agree	23.6%	25.5%
		Agree	29.1%	49.1%
		No Opinion	27.3%	18.4%
		Disagree	18.2%	7.3%
		Strongly disagree	1.8%	1.8%
Importance		Median	4	4
		Range	1--5	1--5
		Rank	6	5
		Mean	3.55	3.89
	Standard deviation		1.1	0.94
	Coefficient of Variation		0.31	0.24

Table 5 shows agreement and importance values for Accessories of Intrahospital transport appurtenance by experts between two rounds. The table describes that the percentage of agreement for accessories of intrahospital transport appurtenance incresed from 66.7% in round one to 72.8% in round two although some percentage of disagreement remained in both the rounds (10.6 % and 7.6%) respectively. The mean values increased from 3.92 in round one to 4.21 in round two the SD increased slightly from 1.01 to 1.06 in round two. The rank level also increased from level five in round one to level six in round two**.** The Coefficient of variation was less than one in both the rounds.

Table no 5 shows agreement and importance values for Accessories of Intrahospital transport appurtenance by experts between two rounds

			Round 1	**Round 2**
Agreement		Strongly Agree	36.4%	57.6%
		Agree	30.3%	15.2%
		No Opinion	22.7%	19.7%
		Disagree	10.6%	6.1%
		Strongly disagree	0.0%	1.5%
Importance		Median	4	5
		Range	2--5	1--5
		Rank	5	6
		Mean	3.92	4.21
	Standard deviation		1.01	1.06
	Coefficient of Variation		0.26	0.25

Table no 6 reveals that 60.6% had no opinions regarding size of intrahospital transport appurtenance in round one whereas in round two 30.3% gave their agreement although 21.2% also expressed their disagreement, which remained constant in both the rounds. Regarding importance to item the median and rank values were same in both the rounds but mean value and SD increased in round two The Coefficient of variation was less than one in both the rounds.

Table no 6: Agreement and importance values for size of Intrahospital transport appurtenance by experts between two rounds

n=11

		Round 1	**Round 2**
Agreement	Strongly Agree	0%	3%
	Agree	18.2%	27.3%
	No Opinion	60.6%	48.5%
	Disagree	12.1%	12.1%
	Strongly disagree	9.1%	9.1%
Importance	Median	3	3
	Range	1--4	1--5
	Rank	8	8
	Mean	2.87	3.03
Standard deviation		0.82	0.95
Coefficient of Variation		0.29	0.31

Table no 7 figures depict strongest agreement regarding material of Intrahospital transport appurtenance. There was an increase in agreement from round one to two. The median was observed same in both the rounds but SD decreased from 0.47 to 0.3 and the mean values increased from 4.73 to 4.91. The Coefficient of variation was less than one in both the rounds

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Table no 7 Agreement and importance values for material of Intrahospital transport appurtenance by experts between two rounds

n=11

		Round 1	Round 2
Agreement	Strongly Agree	72.7%	90.9%
	Agree	27.3%	9.1%
	No Opinion	0%	0%
	Disagree	0%	0%
	Strongly disagree	0%	0%
Importance	Median	5	5
	Range	4--5	4--5
	Rank	1	1
	Mean	4.73	4.91
	Standard deviation	0.47	0.3
	Coefficient of Variation	0.10	0.06

Table no 8 shows variability in agreement for compartments of Intrahospital transport appurtenance. There was no change in median, range and rank between two rounds. Slight increase in SD was found in round two. The Coefficient of variation was less than one in both the rounds.

Table no 8 Agreement and importance values for compartments of Intrahospital transport appurtenance by experts between two rounds

		Round 1	Round 2
Agreement	Strongly Agree	18.2%	27.3%
	Agree	30.3%	18.2%
	No Opinion	24.2%	27.3%
	Disagree	18.2%	18.2%
	Strongly disagree	9.1%	9.1%
Importance	Median	3	3
	Range	1--5	1--5
	Rank	7	7
	Mean	3.3	3.36
	Standard deviation	1.24	1.32
	Coefficient of Variation	0.38	0.39

Table no 9 Agreement and importance values for advantages of Intrahospital transport appurtenance by experts between two rounds. The above table represents that there was an increase in the agreement regarding advantages of intrahospital transport appurtenance in round two. Slight change was observed in median, mean and SD. The rank value increased from two to three in round two but the range remained same in both the rounds. The Coefficient of Variation was less than one in both the rounds.

Table no 9 Agreement and importance values for advantages of Intrahospital transport appurtenance by experts between two rounds.

n=11

		Round 1	Round 2
Agreement	Strongly Agree	39.4%	57.6%
	Agree	45.5%	39.4%
	No Opinion	15.2%	3%
	Disagree	0%	0%
	Strongly disagree	0%	0%
Importance	Median	4	5
	Range	3--5	3--5
	Rank	2	3
	Mean	4.24	4.55
	Standard deviation	0.71	0.56
	Coefficient of Variation	0.17	0.12

Table no 6 represents that there was an increase in the agreement regarding cost effectiveness of Intrahospital transport appurtenance in round two. The mean values changed in round two to 4.32 from 3.77 in round one but the SD was found increased in round two. The Coefficient of variation was less than one in both the rounds.

Table no 10 Agreement and importance values for cost effectiveness of Intrahospital transport appurtenance by experts between two rounds

n=11

		Round 1	Round 2
Agreement	Strongly Agree	18.2%	54.5%
	Agree	40.9%	22.7%
	No Opinion	40.9%	22.7%
	Disagree	0%	0%
	Strongly disagree	0	0
Importance	Median	4	5
	Range	3--5	3--5
	Rank	5	4
	Mean	3.77	4.32
	Standard deviation	0.75	0.84
	Coefficient of Variation	0.20	0.19

Table no 11 shows very strong agreement regarding patient safety in round two. 100% agreement was found in round two from 84.9% in round one. There was a slight change in the values of median, range and Standard deviation in round two. The Coefficient of Variation was less than one in both the rounds.

Table no 11 Agreement and importance values for Patient Safety of intrahospital transport appurtenance by experts between two rounds

n=11

		Round 1	Round 2
Agreement	Strongly Agree	27.3%	69.7%
	Agree	57.6%	30.3%
	No Opinion	15.2%	0%
	Disagree	0%	0%
	Strongly disagree	0%	0%
Importance	Median	4	5
	Range	3--5	4--5
	Rank	3	2
	Mean	4.12	4.7
	Standard deviation	0.65	0.47
	Coefficient of Variation	0.16	0.1

Table no 12 illustrates the difference in Coefficient of Variances between the two rounds the values ranged between - 0.02 to 0.07. The CV difference for each item was found less than one which indicates a strong stability in the responses of experts to each item.

Table no 12 Difference in Coefficient of Variation of each item of intrahospital transport appurtenance in round one and round two

	Coefficient of Variation (CV)		
Item	**Round 1**	**Round 2**	**CV Difference**
Design	0.31	0.24	0.07
Accessory	0.26	0.25	0.01
Size	0.29	0.31	-0.02
Material	0.10	0.06	0.04
Compartments	0.38	0.39	-0.01
Advantageous	0.17	0.12	0.05
Cost effectiveness	0.20	0.19	0.01
Patient safety	0.16	0.1	0.06

Table no13 indicates kappa values within subject agreement in importance ranking between the rounds. The highest value was found for compartments (0.846) size (0.817) and design (0.68) of Intrahospital transport appurtenance. Advantages (0.589) Cost effectiveness (0.491) and use of material (0.421) and patient safety (0.356) were secured the later value and of accessory was valued lowest.

Table no 13 Kappa values for consistency within expert agreement in importance rankings for each item of intrahospital transport appurtenance in between rounds.

Items	Round 1 & 2	Agreement Level
Design	0.68	Moderate
Accessory	0.291	Fair
Size	0.817	Almost perfect
Material	0.421	Moderate
Compartments	0.846	Almost perfect
Advantageous	0.589	Moderate
Cost effectiveness	0.491	Moderate
Patient safety	0.356	Fair

Table no 14 reveals the opinions of Delphi experts on sketch of intrahospital transport appurtenance. It indicated that the Delphi experts had 100% consensus in their opinion regarding the Intrahospital transport appurtenance.

Table no 14 Distribution for opinion of Delphi Experts after designing the intrahospital Transport appurtenance.

Item	f	%
The design of intrahospital transport appurtenance seems to be;		
Appropriate	11	100
Useful.	9	81.8
Safe to carryout intrahospital transport	11	100
Spacious.	11	100
Cost effective to prepare the appurtenance.	10	90.9
Convenient for maintenance.	11	100
Material suggested is appropriate	11	100
The design seems to be good enough to		
Carry all the equipments.	11	100
Handle with limited number of health personnel	11	100
The height and weight according to its design is appropriate.	10	90.9
The numbers of sections available in the design are adequate.	11	100

Description of design of intrahospital transport appurtenance

According to Oxford dictionary, an appurtenance is defined as an accessory, equipage, rig or other item associated with a particular activity.

In this study, an appurtenance is defined as an apparatus, equipage containing emergency equipments required during the intrahospital transport of critically ill patients. This design is prepared with the help of Mechanical and Biomedical engineer.

Introduction

The devices, which are used in intrahospital transports, should have specific characteristics. It is important the equipment to meet the criteria for a safe transport. The devices that are usually needed for the transport of a critically ill patient, like monitors, oxygen cylinders or material trolleys are bid, heavy, not easy to carry, always connected with power source in the ICU or other departments, and they are rarely moved from their position. It is not possible the same devices to be used for a transport, where they should be on patient's stretcher, in motion. For example, devices without a broad base are unbalanced and they can easily fall on stretcher when moved, or devices that are not resistant to hardship can be disabled due to an unexpected striking on a wall during transport. In addition, the necessary technical equipment should be entirely dedicated to intrahospital transport procedures. So, there comes the need to design an intrahospital transport appurtenance.

In this study, the intrahospital transport appurtenance is defined as an apparatus, equipage containing emergency equipments required during the intrahospital transport of critically ill patients.

a) Appearance: - The intrahospital transport appurtenance design is a three stand design with different compartments. This design is a docking system with multifunctional accessories and special fittings that can be attached to patient's bed and moved along with the bed with minimum time and effort.

b) Content: - The intrahospital transport appurtenance design contains space for;

1. Portable Cardiac monitor
2. Portable Ventilator

3. Pulse oximeter
4. Oxygen cylinder(Compatible to IHTA)
5. Ambu bag with mask
   - Medications
   - IV fluids
6. Syringes (2ml, 5ml , 10 ml)
7. Patient's file

c) Compartments

The intrahospital transport appurtenance is divided into upper 2 sections and lower 2 sections. The upper section is for placing the heavy items like cardiac monitor, portable ventilator and other light weight items like syringe pump and pulse oximeter. The lower section is again divided into: - upper drawer and lower drawer. The upper drawer is for placing IV fluids and lower drawer is for placing the medications. At the side of the design, there are loops in which patients file can be placed. IV stand to hang the IV fluids and at the back side, there is a space for keeping the oxygen cylinder.

d) Material for design

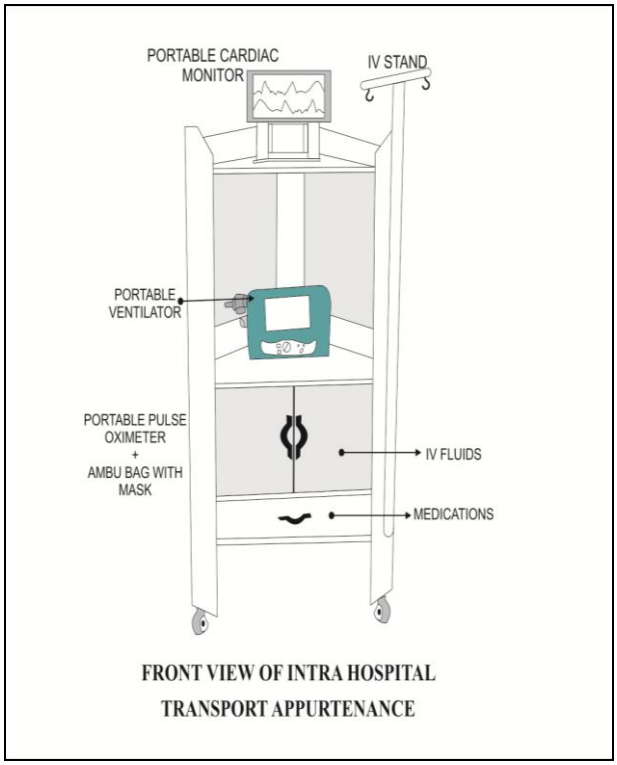
Steel can rust extremely easily and quickly if it is not protected from the elements, especially water, moisture and humidity. This can be achieved through the use of paint. Normally primer paint is applied first. This helps prevent rust and forms a good surface on which to apply a second coat of paint. Paints come in a range of colors, making them idea for a product such as a trolley. The combination of materials, make this trolley lightweight and yet very strong. The aluminum will not rust and the steel parts can be painted, preventing corrosion. It also means that the surface of the sheet steel has a grip/tread. The plates in the upper section for keeping heavy items has slots cut out of it in order to reduce its weight, without reducing its strength which saves on weight increases overall strength of the design. This will hold weights of heavy items in place when the appurtenance is moving. These plates are can be folded back when not in use and height of these plates can also be adjusted.

e) Measurements

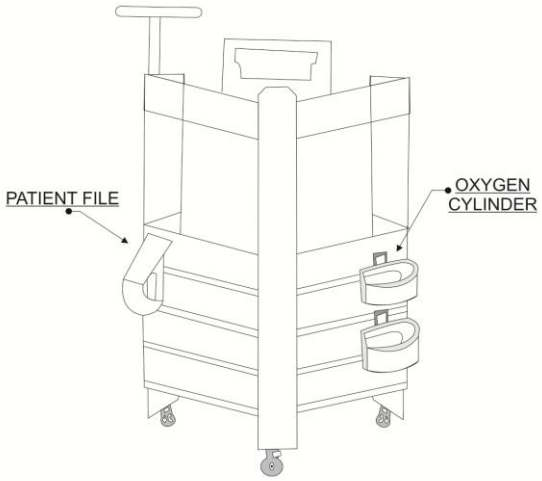
Height: - minimum 4 feet (it should be less than the height of the lift)

f) Advantages of intrahospital transport appurtenance

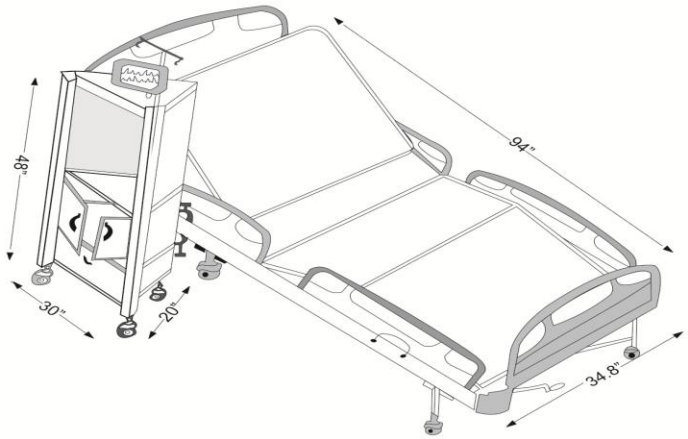
- It will secures placement of all services (assemble and convert to meet patients needs).
- It will have quick and safe docking to patient's bed.
- It will be navigable by single staff also.



FRONT VIEW OF INTRA HOSPITAL TRANSPORT APPURTENANCE



BACK VIEW OF INTRA HOSPITAL TRANSPORT APPURTENANCE



SKETCH OF INTRA HOSPITAL TRANSPORT APPURTENANCE

IV. Discussion

In present study, the incidence of life threatening issues like hypotension and arrhythmia occurred in 50 %(5) hospitals in the past during the intrahospital transport. Similar results were reported in the study by Kue et al[45] in which overall rate of life threatening issues 1.7% (59issues) and most common were hypoxia and blood pressure were observed.

Klein M[46] conducted a retrospective study was conducted on 16 patients who were transported from the ICU for computed tomography scans and OT. The researcher found that recently terlipressin was the drug used during the transportation instead of nor-epinephrine because terlipressin can facilitate the transport of critically ill patients from the ICU for remote diagnostic or therapeutic procedures and produces prolonged hemodynamic stabilization. Whereas in the present study, mainly two drugs i.e. atropine sulphate and dopamine were carried during the intrahospital transport of critically ill patients.

In the present study, only 4 hospitals out of 10 had written protocols for intrahospital transport. The results of survey of 152 hospital ICUs, Only 45% of the surveyed ICUs had written intrahospital transport protocol[47].

The survey of existing practices indicated that 64% of the intrahospital transport has been accompanied by nurses and 20% doctors. The American Association for Respiratory Care (AARC) recommended at least one registered nurse and one respiratory therapist accompany ventilated patients during transport.

V. Conclusion

Majority of hospitals do not have an intrahospital transport appurtenance. Incidences of life threatening conditions during intrahospital transport have been witnessed by the hospitals on several occasions. With opinion from Panel of Delphi experts in three rounds, researcher prepared the design of intrahospitral transport appurtenance to be used during the intrahospital transport of critically ill patients.

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