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Hospital System Failure Points

Anticipate or identify hospital system failure points in the treatment delivery process.

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[See the author(s) background information on Ashbec.com.]

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Issue Summary

What are the best methods for identifying and/or anticipating system failure points in hospital treatment delivery processes under extreme pressure?

Keywords

#patientsafety
#hospitalcapacity
#hospitalssystemfailure
#hospitalalertmanagement

This research note will explore ways of anticipating and/or quickly identifying failure points in the treatment delivery process under normal circumstances and when the process is under extreme pressure. These failures would be anything that would prevent the treatment delivery process from being executed as planned including supply failures or various types of personnel failures.

Precursors

To have the ability to do that, a hospital must have certain capabilities in place already. First, for each patient the hospital must have a detailed yet flexible treatment plan comprised of a series of steps about which the following is known:

- the type of personnel that can execute the step,
- the specific person(s) to whom the step has been assigned,
- the time window in which the treatment step should be executed,
- all supplies required to allow the person to execute the step.

Second, the hospital must have an information system monitoring the execution of the treatment plan that can detect when a treatment step has not occurred in the required time window.

[Treatment Optimization for Patient Safety \(TOPS\)®](#)

Full implementation

TOPS is a system design that includes these characteristics and a full management process to manage the treatment delivery process. In a full implementation of TOPS, the treatment delivery subsystem would be integrated with HR and logistics subsystems. For standard operations, that would allow the system to anticipate supply and personnel needs for the treatment plans of currently



admitted patients.

Since the individual treatment plans would presumably be built from standardized templates/order sets, an analysis subsystem could be built that would anticipate the needs for nonstandard operations, e.g., during a pandemic. This scenario could be selected for a given number of patients arriving within assumed distribution of arrival times and diagnosis. Simulation techniques can then be used to, in effect, "treat" the simulated patients. Hospital capacity can be anticipated by changing assumptions until the treatment delivery process fails. That simulated failure would allow you to anticipate where the real system would fail under similar circumstances. This might be because of a shortage of healthy staff, PPE, staff with a particular type of training or even something as simple as a shortage of nasal swabs. Prior knowledge of the cause would allow the hospital to mitigate the failure and increase the hospital's treatment capacity.

Partial implementation

In a partial implementation of TOPS, the real time alert system signals the continuous process improvement team a system failure has occurred. (See the Ashbec research note: [Preventing Alert Fatigue](#) for a description of an effective alert management system.) Some patient's treatment plan has hit a roadblock. The same types of failures are identified but now they are in real time. In this situation the best you can do is quickly react to the failure and try and prevent it from recurring with another patient. If this mitigation is incorporated into the treatment templates, the organization as a whole will learn.

Benefits

While there are clearly major advantages to a full implementation of TOPS, even a partial implementation that includes an effective alert management system will result in significant benefits.

- There'll be fewer overall system failures.
- Patients will be safer.
- The hospital's treatment capacity will be improved.
- Hospital morale should improve because a staff will know that they are doing the best that they can possibly do.

However, to achieve these benefits, the hospital information system must have well defined treatment delivery processes and the capability of monitoring those processes to detect system failures.