THE MIRROR TECHNIQUE – A Novel use of in-situ simulation to test flow &environment of a new Pediatric Emergency Space

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Introduction

Simulation is being used increasingly as a tool to assess new clinical spaces.[1,2] In a tertiary pediatric center, in-situ simulation testing was essential to the conversion of a 24-bed combined pediatric/adult unit to a 33-bed pediatric emergency department (PED). A key challenge during the testing phase was to identify the best way to reflect both patient and work flow in this dynamic, high turnover, clinical area.

The most prevalent testing technique involves performing multiple predetermined varied scenarios; each designed to assess different objectives. This method however limits the ability to test patient flow-related issues. Therefore, we purposed to find an optimal way to replicate a typical day in the PED. We report the novel use of simulation using the '**mirror technique**' to concurrently assess the impact of environmental changes on work processes and flow in the PED.

Methods

A 4-hour continuous simulation was conducted using the 'mirror technique' - the Existing PED (E-PED) environment was replicated in real time in the new ED space through the use of simulation. An inter-professional operating team of stakeholders and simulation experts orchestrated the day.

Logistics

Mirroring principle was maintained throughout all phases of patient care:

- Simulated PED (S-PED) had a similar staff model to the E-PED, including MDs, RNs, residents, medical students, Child Life Specialists, etc.
- For every patient triaged in the E-PED, a second triage nurse created a duplicate, anonymized chart for the simulated patient with near-identical clinical features.
- A simulation coordinator located in triage determined the level of fidelity to be used for each patient /parent (from 10 mannequins &15 human volunteers).
- A repertoire of scenarios deemed necessary, though less likely to occur on a typical day, was created preemptively to test specific resources in the PED.
- Using hand radios, information regarding real patients (e.g. response to treatment, complications, unexpected events, investigation results etc.) was transmitted from the E-PED to a simulation operator located in the S-PED. Real test results were provided to the simulated patients in real time as a hard and/or soft copy.
- Observers (15) provided feedback using an evaluation tool designed especially for the day.
- Summary of the key findings were forwarded to the PED operational committee.

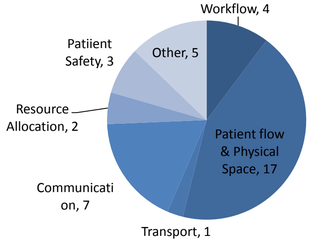
Results

During the 4-hour simulation phase:

- 20 patients were simulated
- 16 scenarios were created using the mirroring technique
- 4 pre-made scenarios were selected

Issues recorded in the observer tool and the post simulation debrief were divided into seven different categories and analyzed. Over 200 issues were identified of which 38 were classified as critical and required immediate correction prior to occupying the new space.

Categorization of Critical Issues



Based on findings, adjustment was made to:

- re-define future movement and communication strategies within the department e.g. patients flow from triage to rooms
- communication method between ED staff, and
- movement of patients between hospital departments

Discussion / Conclusion

The IHI has identified problems with patient flow as an important contributor to delays in patient care.[3] Computer based simulation has been used to diagnose and improve problems with patient flow, however to our knowledge little has been done with in-situ high-fidelity simulation.

The mirroring technique can be a useful tool to assess clinical areas with high patient turnover such as emergency departments, operating rooms, intensive care units and ambulatory clinics. We believe this technique helps diagnose flow related issues that may be overlooked using traditional simulation methods and brings simulation one-step further towards reality.

References

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