MRSA Inferencing Issues

drafted by samson tu, based on 2012.01.10 discussions (involving Mahesh, Pradeep, Ted, Samson)

## Inference goals

Given documents and data about a hospitalized patient, determine:

1. MRSA colonization?

2. MRSA infection?

a. MRSA BSI?

b. MRSA UTI?

c. Central-line associated infection?

d. Primary or secondary?

e. HAI or CAI?

Questions for MRSA project:

* Please clarify inference goals. The (Rubin, 2011 AMIA) document focuses on primary/secondary BSI, CLABI/non-CLABI. Pradeep says "The goal of inference system is not for an independent judgment on MRSA infection. Focus is on binary categorization on intermediate inference goals." What are the "intermediate goals"?
* Please clarify the type of patients we are dealing with in the MRSA project. Mahesh said that surveillance will be performed on any hospitalized patients. The "MRSA Bloodstream Infection" document (Rubin, 2011 AMIA) says, "Since we already know, in this project, that we will be addressing only patients with a known positive blood culture for MRSA..."

## Format of inference results

We assume the results of will not be probabilistic. The format may be:

1. Binary, yes/no

2. Ordinal scale of confidence (e.g., {no, probably no, unknown, probably yes, yes})

Mahesh: Format of inference results should be an ordinal scale of confidence. Question for MRSA project: Please confirm.

## Knowledge for rule-based or algorithmic inference

For rule-based or algorithmic inference, we need explicit rules or algorithms for each inference goal (e.g. algorithm to determine colonization vs. infection, primary or secondary BSI, etc.). If the format of inference results is based on an ordinal scale of confidence, then the algorithms or rules should take that into account.[[1]](#footnote-1) Right now we have a draft algorithm for determining primary/secondary and CLABSI/non-CLABSI BSI as binary choices. (Rubin, 2011 AMIA).

Questions for MRSA project:

1. (Rubin, 2011 AMIA) does not make a distinction between MRSA infection and colonization.
2. Do we have "clinical algorithm" for UTI?
3. Who is/are coordinating the development of "clinical algorithms"? When can we expect the "clinical algorithms" to become available?
4. If the format of inference results is based on an ordinal scale of confidence, then the clinical algorithms need to provide the knowledge for concluding each value of the scale (e.g., when can we conclude that there is "probable" CLABSI (as opposed to "certain" CLABSI)?

## Documents and Structured Data

The types and lists of structured data that are important for rule-based or algorithmic inferences should be specified in the "clinical algorithms" (as they are in (Rubin, 2011 AMIA)).

Questions for MRSA project: What is the procedure and schedule for requesting and getting structured data? What documents are available now?

## Labeled patient cases

If the evaluation of MRSA inference takes the form of sensitivity and specificity of inference results compared to some ground truth or reference cases, we need labeled cases for both training and testing phases. The cases should be selected from the same populations as those for which MRSA surveillance tool will be used.

The cases should be labeled with respect to the goals and format of inferences (see Sections A and B). If the inference results are based on an ordinal scale of confidence, then the cases should be similarly labeled.

Question for the MRSA project:

What kind of labeled cases can we realistically get, when, and in what quantity? If we cannot get cases labeled appropriately for our inference goals and format, we have to change the goals and the format.

1. For an example of inferences based on an ordinal scale of confidence, see Tu, SW, Kemper, CA, Lane, NM, Carlson, RW, Musen, MA. *A Methodology for Determining Patients' Eligibility for Clinical Trials*. Methods of Information in Medicine, 1993, November;32(4):317-25. [↑](#footnote-ref-1)