

# Implementing CAP Guidelines: Impediments and Opportunities

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## ABSTRACT

*Context:* The implementation of guidelines for treatment of Community-Acquired Pneumonia (CAP) has been proposed as a quality improvement and cost-saving strategy, though the effectiveness of several recommendations has yet to be confirmed through clinical trials. We sought to analyze the development and implementation of guidelines at our hospital, and to identify particular successes and impediments.

*Evidence Acquisition:* Date sources included the Web sites of the Joint Commission on Accreditation of Healthcare Organizations, the Infectious Disease Society of America, and the American Thoracic Society. References from their guidelines were reviewed, and further citations were obtained using Ovid software to search for references within the last 15 years using “pneumonia guideline,” “pneumococcal vaccination,” and other relevant search terms. Our own hospital data was compiled, analyzed, and presented using Excel software.

*Evidence Synthesis:* Significant improvement was seen during the 2-year study period when CAP guidelines were implemented at our hospital. However, we also identified several impediments, which will require further attention to achieve our quality improvement goals.

*Conclusions:* Our implementation of CAP guidelines was challenging but overall instructive and contributory to patient care. We review further areas for improvement.

## INTRODUCTION

Clinical practice guidelines have found their way into

all areas of medicine and are generally promoted as “quality-improving strategies” that bring the benefits of evidence-based medicine to the bedside and office.<sup>1</sup> Not only should good guidelines streamline the decision process for the clinician, but broad application of such guidelines also has the potential to improve care on a large scale. For example, adherence to standard treatments for heart attack could save tens or even hundreds of thousands of lives when applied to the 2.5 million patients a year with unstable angina and myocardial infarction.<sup>2,3</sup>

In addition to improved patient outcomes, guidelines are commonly assumed to save money and are therefore very popular with health-maintenance organizations and government bureaucracies that fund health care.<sup>4</sup> Indeed, in the mid-1990s, the French government decided to mandate strict adherence to specific medical guidelines with fines for non-compliant physicians, an aggressive approach that was neither well-liked nor broadly successful.<sup>5</sup> Their popularity in this country may be gauged by a perusal of the listings on the National Guideline Clearinghouse Web site ([www.guideline.gov](http://www.guideline.gov)), a product of the Department of Health and Human Services’ Agency for Healthcare Research and Quality, which includes 72 listings for treatment of respiratory tract infections.

However, medical guidelines have their critics as well. A 4-part series in the *British Medical Journal* explored in detail both positive and negative issues regarding clinical practice guidelines.<sup>6</sup> As stated in the article, “The promotion of flawed guidelines by practices, payers, or healthcare systems can encourage, if not institutionalize, the delivery of ineffective, harmful, or wasteful interventions.”<sup>6</sup> Just as important is the negative impact on physicians. According to the periodical *Health Care News*, “Use of performance data to rank, rate, or penalize a practitioner or institution may lead to defensiveness, gaming of the data system, or systematic manipulation of the data.”<sup>7</sup>

We implemented treatment guidelines for community-acquired pneumonia (CAP) 2 years ago as part

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## Timeline of Key Events

**April 2003** – Team formed

**January 1, 2004** – Began data collection and publication of results; also initiated educational sessions for staff and physicians

**July 2004** – Some changes to indicators; pediatric population excluded from data set, and antibiotic choice added

**August 2004** – Clinical guidelines developed

**January 2005** – Order sets developed, patient education material available

**May 2005** – Orders sets revised, approved, printed; educational process initiated

**May 2005-present** – Regular meetings with CAP Working Group

**Summer – Winter 2005** – Regular meetings with Emergency Medicine physicians and nurses to share data and devise action plans

**December 2005** – Education provided to nursing staff; staffs from key units join CAP team

**April 2006** – Feedback given to individual units on measures for which they have responsibility

of ongoing quality improvement efforts at Gundersen-Lutheran Medical Center. This has been a multi-disciplinary effort involving physicians, nurses, pharmacy, respiratory therapy, and health information and quality improvement personnel. While we feel the results so far have been encouraging, we note significant controversies and challenges that accompany the implementation of guidelines.

## METHODS

Gundersen-Lutheran Medical Center is a large, multi-specialty clinic whose core hospital facility has 325 inpatient beds. Gundersen-Lutheran has had a vigorous quality improvement initiative in place for several years. Our institution participates with the Joint Commission on Accreditation and Healthcare Organization (JCAHO) and the National Voluntary Hospital Reporting Initiative, as well as the Wisconsin Collaborative for Healthcare Quality and Wisconsin Hospital Association Checkpoint Initiative. Data is forwarded to JCAHO through our vendor, Maryland Hospital Association, which provides comparative data for benchmarking and further analysis.

Community-acquired pneumonia (CAP), defined by the Infectious Disease Society of America (IDSA) as “an acute infection of the pulmonary parenchyma...accompanied by the presence of an acute infiltrate on a chest radiograph or auscultatory findings consistent

with pneumonia...in a patient not hospitalized or residing in a long-term-care facility for  $\geq 14$  days before onset of symptoms,” and is a common infectious illness with a high morbidity and mortality.<sup>8</sup> Over 2 years ago, we embarked on a program to put into practice guidelines for treatment of community-acquired pneumonia (CAP). This was stimulated in part by statewide trends on reporting outcomes of treatments for conditions such as diabetes, heart disease, and pneumonia (see [www.wchq.org/measures/](http://www.wchq.org/measures/)). The project was anticipated to include 1) identification and measurement of key parameters, 2) analysis and comparison with data from national benchmarks, 3) development of practice guidelines based on published models, 4) implementation of guidelines, and 5) review of program effectiveness and further interventions as needed. Our goals included consistent documentation for CAP core elements and an overall composite score of 95%.

In April 2003, a group of clinicians, nurses, and administrative staff, including coders and health information specialists, were assembled to identify a set of parameters to be measured. This set was expected to include JCAHO core measures for CAP.<sup>9</sup> We then explored how to acquire that data electronically (if possible) or from the paper medical records (which was more time-consuming). Over time these core measures were revised; for instance, pediatric patients were excluded from the data set and antibiotic selection measures were added. By August 2004, clinical practice guidelines were developed, and by January 2005, admission and discharge order sets were developed. Both the guidelines and order sets required a fairly lengthy process of review, revision, and approval. The order sets were finally ready for rollout by May 2005. A copy of our form can be found here: [www.wisconsinmedicalsociety.org/\\_WMS/publications/wmj/\\_files/pdf/SartinAppendix.pdf](http://www.wisconsinmedicalsociety.org/_WMS/publications/wmj/_files/pdf/SartinAppendix.pdf).

In January 2004 we began an educational process focused on staff and clinicians who provide medical care for CAP patients. Members from the group gave presentations to internal medicine staff and residents, emergency medicine and urgent care staff and physicians, and hospitalist physicians. Nursing staffs from the 2 units, which receive most CAP admissions, were centrally involved in the review and education process. These presentations generated much discussion and some controversy, which will be discussed in detail below. In particular we wished to increase awareness that CAP order sets were available on the hospital wards. We anticipated these order sets would make the admission process more efficient for the busy clinician, as well as provide a reminder of critical actions that should be undertaken.

Several meetings highlighted suggestions and criticisms from involved clinicians. For instance, one significant observation was that the antibiotic options were too complicated and confusing, and further streamlining was suggested. Other clinicians pointed out that separate discharge orders were rarely used and suggested incorporating recommended actions (e.g., pre-discharge immunizations) into the admission orders. Another important part of the quality improvement process involved flowcharting and timing the entire admission and treatment process for CAP patients. This identified significant bottlenecks resulting in delays for important treatments, e.g., time to antibiotic administration.

The CAP Working Group developed and published practice guidelines, which were distributed via Gundersen-Lutheran's intranet. These generally followed nationally recognized guidelines from the Infectious Disease Society of America (IDSA)<sup>8</sup> and American Thoracic Society (ATS),<sup>10</sup> though we made a concerted effort to streamline and simplify recommendations to improve compliance. Implementation of the guidelines included both an admission and discharge order set that, after multiple reviews and revisions, was printed and made available through the nursing staff and unit clerks to admitting physicians (see Figure 1). As mentioned, several clinicians felt a discharge order set was unlikely to be used by most hospital physicians, so pertinent orders (e.g., pneumococcal vaccination prior to discharge) were incorporated into the admission orders.

## RESULTS

Our analysis focused on the following core measures: initial oxygenation assessment, blood cultures drawn prior to antibiotic administration, appropriate antibiotic selection, time from presentation until first antibiotic dose, influenza and pneumococcal vaccination, and smoking cessation counseling. Results for the last 2 years indicate that Gundersen-Lutheran's performance compares favorably to comparator MHA rates and has improved during the study period.

Oxygenation assessment remained high throughout the study period, at or near 100% (Figure 1). Pneumococcal vaccination rates improved significantly during the study period (Figure 2), and this improvement is likely attributable to both more consistent documentation and implementation of standing orders for vaccinations in outpatient departments. Obtaining blood cultures prior to antibiotic administration held steady at approximately 90% during the period (Figure 3).

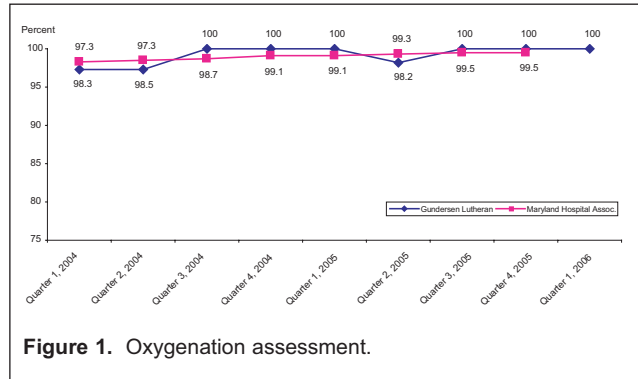


Figure 1. Oxygenation assessment.

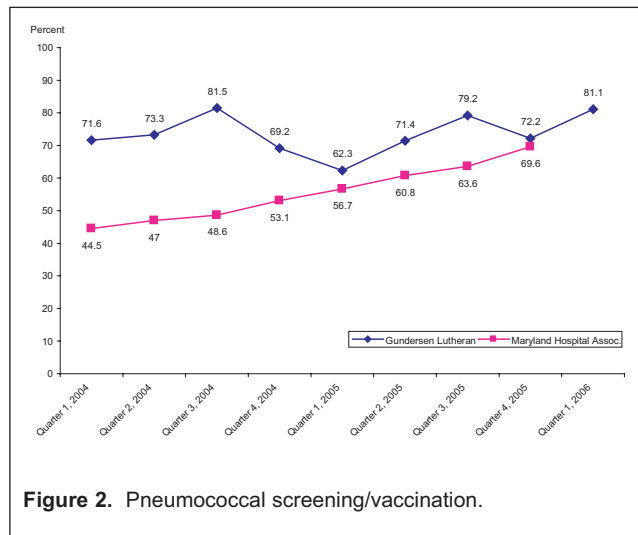


Figure 2. Pneumococcal screening/vaccination.

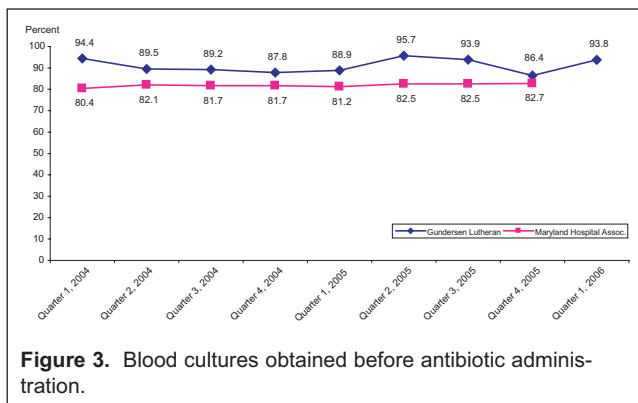


Figure 3. Blood cultures obtained before antibiotic administration.

Smoking cessation counseling showed the most improvement, increasing from 45.5% to 100% (Figure 4), while the rate of antibiotic delivery within 4 hours went up from 72.4% to 88.1% (Figure 5). These changes likely reflect improved documentation as well as educational efforts highlighting awareness of and adherence to the guidelines. A significant amount of month-to-month variability was notable, and in some instances

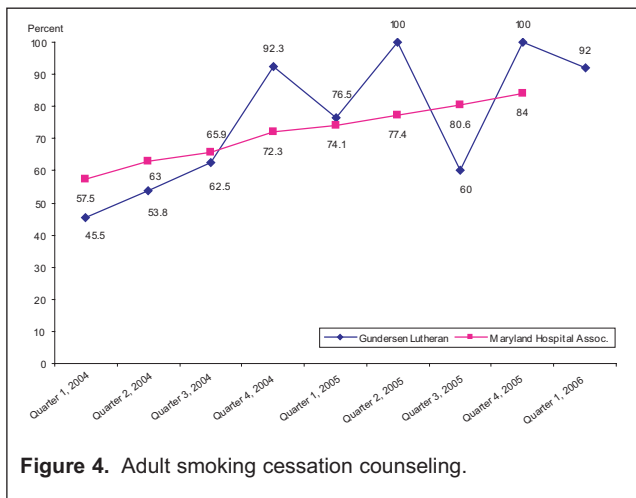


Figure 4. Adult smoking cessation counseling.

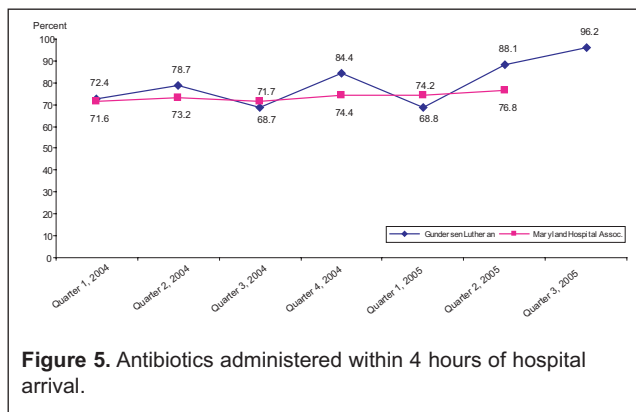


Figure 5. Antibiotics administered within 4 hours of hospital arrival.

the number of patients being studied was quite low (occasionally in the single digits), making quarterly comparison to national benchmarks difficult.

We further found that antibiotic choice was generally in accordance with published CAP guidelines (data not shown).<sup>8,10</sup> Gundersen-Lutheran staff tended to have a uniform approach to antibiotic prescribing for CAP with relatively frequent use of fluoroquinolones (approximately 60% of cases, based on 2004 review) and ceftriaxone/azithromycin (approximately 20% of cases).

## DISCUSSION

Although we judged our quality improvement program to be successful so far, several shortcomings were identified. Deficiencies in documentation were found, particularly in the areas of vaccination and smoking cessation, where chart reviews revealed that in many cases it was not possible to tell if screening had occurred. We concluded that a complicated and somewhat obscure process on paper was hampering efforts to improve performance. Subsequently we worked closely with

the nursing staff to propose enhanced charting modules that would require a definite response (i.e., a “fail-safe” mechanism) and whose data could be harvested by computer, rather than through the time-consuming and inaccurate process of reviewing paper records. These proposals have yet to be fully implemented, however, and significant bureaucratic and technical (i.e., computer programming) challenges and financial costs associated with such a system should be anticipated.

Delay in antibiotic administration was more common with non-emergency room admissions and was identified as one of the most important parameters we could change.<sup>11</sup> Our initial analysis showed that patients admitted through the emergency room received antibiotics in a relatively timely fashion, at a median time interval of 111 minutes.<sup>12</sup> Patients admitted from other locations received antibiotics within 184 minutes. Flowcharting the pathway for antibiotic administration revealed significant roadblocks, particularly for the minority of patients admitted as direct admissions from the clinic. Long waiting times for patient room assignments, poor communication between clinic and hospital staff and pharmacy, and the fact that admissions occurred commonly during shift changes all contributed to an inordinate delay.<sup>13,14</sup> We recommended a streamlined approach with prompt administration of intravenous ceftriaxone or oral levofloxacin in the clinic prior to transfer (see CAP protocol).

We were interested whether misclassification of diagnosis would affect the results, a possibility discussed in JCAHO’s overview of CAP core measures.<sup>9</sup> For instance, if a patient admitted for heart failure was incorrectly classified as having a working diagnosis of pneumonia, an apparent delay in receiving antibiotics would result, significantly skewing the composite results for this parameter. While we identified several cases in which the working diagnoses of the admitting physician did not include pneumonia, we did not find this to be a consistent problem. Nevertheless, this remains a concern for physicians and administrators, particularly given the possibility in the future that reporting of poor results will have financial consequences, e.g., through Pay-for-Performance reimbursement schemes.<sup>15</sup> Strict interpretation of JCAHO’s criteria, which excludes patients who do not have a working diagnosis of CAP, is essential for an accurate evaluation of core measures.

Finally, the fact that indicators were revised frequently, in some cases every quarter, was cited as an impediment by personnel charged with monitoring performance. The observation that “a moving target is harder

to hit” came up frequently in meetings about CAP core measures and reflected frustration with changing parameters.

Certain guidelines generated a significant amount of controversy among medical staff and highlighted the paucity of outcomes data for these recommendations. Recommendations regarding blood cultures, pneumococcal vaccination, and antibiotic selection were particularly problematic.

The need to obtain blood cultures prior to antibiotic administration was criticized by some practitioners. This debate is echoed in a recent “point-counterpoint” discussion in *Journal Watch Emergency Medicine* in which a number of physicians who helped develop CAP guidelines for the Centers for Medicare and Medicaid Services National Pneumonia Project defend their recommendation for blood cultures.<sup>16</sup> While proponents highlight the benefits of obtaining specific etiologies in the 9%-11% of CAP patients with bacteremia,<sup>10</sup> critics counter that blood culture results “rarely have a meaningful effect on clinical management or antibiotic choice.”<sup>17</sup> Indeed, only 1 study, which was designed to look at bacteremias, not CAP per se, is cited in IDSA guidelines as suggesting a mortality benefit.<sup>8,18</sup> After much discussion, we at Gundersen-Lutheran feel the potential benefits of blood cultures outweigh the cost and adverse effects, although we recognize the evidence is thin.

Questions were also raised about the mandate to give pneumococcal vaccination for eligible patients during hospitalization, instead of several weeks after the illness episode, which was our practice. While several studies assess the utility of a hospital-based vaccine program in terms of increasing the vaccination rate,<sup>19</sup> we are aware of no studies based on the timing of vaccination in patients admitted for pneumonia. Indeed, as Fedson et al state in their editorial, cited by most published guidelines and by JCAHO, data on immunogenicity and acceptability following in-hospital vaccination “has yet to be obtained for pneumococcal vaccine, although the vaccine is immunogenic when it is given to patients 1 to 2 months after hospital discharge for pneumonia.”<sup>20,21</sup> While pneumococcal vaccination is recognized as minimizing bacteremic *S. pneumoniae* infection, it has not been proven effective in decreasing hospitalization rates for CAP.<sup>22</sup> Nevertheless, we recognize that deferring vaccination until a follow-up visit 1 or 2 months later may create a missed opportunity for vaccination, especially for patients who may be non-compliant. Therefore, our order set includes vaccination prior to discharge unless the clinician directs otherwise.

Finally, issues regarding antibiotic selection gener-

ated a significant amount of discussion and disagreement. Our physicians have had broad experience with the recommended regimens for CAP, which are generally well tolerated and effective and cover the majority of atypical and typical microorganisms that cause CAP. Concern has been expressed regarding overuse of fluoroquinolones in general and potency of levofloxacin against *Streptococcus pneumoniae* in particular.<sup>23,24</sup> As an answer to the latter concern, some experts recommend higher doses of fluoroquinolone antibiotics given for shorter durations, the so-called “high-dose, short-course” therapy.<sup>25</sup> A small study by Dunbar et al demonstrated similar efficacy and a shorter duration of fever among patients with CAP treated with 750 mg of levofloxacin daily for 5 days total versus patients treated with 500 mg daily for 10 days total.<sup>26</sup> As Thomas File proposes, “High-dose, short-course regimens have the potential to reduce the emergence of antibacterial resistance in the pathogen as well as other commensal flora, both in the patient being treated and in the wider population.”<sup>27</sup>

However, the optimal choice of antibiotics has yet to be determined. Important considerations include drug costs, current and anticipated resistance patterns of existing pathogens (e.g., penicillin-resistant *Streptococcus pneumoniae*), and the goal of streamlining the recommendations as much as possible to make them more user friendly.

## CONCLUSION

We conclude that a quality improvement program such as this should be viewed as an ongoing process, not a 1-time intervention. Our program so far has been a modest success, with improvements in all parameters measured. While we hope to see a long-term benefit on morbidity and mortality, it is too early to judge the effectiveness of our program, as well as any potential cost savings. All in all, we remain optimistic that new information will answer many of these questions and enhance our efforts to improve the quality of patient care.

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