Lab Data Communication Accuracy on MICU Rounds: Data Collection Protocol

Created by Edward Dyer and Kathryn Artis

Steps before MICU rounds begin

1)Arrive in MICU at 7:50AM (rounds begin at 8AM). Bring pre-printed and collated blank data collection forms (Supplementary Digital Content 1).

2)Introduce yourself to the MICU team. Explain that you will be an observer on rounds studying the communication accuracy of data found in the EHR. Remind them that you will be asking to borrow and make photocopies of their pre-rounding notes after rounds conclude (this helps avoid trainees throwing away their artifacts before you can copy them). If participants ask whether you will be correcting their miscommunicated data explain that you will not interrupt rounds for misrepresented data unless in your clinical judgment it represents an obvious and serious misrepresentation that is not caught by any other team member. For example, the presenter omits or states the blood cultures are negative when in fact they are positive.

3)Identify the critical care fellow and attending intensivist. Ask which patient they will be rounding on first. Ask attending what day this is in their rotation (*Ex*. Day 3 of 7).

4)Log-in to EHR, print MICU team patient list. On this list note attending, day of week and day in attending's rotation. If attending is unavailable prior to rounds, this information can be asked of them after rounds.

5)Create lab data screen shots.

a)Open this first patient's chart in the EHR.

b)Navigate to each of the 5 designated EHR lab screens:

5 DESIGNATED EHR LAB SCREENS (based on our institution's EHR):

1. Blood gas components (pH, PCO2, PaO2) and ScvO2

Results Review (left side of screen)→LABORATORY RESULTS (expand menu)→CHEMISTRY→BLOOD GAS (expand menu)

-ScvO2 is called "Cooximeter panel"

2. Chemistries (Na, K, Cl, HCO3, BUN, Cr, Ca or iCa, Mg, Phos), liver panel (AST, ALT, T.bili, alk phos), troponin, lactate

Results Review (left side of screen)→LABORATORY RESULTS (expand menu)→CHEMISTRY (expand menu)→ROUTINE CHEMISTRY (expand menu)

3. CBC (WBC, Hb or Hct, platelets), Coagulation parameters (PT or INR, PTT or heparin level, fibrinogen)

Results Review (left side of screen)→LABORATORY RESULTS (expand menu)→HEMATOLOGY (expand menu)

4.Blood cultures Screen #1
SnapShot (left side of screen)→type "Culture Results" into "Report" field in upper right hand of screen

5.Blood cultures Screen #2
Chart Review (left side of screen)→select Micro tab (third from left)

c)Take "print screen" screen shots of each of the 5 chosen lab data screens.
-For completeness, take images of screens even when there is no available data – for example blood cultures screen #1 will appear blank if there are no culture results
-Toggle left or right (depending on whether researcher's labs display chronologically or reverse chronologically in their EHR display) to ensure previous lab values are included in screen shots.

d)Paste screen shot images into a program that supports editing image files. We used Microsoft Powerpoint and created one slide per screen shot image.

e)Crop the image.
-Crop out identifying patient information including name, medical record number.
-Do not crop your name and current time (displayed at bottom of EHR display) as this will serve as the time stamp for when you captured screen shot data compared to the start of rounds.

f)Re-size so that images are maximally enlarged but still take up only a single slide.
-In rare cases, labs for chemistry or hematology data are so numerous that seeing the entire screen in the EHR requires scrolling down. In this case, take two screen shots to capture all data.

g)Print each slide.

h)Label each page with date and patient's unit and bed number.

i)Collate with a blank data collection form

6)If time allows prior to the beginning of rounds, make screen shots for one or two of the patients in the beds sequential to the first patient.

Steps during rounds

1)Note the time rounds begin and end on the printed MICU team patient list.

2)Keep track of what order patients are presented on the MICU team patient list by numbering the order to the left of each patient name. $1^{st} = 1$, $2^{nd} = 2$ etc.

3)Focus your attention on what data to listen for by striking out labs on data collection sheet for which there is no EHR data. This can usually be accomplished while the team assembles outside the patient's room prior to the presentation beginning or while the presenter is reporting overnight events, physical exam and vital signs.

-all labs except blood cultures: most recent value since noon day prior
-blood cultures: most recent set since 8am 3 days prior

4)For each patient presentation mark down on the data collection sheet:

-times presentation begins and ends
-what order patient was presented relative to the entire patient list
-if the attending is using or viewing the EHR
-training level of physician/medical student presenter
-patient type and disposition – new admission, follow-up, transferring out

5)While listening to the patient presentation, annotate the screen shot printouts in the following manner:

- Data value correctly reported: put a dot next to the value
- Data value described: in quotations, write what was said next to the lab
  Ex: "renal fxn worse" next to most recent Cr
- Data described and value given: put a dot next to value and put description in quotations next to it
- Data value omitted: circle the lab they omitted
- Erroneous data: ensure the value they gave isn't just an outdated value by scanning the printout. If it is in fact erroneous, circle the correct data value and in quotations, write the value that the presenter gave next to it
- Old data given: put a dot next the value they gave – once entering data onto the data collection tool you will see that they gave an old value when there was a more recent one available.
- Data described as not resulted yet when result was available: write "pending" next to the resulted lab value

7)Make any notes about individual patients in the notes section on the data collection form. For example, if you are uncertain about how to code something, star that field and write down your thought process. This is a good place for notes about why you think the presenter's description of a lab was a misinterpretation.

Clarifying points:

- Presenter can mention data at ANY POINT during the presentation and receive credit. For example, they omit the platelet count while verbalizing labs but mention a plan to "hold heparin given worsening thrombocytopenia." This still counts as a description of platelet count.

- Presenter can receive full credit for mentioning just a lab group. For example, "the CBC was unchanged from yesterday" gets credit for describing WBC, Hb/Hct and platelet counts.
    - "BMS" = basic metabolic set or "BMP" = basic metabolic panel. This includes Na, K, Cl, HCO3, BUN, Cr, Ca. Calcium is included because at our institution, this is included in the panel when providers order this test. BMS or BMP does not include Mg or Phos because they must be ordered as separate tests.
    - "Electrolytes" can be taken to be synonymous with a BMS or BMP but also include Mg and Phos.
    - "Liver panel" includes AST, ALT, alk phos and total bilirubin
    - "CMP" = complete metabolic panel. This includes BMP plus liver panel but again does not include Mg or Phos.
    - "Coags" = coagulopathy panel, This includes PT/INR, PTT/heparin and fibrinogen
    - "DIC (disseminated intravascular coagulation) panel" also includes all these components

- Do not give presenter credit for all components of a lab group if only certain ones are mentioned without naming the lab group. For example, if presenter verbalizes only K and Cr lab values, they do not get credit for other components of the BMP. This is because even though it could be assumed that the presenter was aware of the existence of these results given they are part of the same lab group, the language used does not indicate whether or not they actually viewed the other lab components. The presenter would get credit for describing the omitted BMP components by stating, "the BMP was remarkable only for K of 5 and Cr of 3.5," as this is essentially saying the other components were 'unremarkable' or 'normal.'

- Specifics on lab tests: **Blood gases (venous, arterial)**
    -use most recent test (whether venous or arterial blood gas)
    -do not count both arterial and venous blood gas if both exist
    -do not count PO2 from venous blood samples, use PaO2 only
    -do not count PaO2 from an ABG if newest blood gas is venous

- Specifics on lab tests: **Blood cultures**
    -count sets of blood cultures drawn from the same day as one test. For example, if only one of two sets of blood cultures drawn 5 minutes apart is positive, presenter must acknowledge the positive blood culture to get credit even if the negative set was the more recent lab.

- Specifics on lab tests: redundant lab test types
  As long as the most recent of the two tests is mentioned, presenter may mention either:
    - hemoglobin or hematocrit
    - calcium or ionized calcium

-PT or INR
-PTT or heparin level

6)Fill in the data collection form, classify misrepresentations by type. This can be done during the remainder of the rounds or if necessary, between patients or after rounds concludes. However, it should be done prior to leaving the unit since researchers will not reliably remember the details of the presentation, nor clinical context of the labs after the day of data collection.

7) Repeat this process for subsequent patients. Some patients will need to be skipped in order to create screen shots for the next patients. Preparing 2 or 3 patients at a time works best. Having two researchers present on the same day allows capture of most of the team census since the researchers can alternate between auditing and preparing screenshots for the next patients.

8) Verify screen shot data is current. Sometimes the rounding team will not round sequentially or rounds may be interrupted by patient emergencies. Thus, screen shots prepared by the researchers may not represent the most current version of what data are available in the EHR. The time stamp at the bottom of the screen shot printout is a clue to this issue. At the time of this study, delays in lab results were common at our institution. Very few labs resulted in less than 30 minutes time from the time they were drawn. Thus, we used 20 minutes as a reasonable window of time from screenshot printing to the beginning of rounds within which it would not be expected that there would be any new EHR lab data. For patients with screen shots printed greater than 20 minutes before rounds researchers made an attempt to open the EHR again prior to rounds and check the 5 designated EHR screens. When new data were present this was manually written on the corresponding screen shot printouts as well as the time the researchers took this second look (which served as the updated 'time stamp'). In some cases, researchers did not have time to take another look at the EHR. Thus, for every patient in whom the time from screen shot printing until rounds was greater than 20 minutes, the researchers retrospectively (during database entry) reviewed the EHR for any new data that resulted before rounds. This was an uncommon occurrence (4.7%, 10 patients out of 211 in Phase II), of which only 7 out of 10 (3.3% of overall patients) had new data that changed coding of at least 1 lab.

Steps after rounds

1)Ask permission from presenters to borrow their pre-rounding notes (artifacts) on the patients they presented immediately after rounds.

- This is a good time to collect artifacts as most presenters take a break to get lunch after rounds and thus don't mind being separated from their patient notes
- However, collect artifacts from only one or two presenters at a time to minimize how long clinicians are separated from their patients notes, which they often still use after rounds as a checklist to complete tasks on their patients.
- Ensure artifacts collected are from patients the clinician actually presented as it is common for supervising residents to make pre-rounding notes even if they are not presenting the patient.

2)Photocopy artifacts. Remove patient names, medical record numbers and presenter information by covering this data prior to photocopy or blacking out afterwards. Label each page of the artifact with date and unit/room number in case pages are separated. Collate and staple.

3)Track how many artifacts were collected and which ones were missing or unavailable on your printed copy of the MICU team patient team list. Use the blank space in the margin to the right of each patient name. Put a check mark next to patients in whom you collected an artifact. For any patients in whom an artifact was not collected, make a note explaining why.

4)Return artifact to presenter. Collect and copy remainder of artifacts.

5)Complete any entries on the data collection you did not have time to fill out already.

6)Final quality check: prior to leaving the MICU, review each patient's data collection form to minimize missing entries. Missing entries can be one of three things. First, the researcher made notes on the screen shot printout but forgot to classify the communication onto the data collection form. Two, the researcher unintentionally failed to recognize that there was actually available lab data in the EHR that they should have been listening for during rounds. Third, the presenter spoke too fast or it was too noisy for the researcher to hear during rounds. In other words, the researcher is confident the lab was presented but was unable to understand what was said. The first type of missing data can be mostly eliminated by double-checking that the data collection form is entirely filled out. The second instance can be identified by double-checking the screenshots and the data collection form but cannot be remedied after rounds. Indicate this kind of missing data by circling the lab test on the data collection form that was not audited but should have been. The third type of missing data should be denoted by placing a "?" in the appropriate data field on the data collection form. The rate of missing data in our study was very low – 10 of 4945 labs overall (a rate of 0.3% in Phase I and 0.1% in Phase II).
