ENHANCING HUMAN PERFORMANCE FOR BETTER HEALTH CARE OUTCOMES

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In this article...

Improve quality by focusing on high-value tasks and eliminating nonessential tasks.

TODAY'S HOSPITAL QUALITY TEAMS FACE NU- merous challenges that continue to evolve because of various payer and regulatory requirements. Quality teams focus on patient safety, readmissions and increasing cost-effectiveness, metrics that are now directly tied to revenue.

Performance of key support teams, such as quality teams, and their ability to meet quality measures, can now impact a hospital's financial solvency due to recent Centers for Medicare and Medicaid Services (CMS) incentives and penalties contained in value-based purchasing (VBP). VBP is tied to process metrics such as ensuring all chronic heart failure (CHF) or venous thromboembolism (VTE) patients get proper discharge instructions. Patient safety-oriented outcomes are also tracked, such as mortality in CHF cases. These typically complex cases can frequently contract, and succumb to, sepsis from hospital acquired infections (HAI).[1]

Quality and patient safety have bearing on how VBP will finance care.

QUALITY TEAMS' CRITICAL VALUE — Quality teams offer quality assurance (QA), ensuring care delivery is done properly and mistakes are avoided. Task execution is a key part of their job. Improving task execution is a "human performance" challenge. A methodology called the Military Acuity Model (MAM), developed by the U.S. Air Force and Maryland-based ProcessProxy Corp., was tested to see how it could be used to improve performance.

MAM is a methodology and set of tools (such as specialized alerts, worklists and analysis reports) designed to enhance process adherence and team value. It offers teams situational awareness of task saturation, the point of cognitive workload at which tasks drop for individuals across a care team. This leverages teams through a process that allows them to navigate limitations on human performance.

MAM emphasizes reducing preventable error and prevention efforts related to task failures, since these efforts ultimately translate into staff hours and associated costs, but do not add incremental quality. Task execution on certain measures will have a direct impact on hospital revenue now, making this issue even more salient.

THE PROJECT NEED — CMS uses core measures as a means to evaluate clinical process of care in hospitals. In 2015, four metrics were used to evaluate hospitals under CMS' value-based purchasing program: Clinical process, patient experience, outcomes and efficiency. Patient safety has bearing on all of these.

An important patient safety metric includes VTE, since studies[2] note that pulmonary embolism (a VTE condition) is the top preventable hospital death. The management of VTE is not simple, involving medications bearing significant risks if not properly ordered and administered. For this reason, various tasks involved in the prevention of VTE cannot be universally applied.

The VTE discharge instructions task, which the team focused on here, is difficult to manage given the nature of VTE

management by patients. Identifying patients and their tasks at risk for failure requires a significant amount of time.[3] If the team employed cannot handle the staff hours required to fulfill the tasks, then task execution fails.

There is significant value in providing comprehensive discharge instructions for patients with VTE, as it impacts clinical process of care metrics, outcome metrics and the overall patient experience. Furthermore, it can significantly increase patient charges to Medicare over the 30-day period of the episode (e.g., by doctors and EDs), adversely impacting VBP's "efficiency" metric.

Finally, avoiding potentially fatal VTE complications for CHF or acute myocardial infarction (AMI) patients within 30 days of their admission is crucial for outcomes.[4] Thus, this VTE challenge was being addressed in multiple ways during the human performance initiative.

Historically, "hard-stop" electronic alerts have been embedded into the electronic medical record, and did in fact lead to improvements in the VTE management process. However, these measures force doctors to halt their workflow until they addressed questions, and for this reason, their cost-effectiveness is called into question, like many other prevention efforts.[4]

There were several specific challenges with VTE prevention at our institutions:

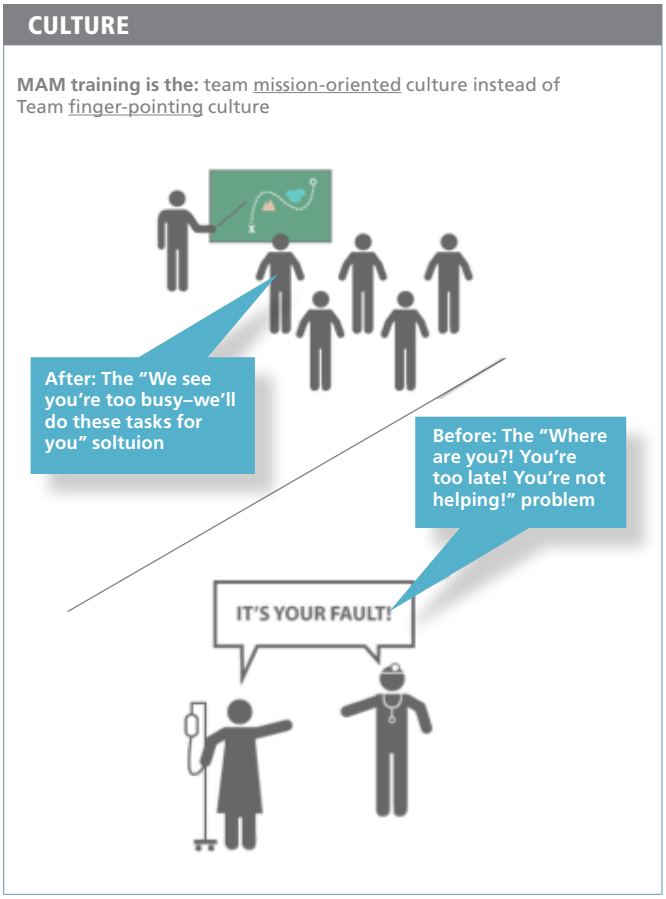
- Efforts added mandatory checklists of tasks to perform (and not by the support team seeking to leverage doctors' time), risks "checklist overload," impairing task execution of critical tasks when people are overloaded.
- VTE discharge instructions were difficult for hard stops to solve. Though a Coumadin hard stop was put in place, it did not prevent task saturation/overload, as it took up time and created interruptions that led to other task failures.
- Discharge instructions need to be done by people, as there is education to be passed on to the patients, not just reminders. This means connecting the dots and improving critical thinking skills for the audience.

METHODS — For quality care delivery and patient safety, we focused on process effectiveness, ensuring care tasks were delivered properly. First, MAM identified "tasks at risk" (TAR) of failure, finding where proven tasks that help the patient failed. This involved process modeling using an intervention lead-time analysis.[5]

Our hospital leaders felt there was too much "noise" in the health care setting, so the quality teams "micro-targeted" on TAR instead of trying to do all tasks — in effect, a "less-is-more approach" for significantly improving productivity of teams.

A change in critical-thinking skills was also needed for problem solving and synthesizing new process solutions. Weekly MAM training sessions to strategize and understand the new approaches were undertaken by the quality teams. Great effort was taken to prevent the "Hawthorne Effect" of improvements fading as teams move from one project to the next. This sustained improvement was achieved while the number of staff on the quality team remained constant.

FIGURE 1



The original performance improvement process consisted of root cause analysis, then training. After this fell short of producing results, the team began redesigning the process by load balancing across the team (a method demonstrated by a quality team partnering with doctors[6]), and focused on core measures as the endpoints of interest, since process adherence was crucial to enable improvement.

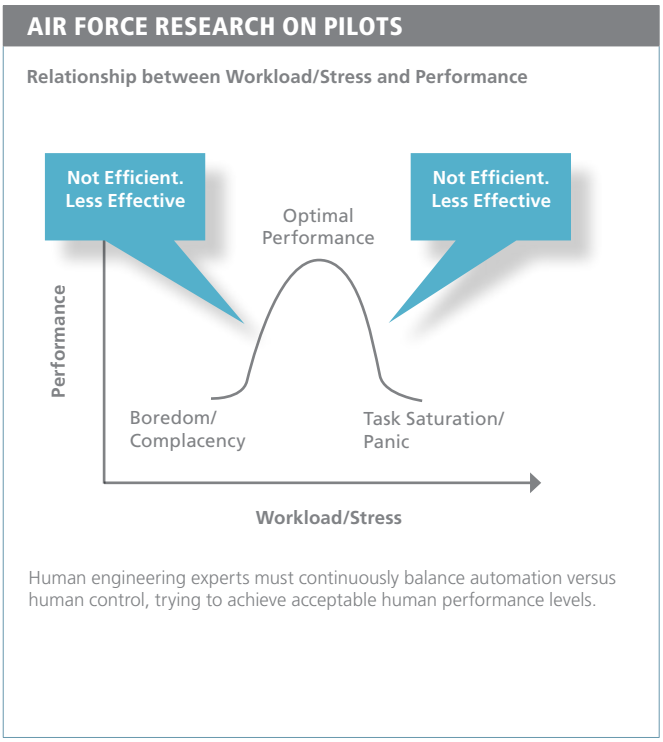
Proactive interventions were undertaken to prevent overload of team members before they sensed it. Fewer tasks, but with concentration on more high-value tasks meant accomplishing more in less time, and with fewer people.

The cornerstone of MAM is findings from the Air Force and others on the concept of "task saturation" and cognitive overload. For example, research relating to Air Force pilots (Fig. 1).

There is a critical premise of MAM, wherein to be effective for the frontline team of doctors and nurses, the support team must be proactive and offer help before they are asked.

Although most support teams say, in effect, "We are here to help," the culture change that is required to truly leverage the frontline is to find a way to be proactive. This is because if the frontline team needs to ask, it's too late. The reasons:

FIGURE 2



- Independent culture of physicians.
- It takes time to ask for help and explain what is needed.
- Fear of resistance or arguing to get help.
- Worry about reliability of support staff to execute the tasks.
- Time-sensitive deadlines (e.g., quality measure timings, "failure to rescue" risks).

The next step is the training of the performance improvement coordinator, or PIC (Figure 3). This member of the quality team is the cornerstone of the performance improvement and achieving the outcome. He or she guides higher-value tasks to the top of the team's list. A highly productive quality team supports a larger team, which in turn becomes more productive, to help frontline care team productivity. MAM successfully taught the PIC concepts, facilitating the required culture change of the team.

ENABLERS — The next step was performing a tasks-at-risk intervention lead-time analysis (TAR ILTA). Using this tool, the team analyzed processes (using retrospective analysis) to see whether a given task was high-value and also at risk of not being executed. This determined whether redesigned processes would be successful — and when to "rescue" tasks.

The PIC then used the Daily Tool (Figure 4), which is in the form of a TAR worklist given to each member of the care team. This focused on tasks that were known to be at risk before clinical encounters even occurred. The PIC also implemented alerts if the lead times were too short to be satisfied by a once-a-day list of TAR.

RESULTS — After implementing MAM, team performance improved across several core measures, including the VTE Discharge Instructions Task At Risk (Figure 5).

In addition to effectiveness, efficiency also improved, with care requiring fewer personnel to accomplish the same amount, or even more, task execution.

THE EFFECT OF MAM ON VALUE — The teams delivered bottom line and top line results:

- Revenue from CMS (from incentives gained/penalties avoided), capacity and supporting marketing through publicly reported numbers.
- Profits would increase not only from higher revenue, but also fewer full-time employees (FTEs) needed to deliver safe, quality care. ILTA showed that FTEs needed for quality assurance would be triple if there was no micro-targeting using MAM's TAR scoring models to double accuracy of where to focus to improve process adherence to near 100 percent.[2]

Adding the savings from fewer FTEs with extra revenue from value-based purchasing improvement, then subtracting the investment (cost of the entire quality team involved and what was paid for MAM Methodology training), resulted in an ROI of nearly 200 percent. So for every dollar spent on the entire team, two dollars extra were made back by the hospitals. Most interesting was the increase in productivity (Figure 6), showing that each person could achieve well over twice as many high-value tasks as before, and four times high-value successes over failures.

Result summary:

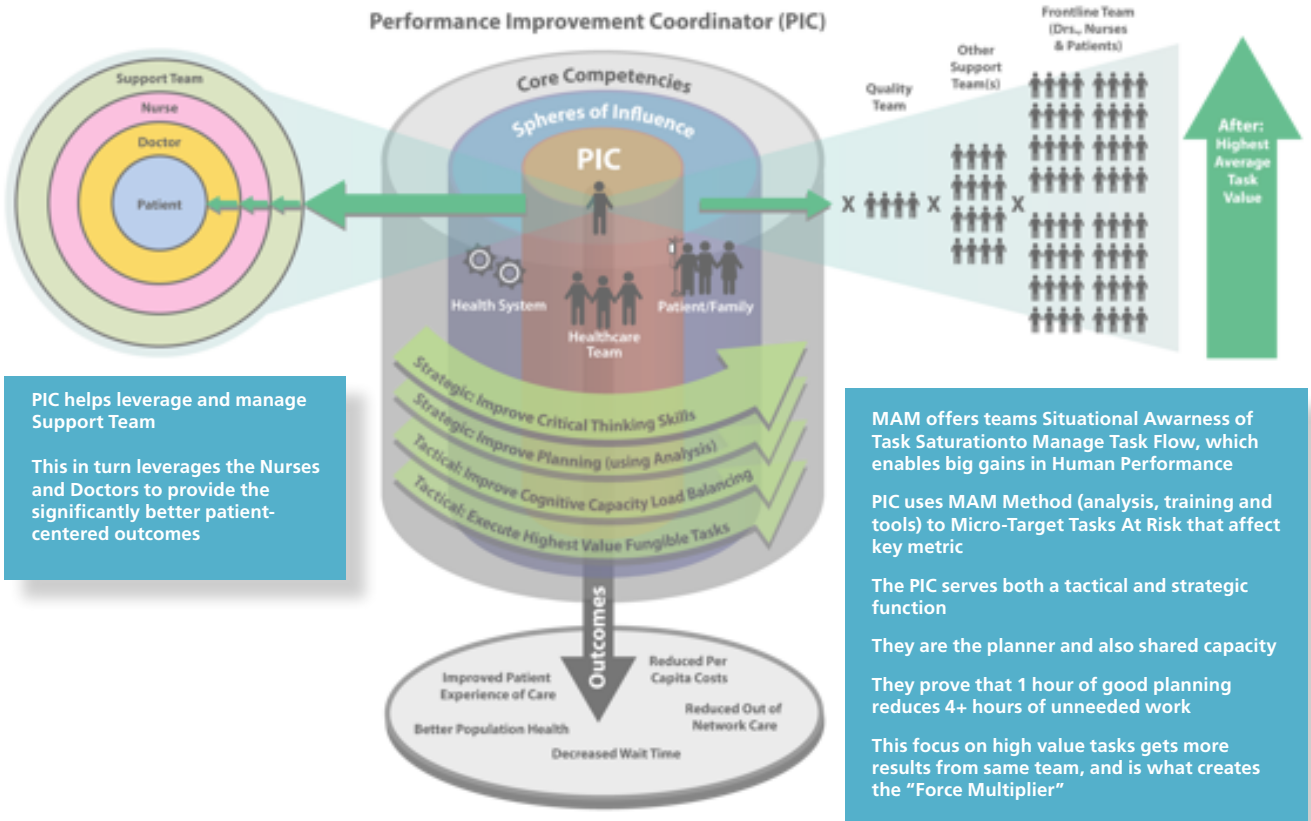
- The PIC improved performance of the existing team and current systems. They "load balanced" the team to avoid task saturation. Micro-targeting a reminder on just those tasks that may fail was the key "task offload." They proactively offered task-flow "navigation" (to themselves or the best team members to micro-target), reducing worry of doctors as they let doctors know key tasks will get done.
- MAM reduced team cognitive load, and thus, the risk of task failure. Leveraging the support team with micro-targeting leveraged the frontline team, as they often had too much to do in too little time.

DISCUSSION AND NEXT STEPS: APPLYING THE NEW APPROACH TO AN OLD PROBLEM – SEPSIS — The former options in quality/safety were simply hire more people, or instead miss tasks (due to staffing shortages). Technologies, process initiatives, and training are not enough unless humans can execute all the tasks.

MAM is an approach that works to focus teams on doing fewer tasks, but concentrating on higher-value tasks in less time and with fewer people. This methodology helped the quality team to go in a new, counterintuitive direction, involving fewer checklists and not relying on overachievers.

FIGURE 3

WHO BEGINS PROCESS – AND WHO THEN LEVERAGES OTHERS



PIC helps leverage and manage Support Team

This in turn leverages the Nurses and Doctors to provide the significantly better patient-centered outcomes

MAM offers teams Situational Awarness of Task Saturationto Manage Task Flow, which enables big gains in Human Performance

PIC uses MAM Method (analysis, training and tools) to Micro-Target Tasks At Risk that affect key metric

The PIC serves both a tactical and strategic function

They are the planner and also shared capacity

They prove that 1 hour of good planning reduces 4+ hours of unneeded work

This focus on high value tasks gets more results from same team, and is what creates the "Force Multiplier"

FIGURE 4

VTE TASK AT RISK SCORING MODEL WORKLIST

TAR Score (which, per MAM, incorporates task failure risk) focuses scarce man-hours

Patients can be listed on task-focused lists, such as VTE Discharge Instructions (Task) Patient List, or alert (if lead time too short)

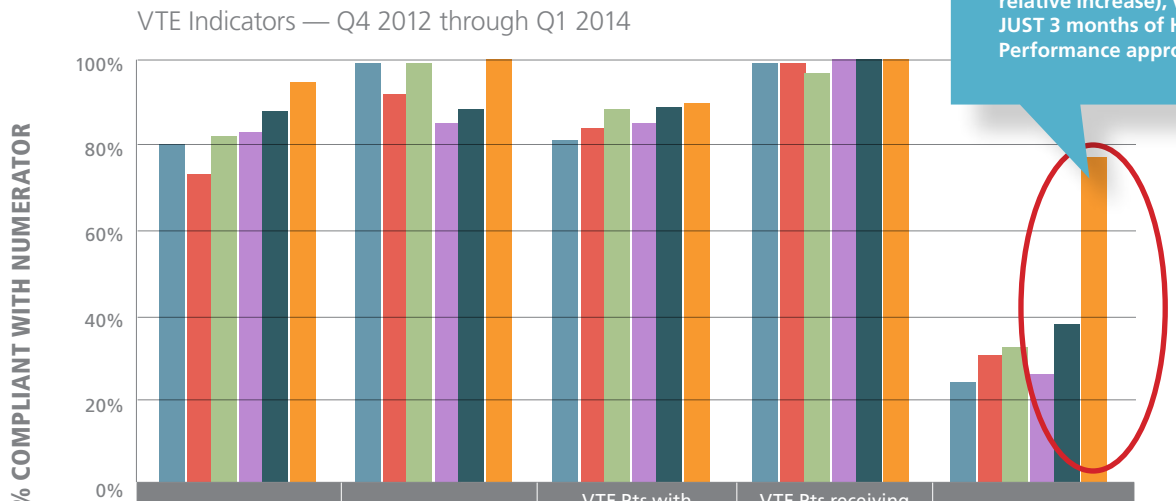
Score	PatientName	PatientId	Unit	Bed	Admitted	MRN	Attendi...
19	Patient 1	111111111	8L	8L14-A	6/13/2026	111111	Hawkeye 1
16	Patient 2	222222222	9S	9S05-B	6/13/2026	222222	Hawkeye 2
76	Patient 3	333333333	9S	9S10-B	6/14/2026	333333	Hawkeye 3
20	Patient 4	444444444	8L	8L14-A	6/13/2026	444444	Hawkeye 4

FIGURE 5

IMPROVEMENT IN VTE DISCHARGE INSTRUCTIONS WAS RAPID AND SUBSTANTIAL

Mount Sinai Beth Israel Core Measure Performance

VTE Indicators — Q4 2012 through Q1 2014



	VTE Prophylaxis	KU VTE Prophylaxis	VTE Pts with Anticoag Overlap Therapy	VTE Pts receiving UHF with monitoring	VTE Instructiosn
Q4 2012	80.7a5	100.0%	81.8%	100.0%	24.5%
Q1 2013	73.4%	91.7%	84.0%	100.0%	29.9%
Q2 2013	82.1%	100.0%	89.0%	97.5%	32.8%
Q3 2013	83.7%	85.7%	85.3%	100.0%	26.0%
Q4 2013	88.6%	88 .9%	89.7%	100.0%	37.8%
Q1 2014	95.5%	100.0%	90.2%	100.0%	77.8%

FIGURE 6

COMPARING HIGH VALUE TASK PRODUCTIVITY: OUTCOME-ADJUSTED TEAM EFFICIENCY ESTIMATE

MILITARY ACUITY MODEL (MAM)				
High Value Task Productivity Table	SLR Before MAM	SLR after MAM	Bi before MAM	Bi after MAM
Total Patients (i.e. Hospital Daily Census)	700	700	800	800
Total Quality Checklist (of checklists in use in the above row)	3	5	3	5
Average Tasks per Checklist (of checklists in ue in the above ros)	8	8	8	8
Total Estimated Tasks from Checklists (i.e. total task throughput of team)	16,800	28,000	19,200	32,000
Total FTEs Performing Tasks	4	5	4	5
Total Tasks/FTE	4,200	5,600	4,800	6,400
FTE Productivity on All Quality Tasks (i.e. relative efficiency measure of team)	100%	133%	100%	33%
Compliance Rate % (i.e. relative effectiveness measure of team)	96%	100%	95%	99%
% Error Rate (i.e. non-compliance) The "Tasks At Risk"	4%	0%	5%	1%
% of Total Tasks That Were High Value Tasks "Saved" from Task Failure	0	4%	0%	4%
Additional "High Value" Tasks Completed Successfully by Team	0	1120	0	1280
High Value Task Success vs. High Value Task Failure Ratio of Team	0:4	4:0	0:5	4:1
Total "High Value" Quality Tasks Saved per FTE in the Quality Team		224		256
"Normalized to Find High Value" Tasks Quantity (i.e. size of the "haystack"		5,600		6,400
Total Tasks/FTE + "Normalized to Find High Value" Tasks/FTE	4,200	11,200	4,800	12,800
FTE Productivity on High Value Tasks (i.e. "effective Efficiency" per Team FTE)	100%	267%	100%	267%

FOOTNOTES: ST. LUKES & ROOSEVELT HOSPITALS ARE COMBINED FOR SLR, AS IS PETERI AND BROOKLY FOR BI

1. Added 1 FTE added as MAM "Co-PIC", providing leverage as they helped PIC identify the Tasks At Risk to micro-target.
2. Before MAM, both SLR and Bi hospitals were circa 95% compliant. They are now consistently at or over 99%.
3. That is, the High Value Tasks that are at risk for Task Failure. Thus, higher the compliance rate, the more inefficient it is to do Quality Assurance double-checking on all tasks versus just micro-targeting on the Tasks At Risk. That is, at 5% failure rate,would require looking through 20 total tasks to ensure finding the 1 that would fail!
4. This is the number of additional tasks (i.e. "haystack") that would normally be required to "sift through" to find these high value tasks that would otherwise fail (i.e. "needles"). Pareto's (80-20) Rule applies here — it is as difficult to squeeze out the last 5% of task failures for a team as it is the first 50% (which virtually all can reach).

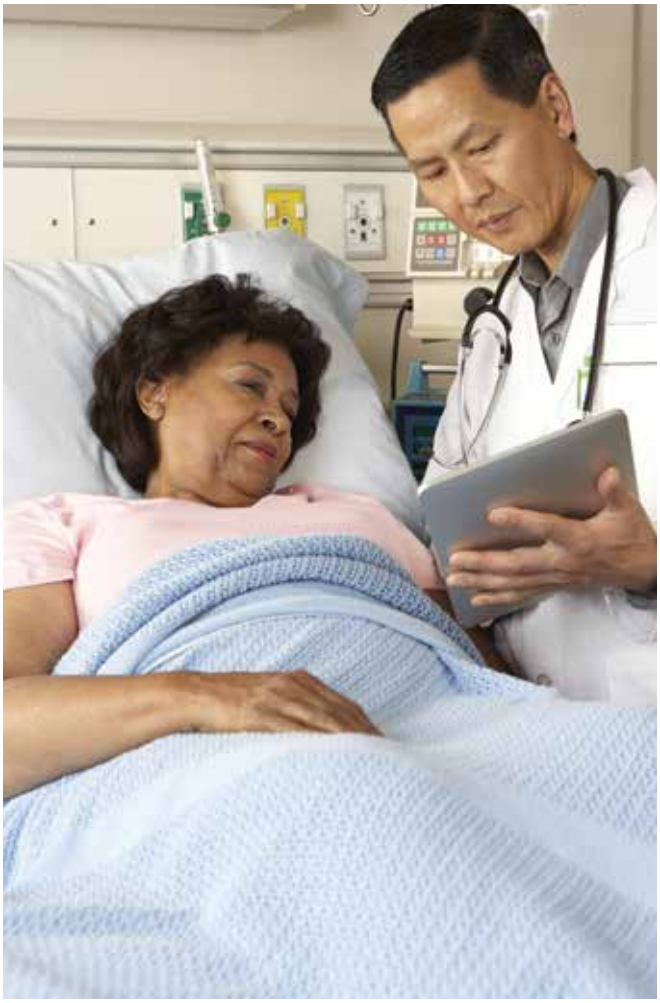
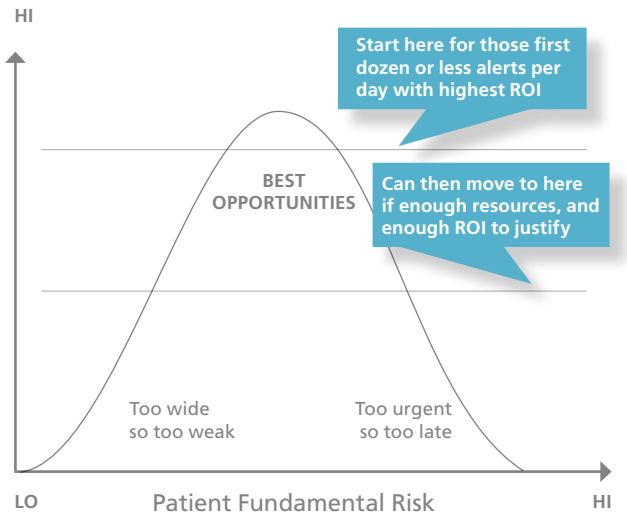


FIGURE 7

THE "BELL CURVE" OF ALL POSSIBLE SEPSIS ALERTS FOR PREVENTING SEPSIS BUNDLE TASK FAILURE.



The change is similar to a "needle in the haystack" analogy — the PIC could determine in advance where tasks at risk would be, and focus support there:

- If the team takes four people to find the needle, when it can actually be found with one, then the process is not efficient.
- If the team does not find the needle, when it must be found every time, then the process is not effective.
- The consequences of not finding the needle are preventable costs.
- Ensuring needles are not missed when it is essential they are found requires prevention costs.

To improve outcomes further, and aid the infection prevention team, MAM is being moved into sepsis. The focus will be on alerts due to the short lead time of three hours to execute the sepsis bundle. Compounding matters is that New York state has arguably the toughest sepsis regulations in the nation.[8]

Although a lot of technology can aid in this effort, the difference is made not only with software technology, but also in human performance. Interventions to date have relied heavily on more checklists or alerts, and then more overachievers to get everything done. Moreover, today's sepsis alerts also rely heavily on a patient meeting two SIRS criteria — but SIRS is not necessarily sepsis.[9]

Finally, the notion of task saturation is not factored in (though it can lead to such issues as delays of the teams on the nursing units in entering vital sign data needed for the alerts to even activate).

In considering how to improve sepsis care, three fundamental steps must be evaluated:

1. Condition of patient
2. Action to improve outcome
3. Actual outcome measured

There is an optimal point for accomplishing this most cost-effectively. The MAM goal is to not send out more alerts to address tasks at risk, but rather many fewer. The initial MAM calculations have shown an 80 percent reduction is possible — without losing "high-value alerts" — using the bell curve shown.

The challenge is finding the right TAR scoring model to micro-target those tasks that will slip by the current team most often to make it more efficient. Finally, investigations are ongoing of the new approach's effectiveness in:

1. Prevention of septic shock.
2. All cause 30-day mortality tied to inpatient and outpatient care.
3. Medicare spending per beneficiary.

Ultimately, the goal of quality teams is to offer much more value than they cost in the care of patients, given that they

are more often considered support teams rather than the frontline. However, these quality teams enable achieving near-perfect levels of quality and safety for a frontline team that is overloaded with patients and a growing list of tasks.

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