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Good morning, everyone

In this Quality Improvement case study we will learn how the Pediatric Emergency team implemented the science of improvement to reduce the incidence Infiltration and Phlebitis. The project was carried out successfully and was published in Indian Journal of Critical Care Medicine. The aim was “To Reduce the Incidence of Infiltration and Phlebitis by 50% over 2 Months Among Children Admitted to the ER of a Tertiary Care Hospital”

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Learning Objectives

At end of session learners will be able to

- Appreciate how pre-assessment finding are utilized to construct a fish bone diagram
- Identify how the root cause of problem is identified using fish bone diagram.
- Prioritize intervention/change using Eisenhower Box.
- Conduct Plan, Do, Study, Act (PDSA) Cycle
- Decide adapt/adopt/abandon the change

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Pediatric Emergencies generally have high patient load, low nurse patient ratio and limited resources especially in low middle-income countries. This leads to poor adherence to aseptic techniques and a higher incidence of phlebitis and infiltration.

Literature search and further reading suggested Aseptic Non Touch Technique (ANTT) is a critical strategy to reduce infection in hospital setup. In addition, Quality improvement (QI) initiatives, Audit/assessment and feedback to healthcare personnel (HCP), Organizational changes, and reminder systems using a variety of methods and Education of patients and health care professionals are other key strategies.

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A team consisting of the bedside nurses, nurse educator, administrative in-charge of the unit and residents was formed and specific roles were allocated to team members.

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The team tried to prepare a fish bone diagram. This diagram as we see in the slide is a visualization tool for categorizing the root causes of a problem. It combines the practice of brainstorming with a type of mind map template. Few causes were striking in the fish bone diagram as demarcated in red color.

- Health care professionals in emergency area were always in hurry given the low nurse patient ratio and since there was no separate recognition between a good performer versus others there was a general lack of motivation for taking additional efforts.
- Sterile trays or packs were limited; the supply of sterillium not adequate. Most of patients admitted were poor and it was difficult for them to buy this material.

- The syringes, sets, cannulation/sampling articles were kept on the cardiac tables, trolley, or bed. No specific tools were used for cannula insertion site assessment. The hand hygiene was poor
- The environment was over crowded due to a greater number of patients, the sinks were poorly located and there was limited space to prepare medications.

All these factors lead to poor adherence to asepsis during the procedure of IV-line insertion and maintenance and lead to development of Infiltration and Phlebitis.

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Now, this slide shows us some pre-assessment observations done by the team members during the baseline phase.

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The possible interventions were entered in the Eisenhower Decision Matrix. This matrix helps us select and prioritize the interventions/ change by less efforts and high impact. In the figure the intervention is categorized in 2*2 table on the basis of less/more efforts required and high/low impact. We selected teaching the bundle and supplying innovative trays as our change based on less efforts and high impact.

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The outcome measure was the incidence of phlebitis and infiltration and process measures included scoring on pre-validated checklist for intravenous line insertion and drug administration of drugs. In addition, the team also recorded opinion of health care professionals as a balancing measure.

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Pre-assessment observation suggested that the incidence of phlebitis and infiltration to be nearly 83% and 96% respectively and intravenous line insertion and drug administration checklist scores as 8.69- 43.47 and 20.58-41.17% which meant a reasonable scope of improvement.

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The Sensitization of the health care personals was done though feedback of audit (pre-assessment), current practices and findings of focused group discussion.

The planned intervention included “Aseptic intravenous line insertion and maintenance bundle”.

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The bundle in include use of ANTT and introduction of new cost-effective trays. This slide shows us the key six steps in the Aseptic intravenous line insertion and maintenance bundle.

1. Strict adherence to hand hygiene,
2. Correct use of gloves,
3. Aseptic field management: create a mobile sterile tray by cleaning it with 70% alcohol, use of transparent cannula fix etc
4. Protection of Key-Part and Key-Site (hub of syringe, needle, ports of sterile equipments, cannula caps and hubs etc): keep all the syringes in the mobile sterile try by closing the hub with needle and cap.

5. Not touching the key parts or key sites
6. Disinfection Key-Parts to prevent entry of harmful microorganisms: scrub the hub with 70% alcohol, clean skin properly

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Here we can see the key steps being implemented

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The first PDSA was followed by a series of three more PDSA cycles in which the team first introduced stakeholders working in the same area for monitoring insertions and training new residents and nurses who had joined. In the third PDSA the infection control nurse took the responsibility to organize teaching program and coordinate with the leader, executive and monitoring team. She also helped conduct regular data monitoring.

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Now coming to analysis.

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The incidence of development of Infiltration and Phlebitis decreased in subsequent PDSA Cycles. The blue bar charts depicting the incidence in 0 to 48 hours and the yellow ones depicting the incidence upto 72 hours. The incidence of infiltration and phlebitis was reduced from 82.96% to 45% and 96.09% to 55 %

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The control charts were plotted for process measures and it was found that the score gradually improved in each PDSA Cycle. The scores for procedure of IV-line insertion increase from 20.54 to 88.99% and for administration of drugs through an IV line from 17.0–68.40 %

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Adherence to the steps of bundle (ANTT+ New Trays) in an emergency department where the providers were absolutely resistant to change, is really a great achievement for the team over period of two months

Regular feedback from team members and the motivation of the HCPs are helpful strategies. Also, the challenges of lack of resources can be overcome by low-cost local innovations. The aseptic IV line insertion and maintenance bundle need to be incorporated in the leading educational program and daily routine to achieve sustained benefits. It is replicable, and with practice, it will become a positive system change.

THANK YOU