Capture the Competitive Edge: How Benchmarking Can Improve Your Ambulance Service

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The *Reflections* section of *EMSMJ* features reprints of significant articles from the archives of the EMS literature. In this issue, we present both segments of a two part article that was originally published in the September and October 1997 issues of the *Journal of Emergency Medical Services (JEMS)* written by Jack Stout.

Roger Bannister set a benchmark. Throughout all the centuries of prior recorded athletic history, no human being had been able to break the four-minute mile. Sheltered beneath this profoundly stable fact, experts boldly advanced elegant theories to explain why this barrier could not be broken. Human anatomy could not generate, sustain, or withstand the forces required. Generations of selective breeding might overcome these limitations, but short of that, the feat was physiologically impossible.

Then, on May 6, 1954, Roger Bannister did the impossible. To preserve their theories, experts postulated that Bannister was a genetic anomaly – a mutant. If so, the anomaly was epidemic in the late 1950's. Within one year, 37 other "genetic anomalies" broke the four-minute mile. The following year, 300 more followed suit.

Roger Bannister set a benchmark, and in so doing, he single-handedly (or footedly, if you will) changed our expectations of how fast a human being can run. Benchmarking changes expectations. It is our best tool for both discovering and advancing the possible. This two-part series introduces the fundamentals of benchmarking organizational performance in the ambulance service industry, with special emphasis on benchmarking key production processes.

BENCHMARKING DEFINES A FRAME OF REFERENCE IN WHICH YOU CAN EVALUATE YOUR PERFORMANCE

Imagine you own an ambulance company. Your fleet operations manager reports a critical vehicular failure (CVF) rate of .87 per 100,000 fleet operating miles, and a total fleet operating cost of $1.87 per mile. Are these results cause for celebration, ho-hum, or cause for termination?

While pondering your fleet operating costs, your personnel director knocks at your door. She tell you that, on a scale of 1 to 5 with "1" meaning "strongly disagree" and "5" meaning "strongly agree", your senior paramedics and training officers averaged 2.8 when asked if they are satisfied with the clinical capability and customer service of new hires. Do you give your director of recruitment and orientation a bonus or a warning?

In the same conversation, you also learn that extraordinary overtime (i.e., overtime in excess of overtime built into normal shift schedules) is running at 12 percent of total field personnel payroll hours. Is this performance something to brag about or avoid mentioning?

You're beginning to sweat just thinking about it when your director of operations walks in. He says that during the past 12-week period, 7 percent of shift starts were delayed by an average of 33 minutes due to "make-ready" problems – i.e., the vehicle was not fully stocked, clean, fueled and otherwise ready for duty at the time of shift start. Paid unit hours lost due to this cause totaled 178. At your marginal cost per unit hour of $37, the economic loss from this single cause was $6,586 for the 12-week period. What's your response?

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Without a frame of reference to tell you how you are doing compared to the operator down the street or across the nation, it's tough to know how to respond. Experience certainly helps, but you don't have to be a thirty year veteran like I am to figure it out. You can define your own frame of reference and evaluate your performance by benchmarking.

There is another value to benchmarking. In a presentation to owners and managers of independent ambulance services recently, I said that one of the organizations represented in the room had the lowest fleet operating cost per mile. I further revealed that one of these organizations had the lowest vehicle failure rate, and that it just might be the same organization. Then, after acknowledging the absurdly obvious truth of these statements, I raised two questions: "Given these facts, is there anything you'd like to know, and why do you want to know it?"

Not surprisingly, my colleagues wanted to know who was outperforming the others on these obviously important measures. Why did they want to know? To learn how this superior performance is created, so they can consider incorporating those methods within their own operations. That is another value of benchmarking – to objectively identify, validate, and accelerate the spread of "best practices."

BENCHMARKING ALLOWS YOU TO COMPARE YOUR PERFORMANCE OVER TIME AS WELL AS ACROSS ORGANIZATIONS

Vehicle failure rates, fleet operating cost per mile, and the other measures employed in the above examples are key performance indicators or measures of results. Comparison of key indicators is called benchmarking. When the same key indicator is compared over time for the same organization, the benchmarking method is "sequential" – i.e., a type of trend analysis. But when we compare the same key indicator for several organizations, the benchmarking method is "lateral."

World-class performance requires effective use of both sequential and lateral benchmarking. Using the example of athletic performance again, we all know that athletes compete with themselves "sequentially" over time, earning pride and satisfaction from their improvement. But as satisfying as individual improvement may be, it is not the same as comparing one's performance to others'. Breaking the four minute mile is a grand accomplishment; setting a world record of 3:44:39 is quite another.

Like athletes, world-class organizations must do more than improve; they must approach or exceed their most accomplished peers. World class performers willingly and routinely endure the discomfort of laterally benchmarking their own performance against the best in their field.

Since there are no EMS Olympics, how can we achieve lateral benchmarking? One way that single-site operators in other industries (including emergency department management) have done this is to participate in "blinded" lateral benchmarking projects. In blinded benchmarking, an independent party collects data submitted by participating organizations, and assigns coded identifiers prior to analysis and reporting. Each participating organization knows its code identifier, but not those assigned to other members. Thus, in viewing reports, participating organization know where they stand in relation to other organizations on each benchmarking measure but cannot identify the other organizations with which specific comparisons are made.

A comparative benchmarking system is currently being developed in the ambulance industry, and much of the information that follows is drawn from that project. For information on participating in this project, contact Ben Hinson, President, Mid Georgia Ambulance Service at benhinson@aol.com.

The first of these is outcome-oriented benchmarking, which measures the external effects of organizational performance. In the ambulance industry, examples of outcome-oriented key indicators include cardiac survival rates, measures of customer satisfaction, measured effects on down-stream health care costs

Output-oriented benchmarking measures the quantity, quality, or costs to the seller – not the buyer, of the products or services produced by the organization. In the ambulance industry, examples of output-oriented key indicators include fractile measures of response time reliability, measures of protocol compliance, clinical level of service, or the producer's cost per patient. In

practice, the line dividing process-oriented benchmarking from output-oriented benchmarking tends to blur as some key indicators are useful for both purposes (e.g., frequency of protocol compliance is both a measure of the output product and a factor in evaluating several key processes). This article deals primarily with process oriented indicators.

MEASURING THINGS THAT MATTER

Knowing what to measure is at least as important as knowing how to measure precisely. In fact, it is preferable to imperfectly measure something that that really matters than to measure trivia with perfection (or measure nothing at all).

Things that matter are processes so important that, when not performed well, will prevent the organization from generating competitive value. These are called "key processes." The following six key processes are absolutely essential to delivering competitive value in the ambulance service industry.

1. UNIT HOUR PRODUCTION (UHP)

The aim of this key process is to produce quality unit hours at a competitive cost. A "unit hour" is every ambulance service's basic unit of production – i.e., an ambulance crew assigned to an ambulance vehicle for one hour. This single key process typically consumes about 70% of the organization's budget, and includes seven important sub-processes:

Employee Recruitment and Orientation - If you were made responsible for producing quality unit hours at a competitive cost, but were allowed to control only one thing, this would be it. Hire the right people, and you're more than half way home. Hire the wrong people, and it won't much matter what else you get right.

CQI and Training - If you've hired good people in the first place, a sound continuous quality improvement (CQI) and training program will earn you a competitive edge. If you haven't, the same CQI and training program may merely keep you afloat. Some managers prefer to separate the CQI and training functions, thereby allowing the CQI people to objectively evaluate the training program, as well as other internal operations.

Fleet Operations - The task of fleet operations is to serve field personnel by making available to them an ambulance vehicle of a type and design preferred by those who use it, that rarely if ever malfunctions in the field, and at a competitive operating cost (including amortized capital costs, fuel, maintenance and repairs, driver training, vehicular insurance – i.e., all the costs that would not be incurred if you could operate an ambulance service without ambulances).

Materiels Management and Make-Ready - The aim of this key process is to serve field personnel by ensuring that a fully-stocked, equipped, clean and fueled ambulance is available for each crew at the start of each shift, and at the location of the shift start. (Except at very low-volume remote rural stations, high performance ambulance services do not expect field personnel working at high productivity levels to perform these tasks.) Efficient mid-shift restocking is also included within this key process.

OTHER TYPES OF ORGANIZATIONAL BENCHMARKING

This article describes several key indicators used in process-oriented benchmarking, in which the indicator, compared over time or across sites, reveals how well a key production process is being performed. There are two other types of benchmarking that are relevant to EMS.

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Scheduling, Compensation, and Labor Relations - The purpose of this key process is to develop and allocate work schedules which effectively meet two objectives. First, personnel must be scheduled so as to match customer demand by time-of-day/day-of-week, as requested by the manager of unit hour distribution, without generating unacceptable levels of "excess" unit hours. Second, to the maximum extent possible, shifts are designed to meet the personal and family preferences, and off-duty lifestyles of individual field personnel.

Field Operations - This key process is primarily used as a management-accounting cost center in which the direct labor costs of non-management field personnel are captured and reported. In addition, out-of-chute times, facility turnaround times, post facility expenses, and certain other items are tracked within this key process.

UHP Management and Supervision - Because unit hour production is so large and complex, it often requires its own "departmental" management and supervision. The quality, cost and scheduling of unit hours produced are the acid test of UHP management's effectiveness. The efficiency of UHP management is best tracked by the percentage of total UHP costs required to support this overhead function.

TEST YOUR SKILL

Using only the information contained in Scenario #4, it is possible to calculate this organization's total number of weekly shift starts. (The answer is 385.)

Competitive value is the ultimate benchmark — a combination of quality and price that is at or near the best service attainable from any supplier for the money spent.

2. MAXIMIZE "EFFECTIVE" UNIT HOURS

The purpose of this key process is to limit "lost" and "excess" unit hours. All "paid" or "produced" unit hours are not necessarily "effective" unit hours. In general, an effective unit hour is 60 minutes of paid unit hour production capacity available for posting and response, or assigned to a call. "Lost unit hours" are paid unit hours that, for various reasons, are not available for posting and response, or assigned to a call (e.g., unit out-of-service due to mechanical failure, or on-coming crew not available due to vehicle-not-ready at shift start). "Excess" unit hours are paid unit hours exceeding the coverage level requested by the manager responsible for unit hour distribution. Depending upon management's ability, from 6 to more than 30 percent of paid unit hours are lost or excess – a dangerous and costly source of waste.

3. UNIT HOUR DISTRIBUTION (UHD)

Sometimes referred to as system status management, this key process is exactly what its name implies: the task of distributing unit hours (by time-of-day/day-of-week, geographically, and to requests for service) to achieve on-time performance, fair and reasonable workload allocation, and competitive levels of productivity. Typically, clinical quality and customer-service aspects of the call-taking process are also included within this key process. While the direct cost of unit hour distribution is a small percentage of total costs (even where highly advanced technology is employed), the manager of this process determines productivity levels, and thus the number of unit hours required. Effectively, this manager holds the company checkbook, as well as the organization's ability to meet its response time obligations.

4. SERVICE PRICING AND CONTRACTING

Regardless of how efficient the organization may be, consistent pricing below average cost, or making contractual commitments that cannot be fulfilled, will eventually spell disaster. Professional business management has always been important, but the added complexities of managed care contracting are increasing the level of expertise required. Typically, marketing is also included within this key process.

5. PATIENT-ACCOUNTS MANAGEMENT

Having mastered the first four key processes, many organizations find they can survive and even prosper with little or no local tax support (and may be expected to do so). Increased reliance on earned income requires simultaneous achievement of competitive collection results (for local market conditions) and a humane corporate image.

6. CORPORATE MANAGEMENT AND ADMINISTRATION

The organization's ability to consistently generate competitive value while living within its means is the acid test of effective management. The efficiency of the organization's management is best tracked by the percentage of total costs required to support this overhead function.

Having a reasonably clear understanding of each of these key processes, we are now ready to design key performance indicators that will tell us how well each key process is being performed. The indicators will be the benchmarks against which we measure our performance.

In the second part of this series, we'll develop selected key performance indicators for several key processes, consider options for displaying the information, and discuss methods of obtaining and managing source data.

PART II

In Part One in the September issue, we showed how benchmarking creates our sense of what is possible, what is admirable, what is acceptable, what is embarrassing. Consciously or unconsciously, we routinely benchmark when we compare ourselves to others, deciding if we are rich or poor, fast or slow, masterful or incompetent, hard-working or lazy, fair or ruthless. In Part One, we acknowledged that it was better to imperfectly benchmark things that really matter than to precisely benchmark trivia. We defined competitive, sequential and lateral benchmarking and revealed how organizations use blended benchmarking services to improve their performance. We defined process-oriented, output-oriented, and outcome-oriented benchmarking. We listed the key processes essential to generating competitive value. For each of these concepts, examples from the ambulance industry were provided.

Perhaps most importantly, we noted that with virtually no exceptions, world-class performers in athletics and business routinely endure the discomfort of benchmarking their performance – not merely over time (i.e., sequential benchmarking) – but against that of their most accomplished peers (i.e., lateral benchmarking). Part Two continues to look at process-oriented benchmarking, defines how it is done and suggests methods of obtaining and managing benchmarking data.

Having a reasonably clear understanding of those things that matter most (i.e., the key processes we intend to benchmark), we are now ready to design key performance indicators that will tell us whether and how well each key process is being accomplished.

Because management is, in part, a process of converting financial resources into useful goods or services, and because value is a subjective measure of the balance between quality and cost, key measures must measure both the quality and cost of each of each of the key processes. In addition, benchmarking relies on a third measurement unit called a "collateral impact indicator," which defines the relationship among key processes. Finally, in developing key indicators, it is important to find comparisons that permit lateral (cross-site) benchmarking. For example, comparing the number of critical fleet failures or the fleet operations budget of a large operation with those of a smaller operation is relatively meaningless. However, comparing the ratios of critical vehicle failures per 100,000 fleet operating miles of the fleet operating cost per mile can be highly informative, provided both operators use the same definition of 'critical vehicle failure" and the same accounting rules for calculating "fleet operating costs."

So there you have it – you can benchmark the key processes that contribute to your success by designing and measuring key indicators of quality, cost and collateral impact. Now, let's

identify those key indicators for a key process I defined in Part I, Materiel Management & Make Ready.

Materiels Management & Make-Ready (MM&MR) is a sub-process that falls under the broader key process of Unit Hour Production (UHP). The aim of MM&MR is to serve field personnel by ensuring that a fully stocked, equipped, clean and fueled ambulance is available for each crew at the start of each shift, and at the location of the shift start. Efficient mid-shift re-stocking is also included in this key process. When MM&MR is optimum, it serves to maximize the ambulance crew's percentage of on-duty time available. Sample key indicators for MM&MR are listed below. Note that these are suggestions based on my experience; you may think of other indicators that are also valid in measuring your MM&MR performance.

HOW TO DESIGN QUALITY INDICATORS

Let's examine how I came up with the first quality indicator on the list: percent shift starts without delay because of make-ready defect.

A well designed key indicator of quality reveals how well a key process achieves its purpose. By "purpose" I mean the essential contribution this key process makes to the organization's ability to satisfy its customers.

Thus, I started by asking from the customer's point of view: What single measure would best reveal how well this key process achieves its primary purpose, as compared with the same organization's previous performance (sequential benchmarking), and with that of other organizations (lateral benchmarking)?

In high-performance systems using precision peak-load staffing, a request for 18 unit coverage during say, hour 60 of a 168 hour week means that 18 units will truly be needed at that time, and that a delayed shift start will almost surely result in a delayed response. Response time, clearly, is a measure of how well (or how poorly) an ambulance organization satisfies its customers.

High-performance systems typically operate with little or no tax support and cannot afford the cost of unit hours unavailable for service. If not tracked and controlled, make ready problems routinely waste 10 percent of more of paid unit hours, or put another way, nearly 10 percent of an operating budget. Furthermore, crews working high productivity shifts deserve the support of a responsive and reliable make ready program. In short, a delayed shift start caused by a make ready defect endangers and inconveniences patients, irritates and inconveniences institutional customers, wastes money and sends the wrong message to field personnel.

However, a raw count of delayed or on-time shift starts is not meaningful either in sequential or lateral benchmarking. As I suggested previously, what really matters is the ratio of shift starts delayed by make ready defect to total shift starts (e.g., 17 delayed shift starts divided by 208 total shift starts equals 8 percent shift starts delayed by make ready defect). Figure 1 charts this key indicator in lateral benchmarking for 46 organizations.

Before moving on, don't forget that key indicators need to be designed so that managers can tap into the necessary data to measure the key measures accurately. Are they available? Will they be difficult or costly to collect? Will capturing the data place an unreasonable burden on ambulance crews or other personnel? In other words, is this information really worth the effort required to obtain it?

When looking at shift start delays and make-ready defects, we need only count the total number of shift starts and during each reporting period and the number of shift starts caused by make-ready defects. Slight modification to existing documentation (e.g., vehicle checkout sheets or CAD unit setup records) will do the trick. (Some systems have solved this problem by using the CAD system's unit activation and log-off time stamps as the basic payroll time-keeping system for field personnel, with paper documentation required for other on-duty activity, such as in-service training and, of course, shift start delays.)

Finally, having developed our most valuable indicator of make-ready quality, we now ask ourselves another question, "If we could have just one more measure of make ready quality, and only one more, what would it be?" In practice, this process is seductive. Each key indicator seems

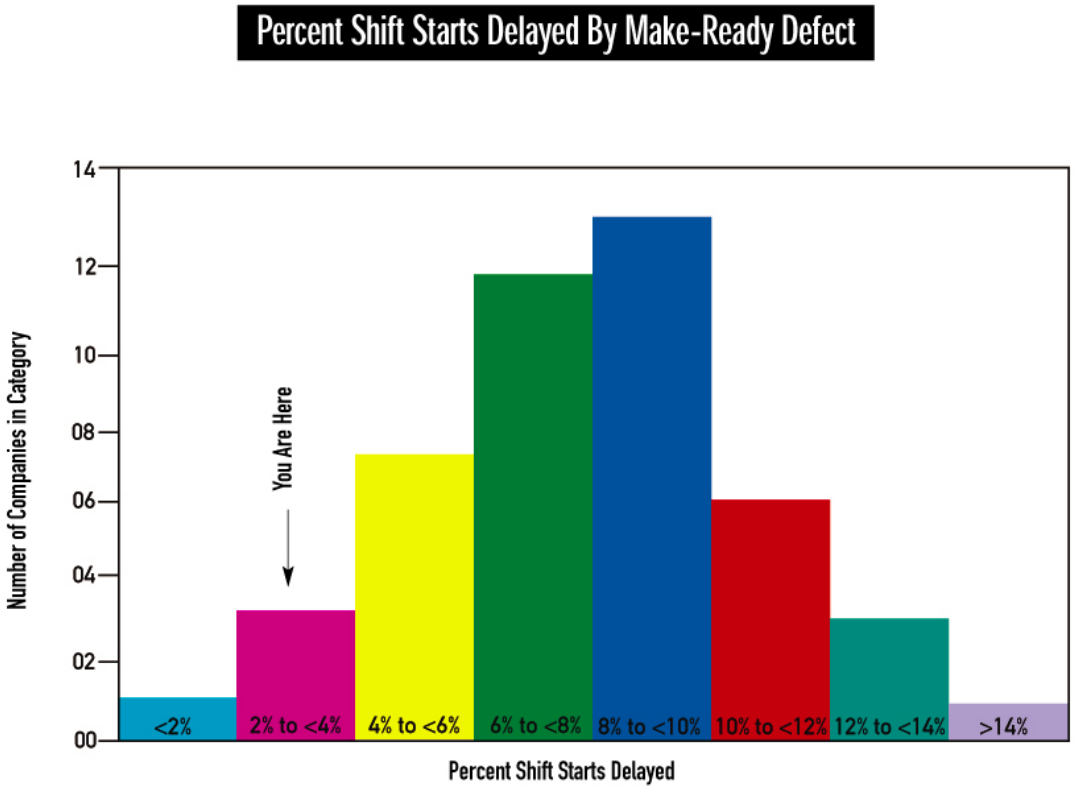

Figure 1 - Key Process: Unit Hour Production; Sub-Process: Materiel Management & Make Ready; Quality Indicator: Percent Shifts Starts Delayed by Make Ready Defect

to point to another. To be of practical value, benchmark reports must be tightly focused on the things that matter most, easily understood and very brief. Tip: Limit yourself to an absolute maximum of eight key indicators (i.e., all cost, quality and collateral impact indicators combined) for each key process and sub-process. You'll be amazed at how challenging (and effective) this limitation can be.

COST INDICATORS

Having developed means of measuring the quality of our MM&MR key process, we can now turn our attention to measuring the efficiency with which these results are achieved, i.e., their cost. Given a big enough budget, even incompetent managers can produce quality, so quality alone doesn't tell us anything. Key process benchmarking requires simultaneous understanding of quality and cost. But cost per what?

Just as a raw count of shift starts is meaningless, a comparison of MM&MR budgets alone would reveal little of value. Tracking the MM&MR cost per unit hour isn't appropriate either because it unfairly favors organizations using extended shifts (with fewer shift changes per unit hour). MM&MR cost per patient served would be better, but still of the mark. We need a unit-costing measure more closely related to the key process purpose: expediting the start of each shift in order to maximize the time that ambulance crews are available for patient response. Thus, the most useful costing measure for this key process will be the MM&MR cost per shift start. This indicator is illustrated graphically in Figure 2.

Since we are already counting the number of shift starts during each reporting period, we need only capture the costs for performing the key process itself to produce the cost indicator report. This can be accomplished with a management accounting system capable of tracking costs in a least two dimensions (i.e., line item category and key process category).

Cost accounting is an important part of the equation, and while an in-depth discussion of cost-accounting issues is beyond the scope of this article, two major issues are worth noting. First, lateral benchmarking of efficiency requires common rules for allocating costs among key pro-

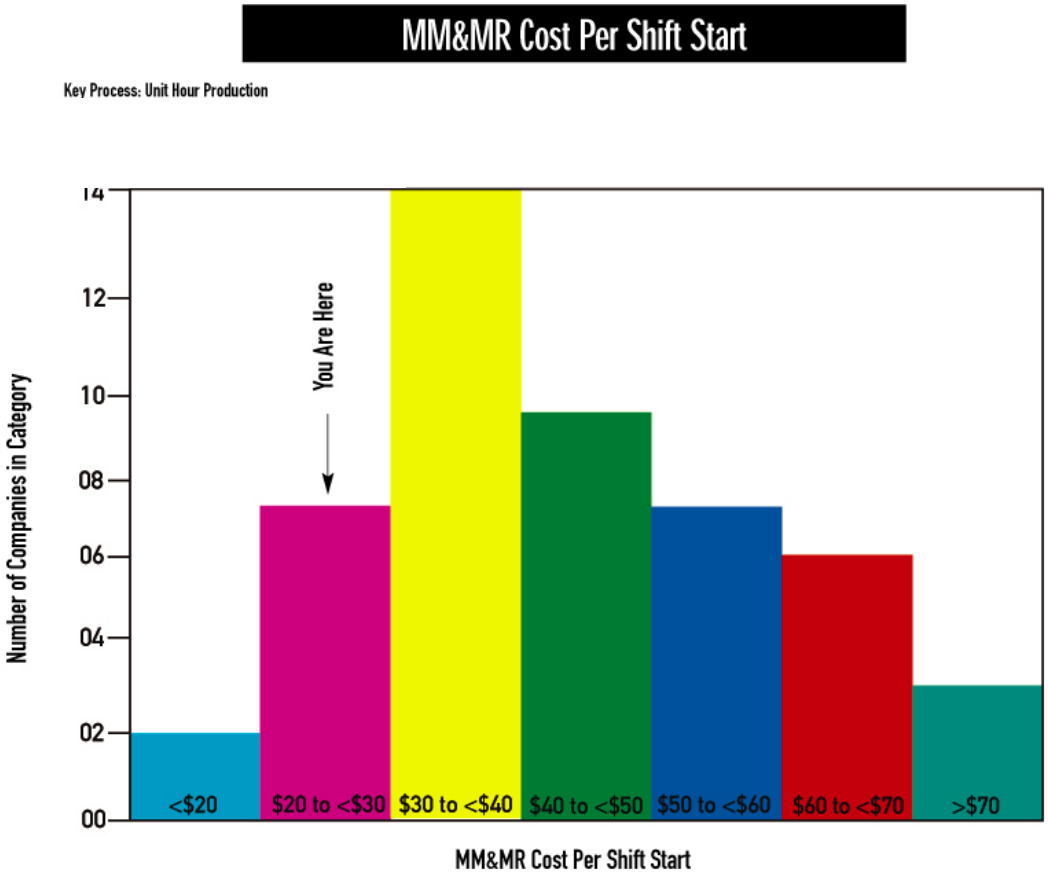

Figure 2 - Key Process: Unit Hour Production; Sub-Process: Materiel Management & Make Ready; Cost Indicator: MM&MR Cost per Shift Start

cesses. Second, to assess the full effect of a change in production method, it is important that all significant costs of conducting that key process are allocated to that category.

For example, the use of vehicle service technicians (VSTs) to clean, stock and refuel vehicles between shifts, and to expedite mid-shift restocking, can easily save far more money than it costs to hire these folks because. Their work can dramatically reduce unit hours list both at the start of each shift (when the crews must perform these duties) and at shift's end (when it can be even most costly if the ambulance crew is working overtime). VSTs can also help reduce inventory losses. But unless the cost accounting system captures all of these costs within the MM&MR key process category, the wisdom of using VSTs may not be revealed.

Tip: When designing cost allocation rules, a good rule of thumb is to allocate all the costs to a given key process that would not be incurred if that key process were unnecessary. In the case of MM&MR, your costs are all those that would be saved if you never had to restock or clean the ambulance or refuel between shifts.

WHAT ABOUT COLLATERAL IMPACT INDICATORS?

As discussed in Part 1, collateral impact is the effect of one key process upon the performance of another. Failure to track and understand these relationships can severely degrade management accountability and morale. \ Continuing with the MM&MR example, consider how a chronic pattern of shift start delays will adversely affect the primary cost indicator of field operations, i.e., the key process cost per effective unit hour. (As noted in Part 1, an "effective unit hour" is, in general, one hour of service by a crewed ambulance available for calls or assigned to calls). In an operation using a 10-hour average shift length, a 20 minute average shift start delay will increase the Field Operations direct labor cost per effective unit hour by 3.4 percent, i.e., for than $100,000 per year in a medium sized ambulance service, not counting the effect of extraordinary overtime resulting from related end-of-shift holdovers.

One way of tracking this effect is to benchmark the percentage of paid unit hours lost at shift start because of make-ready defects. This is a collateral impact indicator that works well for both sequential and lateral benchmarking purposes.

DATA SOURCES AND REPORT GENERATION

Three strategies are available for organizing the production of benchmark reports. To discuss these options, it is essential to understand the difference between primary and secondary data, Primary data is captured at its original source without modification or interpretation. Secondary data is data derived from by processing or interpreting primary data. For example, "call received" and "arrived at scene" time stamps created by a CAD system are primary data elements while "response time" is a secondary data element derived by comparing those two primary data elements.

Of the three strategies available for generating benchmarking reports, the moist cumbersome and least accurate requires managers to collect and submit the required information in the form of secondary data. Using this method, the reports flow "upward" within the organization structure as a service provided by lower management for the benefit of upper management.

Still cumbersome, but slightly more accurate is the gathering and submission of primary data by key process managers, with processing and report preparation performed by others. Although somewhat useful for sequential benchmarking, neither of these methods is adequate to support reliable lateral benchmarking because of the vast differences in what and how data is gathered and interpreted. For example, one operation may track unit hours lost because of mid-shift restocking while another does not. Two operations may require crews to refuel near the end of their shifts, but one may count this time as lost hours and another may not. Lateral benchmarking based on comparisons may be misleading.

For these and other reasons, successful lateral benchmarking requires use of the third strategy – direct collection of 100 percent of most primary data by a single, independent source. Uniform rules governing exclusion and processing can then be applied by an unbiased party. This does not mean that all participating organizations must employ the same code structures, chart of accounts and other record keeping conventions. Each participating organization's "language' can be indexed to a universal data element dictionary. Primary data elements are then translated into this "universal language" prior to processing, then translated back for report generation.

Besides ensuring true compatibility of reports from different organizations, this third strategy is far less cumbersome than "bottom up" reporting. Most of the primary data elements needed the key processes discussed in Part 1 can be obtained by data transfer from existing CAD, payroll, accounting and billing system databases. Automated extraction of primary data enhances system integrity, avoids the time and expense of redundant record keeping and creates a "top down" management information system of real value to line managers.

INFORMATION DISPLAY AND INTERPRETATION

Figures 1 and 2 provide sample displays of lateral benchmarking charts from the MM&MR quality and cost examples discussed above. (Sequential charts look the same, but show a single organization's performance over time.)

Even when viewing these charts for the very first time, we can quickly tell that the subject operation (i.e., the "you are here" arrow) is apparently more efficient than most and more effective as well. At the very least, we want to know more about that organization's methods.

A key process manager who reviews these charts routinely for five to 10 key indicators can gain a useful understanding of his or her key process performance in relation to others in less than 10 minutes. A general manager familiar with these reports can identify the greatest opportunities for organizational improvement in less than two hours, and a regional manager of multiple operations can rapidly identify "best practices" and operations needing help.

It is commonly assumed that differences revealed by lateral benchmarking measures are typically of a limited magnitude – perhaps 10 to 20 percent. This is not so in the ambulance

service industry. Ranges of 200,300 and even 400 percent in vehicle failure rates, on-time shift starts, productivity levels, response time reliability, lost unit hours, hospital turnaround times, out-f-chute times, extraordinary overtime, recruitment and orientations costs per successful new hire and many other key indicators are routine. No doubt these ranges will narrow as our customers demand better value as comparative information becomes more widely available. In the mean-time, such huge variations in quality and efficiency offer a tremendous advantage to individuals and organizations who understand what's possible and strive to achieve it.

Jack Stout, a renowned authority on EMS systems, probably wrote this article from the aft deck of his sailboat.

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