

# White Paper

## Mandatory Statewide Reporting of Hospital-Acquired Infections: Stumbling Blocks on the Road to Implementation

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### **Introduction:**

Consumers Union has mounted a nationwide campaign to pass legislation or regulations in all 50 states that will require public reporting of hospital-acquired infections (HAI). The motivation for requiring mandatory reporting and public disclosure of HAI is two-fold:

- 1) To allow consumers to choose better hospitals for their own care, and
- 2) To motivate hospitals to reduce their infection rates and thereby improve the quality of care they provide. A secondary benefit is that this will also reduce healthcare costs

Since all infections in hospitalized patients are supposed to be documented, both consumers and lawmakers might think that it would be a simple matter to make that existing data about HAI available to the public. Now that HICPAC has published guidance on the subject, they might even believe that all the problems related to implementation had been solved. However, there remain significant stumbling blocks (and a few mine fields) on the road to implementing mandatory statewide reporting regulations. The major problems are outlined below.

### **PROBLEM #1: Sources of Infection Data**

Most of the hospital data currently collected by state and federal agencies is derived from billing records, and billing records are derived from the patient's medical records. Unfortunately, HAI are not routinely or systematically documented in the patient's medical record. The reasons for this lack of documentation relate to real differences of opinion about the definition of an HAI, whether or not cultures are obtained before antibiotic treatment is begun, and a general reluctance among physicians to admit that an HAI has occurred. Furthermore, some post-surgical HAI that are **acquired** in the hospital do not **manifest** themselves until after discharge. These infections are almost never documented in the hospital medical record. Even when an infection is documented in the patient's medical record, it is often not documented in the billing record. This is understandable, because hospitals are not reimbursed for most types of hospital-acquired infections. For these and other reasons listed in Table 1, only a small proportion of HAI are documented in the patient's chart.

Fortunately, it is the job of the hospital's infection control practitioner (ICP) to keep track of HAI, whether or not they are documented in the medical record, and whether or not a microbiologic culture was obtained. Therefore, the ICP is clearly the best source of data for mandatory reporting purposes. HICPAC agrees and states "Do not use hospital discharge codes as the sole data source for HAI public reporting systems." Therefore, the ICP is the best source of data for any mandatory reporting system for HAI.

### **PROBLEM #2: Under-Reporting Infections**

Another obstacle to successful implementation of mandatory reporting is under-reporting of HAI. If any hospitals consistently under-report their HAI **for any reason** then it defeats both purposes of this legislation. In the first place, the numbers reported: 1) Will not help consumers choose better hospitals, and 2) Will not encourage hospitals to reduce their infection rates (it's easier and cheaper to under-report).

What are the possible reasons for under-reporting? Table 1 identifies four major causes and possible solutions. The last reason in Table 1 is “Intentional under-reporting”. This is the Achilles heel of any mandatory reporting implementation, because many consumers already fear that hospitals are “trying to hide something.”

**TABLE 1: Major causes of Under-Reporting and Some Possible Solutions**

| CAUSE OF UNDER-REPORTING   | POSSIBLE SOLUTIONS  |
|--|---|
| 1. Different Definitions of HAI, based on<br>A. Laboratory test<br>B. Clinical criteria<br>C. Physician diagnosis<br>D. Medical Record documentation<br>E. Criteria used to differentiate community-acquired from hospital-acquired infections | <b>1. Require standardized definitions</b><br><b>NOTE:</b> CDC definitions are excellent, but most ICP’s would <b>also</b> count any infection diagnosed by a physician, or presumptively treated with antibiotics. Note also that NNIS definitions change over time, and this may not be desirable in a mandatory reporting system.  |
| 2. Different Surveillance Methods<br>A. Laboratory surveillance<br>B. ICP ward rounds<br>C. Post-discharge surveillance<br>D. Medical Record review<br>C. Monitor antibiotics patient receives in hospital and upon discharge                  | 1. Require standardized surveillance methods (this is almost impossible to enforce)<br>or<br><b>2. Report results stratified by surveillance methods used at that hospital.</b>   |
| 3. Different Levels of Resources Allocated to HAI Surveillance<br>A. Personnel<br>B. Budget<br>C. IT Support   | <b>1. Report IC Hours per day per 100 beds (see Footnote #1 for formula).</b><br>2. Report annual IC budget / 100 beds<br>3. Report whether system is computerized or manual.   |
| 4. Intentional Under-Reporting   | 1. State personnel collect data concurrently (extremely expensive - requires 1 or more state employees in every hospital)<br>2. State personnel collect data by chart review (extremely expensive and misses infections not recorded in the medical record)<br>3. Random audits by state personnel (very expensive and questionably effective)<br><b>4. Compare hospital-reported cases with public reports of HAI (see next section in text)</b> |

**Footnote 1:** This calculation is necessary because hospitals sometimes claim to have a full-time ICP, but the position may be unfilled, or the person may be on vacation, or the person may have many other duties like Employee Health.

$$\text{Ave Hours / Day / 100 beds} = \frac{\sum (\text{IC Hours worked each day this month}) * 100}{\sum (\text{Occupied Beds each day this month})}$$

## **Comparing Hospital Reports of HAI with Public Reports of HAI**

Most solutions to the intentional under-reporting problem are very expensive and questionably effective, but one inexpensive solution has the potential to provide ample motivation for accurate reporting by hospitals. This solution allows patients to report their own HAI to the state, and then compares the number of HAI reported by each hospital with the number reported by the public.

A web site could also provide an inexpensive and easy way for the public to report HAI to the state (using SSL to transmit patient data and having each patient give their permission to share personal health information with the hospital where they were treated should meet HIPAA requirements). If this does not provide enough public reports, simply provide each patient with a form or postcard at the time of discharge with the definition of an HAI, and a reminder that he/she has the right to report any HAI by mail or by using the web site.

Of course, one would expect the hospital to report more HAI than the public, but the possibility that the public might report more cases than the hospital would provide a strong incentive for the hospital to maintain accurate records. In fact, the ratio of HAI reported by both sources should remain relatively constant. A dramatic change in this ratio could trigger an audit by the state.

To prevent anyone from trying to “blacklist” a hospital by reporting fallacious HAI, the hospital should have the right to review and comment on the list of all publicly reported cases before they are published by the state. For example, the hospital could place each publicly reported case into one of the following categories:

- I. Agree with HAI report – this infection is included in our numerator for Month X
- II. Disagree with this HAI report because
  1. Person was not a patient at our hospital during current quarter
  2. Person was a patient at our hospital during current quarter, but
    - A. We have no record of an infection, but
      - a. Patient reports an SSI, so HAI could have occurred after discharge
      - b. Patient was treated with antibiotics which implies an infection
      - c. Patient received no antibiotics in hospital or upon discharge, so HAI is unlikely
    - B. We are aware of an infection in this patient, but
      - a. It was not nosocomial
      - b. It was nosocomial, but
        - i. Infection was not at a reportable site.
        - ii. We attribute this infection to another facility (transfer with infection)

## **PROBLEM #3: Risk-Adjusting Infection Rates**

Risk-adjustment is required for any system that attempts to compare hospitals, because the risk of an HAI is closely related not only to the quality of healthcare delivered, but also to each patient’s own underlying health status. The usual risk-adjustment approaches for HAI are shown in Table 2. The “Standardized Infection Ratio”(SIR) is probably the most flexible and powerful statistic for comparing HAI infection rates between hospitals. It is also very useful for identifying clusters of infections in the same hospital over time.

**TABLE 2: Risk-Adjustment Methods for Hospital-Acquired Infections**

| <b>Risk-Adjustment Method</b>   | <b>Data hospital must collect</b>  | <b>Problem</b>  |
|---|--|---|
| <b>1. Overall Rates</b><br>A. SSI<br>B. All Pneumonia<br>C. Post-Op Pneumonia<br>D. Vent-Pneumonias<br>E. All Bacteremia<br>F. CL-Bacteremia<br>G. All UTI<br>H. Cath-UTI | Numerator = # of Infections<br>A. Denominator = Procedures<br>B. Denominator = Discharges<br>C. Denominator = Procedures<br>D. Denominator = Vent-Days<br>E. Denominator = Discharges<br>F. Denominator = Central Line-Days<br>G. Denominator = Discharges<br>H. Denominator = Catheter-Days | Relatively easy to obtain or calculate these denominators   |
| <b>2. Stratified Rates</b><br>A. SSI by Procedure<br>B. Pneumonia by Service or ICU<br>C. Bacteremia by Service or ICU<br>D. UTI by Age                                   | Numerator = # of Infections<br>A. Denom. for each procedure<br>B. Denom. for each Service or ICU<br>C. Denom. for each Service or ICU<br>D. Denom. for each age group  | Multiple stratifying variables, and denominators are often too small to yield meaningful comparisons.                     |
| <b>3. Standardized Infection Ratio (SIR)</b><br>A. Observed Number in each stratum is compared with Expected Number.  | “Expected Number” calculation can be simple or complex as data allow:<br>A. “Standard” rates for each level of risk factors chosen, or<br>B. Multiple logistic equation that includes all risk factors in model  | Requires computer to calculate, but is very flexible. “Expected” formula can be updated annually to reflect new research. |

**PROBLEM #4: Small and Specialty Hospital**

Many hospitals in the United States have fewer than 50 beds or serve special populations. These hospitals may perform very few surgical procedures, very few central lines and very few ventilators. Rates calculations based on very small denominators are statistically “unstable,” which means they could easily vary from 0% one month to 25% the next month with no change in the real quality of care.

There are two ways a mandatory reporting system could avoid publishing misleading results for small and/or specialty hospitals. If these hospitals belong to a single parent organization, then it is possible they could combine data from several small hospitals and report aggregated rates. Another approach would be to provide these hospitals an alternate way to report on the quality of their infection control program. For example, they could substitute a “success story” for their quarterly report. This success story would include the identification of a problem, what intervention was made, and the followup results that show an impact on an HAI rate.

**PROBLEM #5: Data Collection Burden on Hospitals**

“Less is more” when collecting and publishing data, and both consumers and hospitals have several reasons to limit the amount of data reported to the state. For hospitals, the financial burden of reporting is directly related to the volume of data they must submit. For consumers, a simple report is more understandable than a 100-page document. The advantages and disadvantages of various data collection approaches are described in Table 3.

By submitting summary data plus a small amount of validation data, one can design an economical program that meets the goals of the legislation. For example, a single hospital might need to report only 19 numbers each month, as shown in the Table 3A.

**TABLE 3: Data Requirements for Hospital Reports to the State**

| <b>Data Collected</b>                            | <b>Advantages</b>   | <b>Disadvantages</b>  |
|--|---|---|
| 1. Patient-Level Data                            | 1. State performs risk-adjustment   | 1. Huge volume of data required on both infected and non-infected patients.<br>2. Building and maintaining centralized computer systems for data collection & analysis very expensive.<br>3. Hospital not motivated to analyze data themselves, so problem detection delayed. |
| 2. Summary Data Only                             | 1. Small amount of data requires no expensive computer systems. Data can be collected on paper forms! | 1. Hospitals may purposely under-report or make errors in calculations with no way to validate results  |
| <b>3. Summary Data plus some Validation Data</b> | 1. Modest amount of data that both hospitals and consumers can trust.                                 | 1. State must develop mechanisms for public to report HAIs<br>2. Hospitals must produce validation reports  |

**TABLE 3A: Example Summary and Validation Data that Might be Included in a Monthly Hospital Report**

| <b>Sample Fields of Data</b>         | <b>Stratified by:</b>  | <b>Purpose</b> |
|--------------------------------------|--|----------------|
| Numerators                           | How Infection Identified<br>A. Laboratory surveillance<br>B. ICP Ward rounds<br>C. Post-discharge surveillance<br>D. Medical Record review<br>E. Antibiotic therapy monitoring | Validation     |
| Ave Daily FTE / 100 Occup. Beds      |  | Validation     |
| Annual Infection Control Budget      |  | Validation     |
| Numerators & Denominators            | Site of Infection<br>A. SSI<br>B. VAP<br>C. CLB<br>D. UTI  | Comparison     |
| Standardized Infection Ratios (SIRs) | Site of Infection<br>A. SSI<br>B. VAP<br>C. CLB<br>D. UTI  | Comparison     |

### **PROBLEM #6: Data Collection Burden on the Public**

If the public is allowed to report HAI, they must provide enough information to 1) avoid duplicate counting, and 2) allow the hospital to verify or refute their claim. Fortunately, this can be done with very little information on either a paper form or a web-based form entry, as shown in Table 4. Note that neither a paper form nor a web-based form can identify with certainty the person who filed the report (even a signature on a paper form can be forged.). But it doesn't really matter who completes the form, as long as duplicate reports of the same HAI are eliminated.

**TABLE 4: Data Required to Identify a Patient's Report of HAI**

| <b>Case Data Required for Public Reporting of a HAI</b>  | <b>Purpose</b>         |
|--|------------------------|
| 1. First Name<br>2. Last Name<br>3. Middle Initial<br>4. Birth Date  | Patient Identification |
| 5. Hospital Name<br>6. Date of Admission to Hospital<br>7. Date of Procedure (needed for SSI)<br>8. Date of Onset Infection Symptoms (when did first get sick from this infection?)<br>9. Was infection treated with antibiotics?                                    | Validation             |
| 10. Site of Infection<br>11. How do you know you had an infection?<br>A. A doctor told me I had an infection<br>B. Some other healthcare professional told me I had an infection<br>C. A friend or relative told me I had an infection<br>D. I figured it out myself | Categorization         |

### **PROBLEM #7: How to Report and Publish Results**

There are both statistical and practical reasons to present or publish most of these data in graphic form. Tables can be used for some of the validation data, but for HAI comparisons, the clearest presentation is in a run chart or control chart format. The run chart can show numerators, rates or Standardized Infection Ratios (SIRs). Of these, it is likely the hospitals would prefer to publish monthly SIRs because the numbers displayed could be risk-adjusted for both patient-level and hospital-level risk factors.

Since any healthcare quality measure has a certain amount of natural (or background) random variability, it is helpful to also show control limits. To show both risk-adjusted data, as well as natural variation over time, and X-mR or mX-mR chart of SIRs covering the last 24 months of reported data is ideal. Note, however, that there are situations where both monthly rates and SIRs fluctuate wildly because denominators are too small to perform meaningful analysis. Other options for presenting data are listed in Table 5.

**TABLE 5: Ways to Present or Publish Comparative HAI Data**

| <b>Data Presented</b>                      | <b>Format</b>  | <b>Purpose</b>                                  |
|--|--|---|
| 1. Numerators for method of identification | # Hospital identified by each surveillance method  | Validation that hospital is not under-reporting |
| 2. Numerators for each site                | For each site of infection, the # Hospital reported & the # Public reported  | Validation that hospital is not under-reporting |
| 3. Rates for each site                     | Graph – could compare this hospital to average of all other hospital rates that quarter.   | Comparison with other hospitals                 |
| 4. SIRs                                    | Graph – Run Chart or mX-mR control chart of last 24 months   | See one hospital’s trend over time              |
| 5. Coding system                           | Use symbols to represent<br>A) Sig. higher than expected<br>B) Within expected range<br>C) Sig. lower than expected<br>D) Not reported because denominator is too small. | Simplify reports for consumers                  |

**Summary**

If legislation in your state requires mandatory reporting of hospital-acquired infections (HAI), the systems designed to implement this law should achieve the intent of the law. We assume the major goals of such legislation are to:

- 1) To allow consumers to choose better hospitals for their own care, and
- 2) To motivate hospitals to reduce their infection rates and thereby reduce healthcare costs

There are at least seven serious obstacles to meeting these goals. This white paper has attempted to demonstrate that all of these obstacles can be overcome without imposing a heavy financial burden on either hospitals or taxpayers.