

Research Article

Hospitalization Rate Index a Proposed Measure of Quality of Care

Roy N. Morcos*, Thomas Macabobby, Angelina Rodriguez, and Cary Jordan

Department of Family Medicine, St. Elizabeth Health Center, USA

***Corresponding author**

Roy N. Morcos, Department of Family Medicine, St. Elizabeth Health Center, Youngstown, Ohio, 8423 Market street, Suite 101 Board man, Ohio 44512, USA, Tel: 330-729-8749; Email: roymorcos@gmail.com

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Abstract

We are proposing in this paper a new measure, the Hospitalization Rate Index (HRI), that evaluates the rate at which patients in a given practice or group are admitted to the hospital, and the duration of such hospitalization, corrected for the total number of patients cared on an outpatient basis in a given period of time. The numbers must be collected on a daily basis and the HRI calculated for a period of time. $HRI = \frac{\text{Number of hospitalized patients}}{\text{Number of office patients}} \times 100$. Excluded from the HRI are hospitalizations for certain defined conditions such as accidents and maternity care. Office visits for purely nursing encounters or immunizations are also excluded from the calculation. We propose that the HRI may be viewed as a measure of overall quality of care especially if used to monitor one given practice over time, or if used to compare different practices only after meticulous attention is given to minimizing confounding variables. As changes in the way medical care is provided, such as the introduction of the patient-centered medical home, the HRI may be an important tool to evaluate the overall impact of such changes on patient outcomes.

INTRODUCTION

Quality of Medical Care has been under increasing scrutiny in the last few years with an emphasis placed on attempting to improve quality while containing cost [1]. Measurement of quality of medical care is a daunting endeavor, but is nevertheless of utmost importance, especially in a primary care residency training program setting such as Family Medicine, Internal Medicine and Pediatrics. As new training and educational methods are implemented and new office procedures are introduced, such as initiation of the Patient Centered Medical Home [2-4], there is a critical need to measure the impact of these changes on actual patient outcomes on an ongoing basis. Residency Programs as well as other primary care organizations can greatly benefit from a method to measure and monitor clinical outcomes.

BACKGROUND REVIEW

Numerous methods are currently utilized to evaluate the quality of care delivered in the hospital setting. Such methods include length of stay, rates of readmission, complications, nosocomial infections, falls and many other outcome measures [5]. In addition, the quality of care delivered in the office can be evaluated by determining rates of vaccinations, colonoscopy and mammography among numerous other factors [6]. While all of these measures are important, there is a need for a simple method that evaluates overall medical care outcome in both office and hospital settings.

One such method that we are proposing in this paper examines the rate at which patients in a given Residency Program, practice, or clinic are admitted to the hospital and the duration of such hospitalization. The number of hospitalized patients and the duration of hospitalization are expected to be affected by a variety of factors among which is the number of patients cared for in the practice. The underlying assumption is that the number of hospitalized patients and the duration of such hospitalizations, corrected for the total number of patients cared for in the program or practice, may be viewed as a reflection of the overall quality of medical care within that program or practice. The correlation between hospitalization rate and overall quality of medical care may not be immediately apparent but the following examples may help illustrate the point:

1. Access to care: if patients cannot be promptly scheduled for acute illnesses or complications, delay of care will result, increasing the risks of complications and of hospitalization. Furthermore, if acutely ill patients cannot be evaluated by their PCP, they will more likely be seen by another provider (who is unfamiliar with their condition) in an urgent care or ED, resulting in more testing and a greater chance of hospitalization.
2. Immunization rate: administration of all recommended immunizations such as influenza, pneumococcal and Tdap vaccines can help prevent illness and hospitalization.

3. Appropriate management of common chronic illnesses such as diabetes, hypertension, dyslipidemia, coronary artery disease, congestive heart failure, asthma and COPD can help reduce hospitalizations. This requires a coordinated team effort including the primary care physician as well as specialists, ancillary staff and patient educators.
4. Meticulous attention to pharmacotherapy, especially avoiding poly-pharmacy in the elderly, is of utmost importance in minimizing risks and complications. The use of an EHR can be invaluable in this task. Assessment of gait, balance and coordination in the elderly may help reduce the risks of falls and fractures.

There are numerous other such examples where timely access to care as well as patient education, delivery of preventive and acute care, can reduce morbidity and hospitalization. Patient outcomes and risks of complications leading to hospitalization are also influenced by compliance with medical advice including lifestyle modification measures and intake of prescribed medications. While medical compliance is, to a significant extent, dependent upon patient characteristics, it is also influenced by the ability of the PCP and care team to establish a trusting rapport with the patient. This factor is at the core of quality medical care.

One obvious major caveat to consider is the nature of the patient population cared for within a practice or residency program. This includes important elements such as prevalence and severity of chronic illnesses, socio-economic factors and other variables that are likely to have a significant impact on compliance, morbidity and hospitalization risk. This caveat however is not as critical if the evaluation method is used to track the performance of a given practice or residency over time, or if similar programs are compared.

We therefore propose a Hospitalization Rate Index (HRI) that is simply a ratio of hospitalized patients over the total number of patients cared for in the office on any given day. These numbers must be determined at the end of each day, since patients are continually admitted and discharged from the hospital. This index would therefore also take into account the length of hospital stay for each patient, which is a major index of quality of care. The HRI can then be calculated on a quarterly or annual basis and compared with past indexes from previous years within the same Residency Program or practice.

$HRI = \text{Number of patients in the hospital} / \text{Number of patients seen in the office} \times 100.$

For the HRI to be accurate, all hospitalized patients must be accounted for, especially if patients from a practice or Residency Program are admitted to more than one hospital. Excluded from the HRI numerator (number of hospitalized patients) are patients admitted for labor and delivery, neonates, patients admitted for accidents, for scheduled orthopedic or general surgical procedures such as arthroplasty, cholecystectomy, hernia repair, hysterectomy and others. Excluded from the HRI denominator (number of office visits) are purely nursing encounters such as visits for blood pressure measurement, for immunizations and for various laboratory tests (Table 1).

Table 1: HRI exclusion factors.

A. Office encounters
Nursing visit for blood pressure check
Nursing visit for vaccination
Nursing visit for laboratory tests
Other nursing visits
B. Hospital encounters
Admission or observation for elective or urgent surgical procedures such as appendectomy, cholecystectomy, hernia repair and other procedures.
Admission to Labor and Delivery, post-partum care.
Neonatal admissions.
Admission for trauma

Comparing the HRI of different Programs or practices may be useful but could lead to inaccurate conclusions if patient populations are likely to be different, especially when comparing inner city programs with suburban or rural programs [7].

MATERIALS AND METHODS

We have calculated the HRI for two Family Medicine practices for the months of July, August and September of 2015. The first is a Family Medicine Residency Program, the St. Elizabeth Family Medicine Residency Program in Youngstown, Ohio (practice A). This is an established, fully accredited inner city program, with a total of twelve residents and five full-time clinical faculty members including the program director. The second is a Family Medicine group, the St. Elizabeth Boardman Family Health Center in Boardman, Ohio (practice B). This group includes three Family Medicine physicians faculty in the process of establishing a new Family Medicine Residency Program. Both practices (A&B) utilize the same EHR and admit their patients to the same two hospitals, which allows for easier and more complete data collection.

The data were obtained by daily review of the office schedules as well as the hospital census for both practices for a period of three months. The data was reviewed by the principal investigator (RM). Criteria for patient exclusion from the HRI are as listed in the table. The HRI for both practices (HRI-A and HRI-B) were calculated and compared.

RESULTS

For practice A, there were a total of 2657 office encounters and 614 hospital encounters. The HRI-A is $614 \times 100: 2657$ or 23.11 %.

For practice B, there were a total of 1406 office encounters and 161 hospital encounters. The HRI-B is $161 \times 100: 1406$ or 11.45%.

DISCUSSION

We have shown the feasibility of calculating the HRI for two family medicine practices. Practice A is a fully accredited allopathic Residency Program located in an inner city setting. Both residents and faculty are assigned a panel of patients who are provided with continuity medical care at the Family Health Center. All resident-patient encounters are supervised by a faculty member according to the ACGME residency guidelines. Patients are admitted and managed by a team of residents under the direct supervision of a faculty member on a daily basis. Since

both practices A and B are owned and operated by Mercy Health, a not-for-profit organization, no patient is denied office or hospital care regardless of insurance availability or ability to pay.

Practice B is located in a suburban setting. Patients are assigned to one of three faculty physicians who provide office and hospital continuity care. Patients are admitted to the hospital by the faculty on call, and managed by one of the faculty on a daily basis for the duration of hospitalization.

It is immediately apparent that HRI-A is about twice as high as HRI-B. However, conclusions and comparisons between the two programs are not possible due to several major confounding factors. One such factor is the dissimilar socio-economic composition of the patient populations cared for in the two practices. Another factor is the relative inexperience of the residents who provide medical care to most patients in practice A, despite the fact that all encounters are supervised by a member of the faculty. These results will serve as a baseline and compared with future HRI for each practice. It is possible however to make comparisons in HRI between two programs with similar patient composition and demographics, such as two inner city primary care residency programs.

The main use of the HRI will be to evaluate its variation over time within the same practice, group or residency program in order to ascertain the impact of future changes in the way medical care is provided. Some of the changes that are proposed and introduced include implementation of the Patient-Centered Medical Home (PCMH). Another major change is to link physician compensation to quality of medical care. The impact of these and many other changes have been variable to date and difficult to assess due to the lack of a simple and reliable method to measure outcomes [8-13]. As these and other practice guidelines are introduced [14], there is a need for a simple and objective measure of performance and the HRI is one potentially useful index.

The HRI can be a measure of quality of care provided in both office, as well as hospital settings. It is also a measure of the cost of medical care since it includes factors such as need for hospitalization as well as duration of hospitalization.

CONCLUSION

We have proposed a new method, the HRI that may prove valuable in evaluating overall quality of medical care. This index is simple to measure and can be tracked over time to ascertain the impact of changes in the way medical care is provided on medical outcomes, as new patient care delivery methods and techniques are introduced. Comparisons between different programs can be made, provided meticulous attention is given to minimize confounding variables.

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