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## An exploration of management practices in hospitals

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### ABSTRACT

**Background:** Management practices, including, for example, “Lean” methodologies originally developed at Toyota, may represent one mechanism for improving healthcare performance.

**Methods:** We surveyed 597 nurse managers at cardiac units to score management on the basis of poor, average, or high performance on 18 practices across 4 dimensions (Lean operations, performance measurement, targets, and employee incentives). We assessed the relationship of management scores to hospital characteristics (size, non-profit status) and market level variables.

**Results:** Our findings provide concrete examples of the high degree of management proficiency of some hospitals, as well as wide variation in management practices. Although the exact ways in which these tools have been implemented vary across hospitals, we identified multiple examples of units that use standardization in their care, track performance on a frequent basis and display data in a visual manner, and set aggressive goals and communicate them clearly to their staff. Regression models indicate that higher management scores are associated with hospitals in more competitive markets, teaching hospitals, and hospitals with a higher net income from patient services ( $p < 0.05$ ).

**Conclusions:** High quality management practices have been successfully adopted by some hospitals in the US, but the ways in which these practices have been implemented may vary, reflecting the specific context or environment of the hospital. The adoption of modern management practices may be driven in part by market pressure.

**Implications:** An improved understanding of key management practices may assist researchers and policy-makers in identifying mutable hospital characteristics that can drive efficiency, safety, and quality.

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### 1. Introduction

It is well documented that the U.S. healthcare system has problems with inefficiency and variable quality of care.<sup>1–3</sup> In efforts to transform their care, a number of hospitals have invested in management practices, including, for example, “Lean” methodologies originally developed at Toyota.<sup>4–7</sup> These practices typically use a combination of tools with a focus on streamlining workflow, incorporating a mindset of continuous improvement, and eliminating different types of waste. Management practices are not strictly limited to Lean; hospitals are also experimenting with ways to use data to drive change or engage and incentivize their employees.

This article has three goals. First, we present a relatively concise framework to measure “management.” By management, we do not mean “disease” or “care” management, which are typically focused on narrower clinical issues. Rather, we investigate 18 organizational questions across four management dimensions: (1) operations; (2) performance monitoring; (3) target setting; and (4) employee incentives. Hospitals across the country have invested heavily in the approaches that parallel these management dimensions. Second, using a large survey of cardiac units across the U.S., we provide concrete examples of management approaches in use today. By providing actual examples of these tools, we hope to improve the potential for evaluating and spreading beneficial practices. Third, having scored management practices as part of previous work, we quantitatively test the association between management scores (as a dependent variable) and hospital characteristics. Overall, we aim to open the black box of hospital operations and provide a more material understanding of how and why management practices are disseminated.

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## 2. Materials and methods

### 2.1. Survey design

To measure management, we took an approach originally developed by economists to assess management in the manufacturing setting<sup>8,9</sup> and adapted it to the cardiac inpatient setting. We surveyed cardiac units on 18 questions covering four dimensions of management for which a variety of tools and rudimentary empirical evidence has surfaced: (1) Lean operations; (2) performance measurement; (3) target setting; and (4) employee incentives. This framework has been validated through survey work in more than 6000 manufacturing firms<sup>8,9</sup> as well as a large-scale field experiment in India<sup>10</sup> and serves as the basis for the newly introduced Management and Organizational Practice Survey (MOPS) component of the US Census.<sup>11</sup>

Our management surveys used several steps to allow flexibility in measuring management while avoiding the tendency of respondents to answer questions in a way that they believed might be “correct.” First, surveys were conducted by phone, and respondents were not told in advance that they were being scored. Second, to elicit scores, the interview was based on a series of structured open-ended questions (e.g., “Can you tell me how you promote your employees?”), rather than closed questions (e.g., “Do you promote your employees on tenure [yes/no]?”). For each practice, the first questions were broad, continuing with detailed follow-up questions until the interviewer could make an accurate assessment of the organization’s practice, providing a score from 1 to 5, with higher score representing better practices. Table 1 provides a brief description of these 4 groupings and 18 practices, including examples of the questions we asked and an indication of the scoring approach. Additional technical details of the survey have been described previously<sup>12</sup> and are available in e-Appendix.

The survey was conducted in summer, 2010. Interviews were conducted by a team of 9 individuals with professional and educational experience in healthcare and management, using a standard interview guide. Interviews were scored by two members of the interview team, with one member asking questions and scoring responses, and the second member listening and scoring responses in parallel. We used the American Hospital Association (AHA) Guide to identify hospitals with interventional cardiac catheterization laboratories and to determine hospital contact information. We excluded federal (Veterans Administration) hospitals and hospitals with fewer than 25 annual Medicare discharges with a primary diagnosis of AMI.

Following our previous work, we converted the management scores from the original 1- to 5-point scale to z scores (mean, 0; SD, 1). This process mediated scaling differences between questions (e.g., interviewers may have consistently given higher scores for some questions and lower scores for others.) The average management score, used in our regressions, is defined as the average of these z-scores.

“Best” practices – those receiving a score of a “5” – represented the interviewer’s assessment of a unit whose performance was at the high end of the scale. We collected multiple descriptions of “average” and “best” practices and present selected examples in this study.

### 2.2. Administrative data

For our regression analyses, we obtained hospital administrative data (i.e., number of beds, teaching status) from the AHA Guide<sup>13</sup> and Medicare’s Provider of Service file. A list of accredited Master of Business Administration (MBA) schools was obtained from the Association to Advance Collegiate School of Business

(AACSB). Competition measures and AMI volume were based on the 2010 Medicare Provider Analysis and Review file.

### 2.3. Statistical analysis

In order to assess the relationship between management scores and hospital characteristics, we conducted regression analyses that used the average of the management z-scores as a dependent variable. Our independent variables included a measure of competition, the predicted Herfindahl-Hirschman Index (HHI – described in more detail below), net income reported by the hospital for patient services, distance to the nearest AACSB-accredited MBA school, region, ownership, AMI volume (25–75, 76–125, 126–250, and > 250 discharges annually), licensed beds (less than 151, 151 to 374, and more than 374), rural vs. urban, teaching status, open heart surgery capability, and hospital system membership. We also included a number of prespecified “interviewer” controls designed to mitigate biases across interviewers and types of interviewees.<sup>12</sup> These included indicator variables for interviewer, interviewee job position (e.g., nurse manager vs. unit director), interviewee location (e.g., intensive care unit vs. telemetry), and the duration, day, and week of the interview.

HHIs are indices of the competitiveness of the market and were calculated based on a hospital choice model. Following Dranove and colleagues,<sup>14</sup> we used HHIs based on predicted zip code-level patient flows instead of actual patient flows, because predicted flows more closely approximated a measure of market pressure, rather than the patients actually referred to the hospital. Patient flows were estimated using a grouped McFadden choice model, with choice of hospital modeled as a function of hospital level variables interacted with the drive time between zip code centroids and all hospitals in the market, patient age range, and per capita income for the patient’s zip code.<sup>14,15</sup> HHIs can range between 0 and 1, with higher values representing a more concentrated, less competitive market.

The study protocol was approved by the institutional review board of Oregon Health & Science University.

## 3. Results

We attempted to contact and schedule interviews with all hospitals identified from administrative data as having interventional cardiology and at least 25 annual AMI discharges. We scored management practices in 597 hospitals, representing a 51.5% response rate. Table 2 displays key hospital characteristics. Surveyed hospitals were slightly more likely to be not-for-profit hospitals and offer cardiac surgery.

Table 3 provides an indication of the distribution of specific management practices across our surveyed units, as well as the average score across all practices. Overall, hospitals performed best on Question 10 (Performance Review) and most poorly on Question 18 (Retaining Talent). All of the 18 questions suggest considerable room for improvement: fewer than 50% of hospitals scored a 4 or 5 on all but 2 questions (Q5, Patient Focus, and Q10, Performance Review).

Table 4 provides examples of management approaches in hospitals in the US. We provide an example of an “average” practice (as scored by our interview team) and two examples of “best” practices – as identified by our interview team – for each of the 18 questions.

### 3.1. Lean operations

Questions on operations follow the typical flow of AMI patients through the hospital: from admission (Q1), to procedures

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