**Supplementary Material**

**for**

**Healthcare Personnel Interactive Pathogen Exposure Response System**

Leigh Smith1,2, Susan Fallon2, Zunaira Virk1, Alejandra B. Salinas1, Melanie S. Curless2, Sara E. Cosgrove1,2, Lisa L. Maragakis1,2, Clare Rock1,2, Eili Klein1,3

For the Centers for Disease Control and Prevention’s Prevention Epicenters Program

1 Johns Hopkins University School of Medicine, Division of Infectious Diseases, Baltimore, MD, USA

2 The Johns Hopkins Hospital Department of Hospital Epidemiology and Infection Control, Baltimore, MD, USA

3 Center for Disease Dynamics, Economics & Policy, Washington, DC, USA

Corresponding Author:

Leigh Smith, MD

llsmith@som.umaryland.edu; Alternative: smith.laurenleigh@gmail.com

**Automated EHR-based Algorithm**

The algorithm requires two pieces of information to identify potential contacts. The first is a medical record number, and the second are the dates of the exposure period. Then the following is performed through a stored procedure in the reporting database.

1. Find patient
	1. Given a medical record number, the algorithm first finds the patient identifier in the database.
2. Find encounters
	1. Given the exposure period, the algorithm finds all potential encounter identifiers that overlap the exposure period.
3. Find time-stamped data
	1. Medication Administrations – Includes all medication administrations where the time/date of administration is in the exposure window and the HCP is documented. Excludes stops and rate changes. Every employee noted as having administered a pharmaceutical during the exposure window was included.
	2. Flowsheet data – The flowsheet data include all sorts of semi-structured data, such as vitals, that may be indicative of contact. However, while some data is entered in an automated fashion, to maintain generalizability, no filters were applied to the data. All employees noted as having taken the information or documented the information during the exposure window were included.
	3. Laboratory data – specimens that are collected are noted in the EHR along with the HCP that collected the specimen. All HCP noted as having collected a specimen during the exposure window were included.
	4. Imaging – HCP noted to be the performing provider of an image captured during the exposure window were included.
4. Find non-time stamped data
	1. Clinical notes – while notes are time-stamped regarding when they are created and written, this does not have to be completed while interacting with the patient, so we only included the provider authoring the note, but not the date/time of the note.
	2. Care team assignment – there are several places within the EHR that document that a provider was included on a patients’ care team, but the timing of these additions does not appear strongly related to actual interactions with patients. Thus, we included HCP on the care team, but not the time/date of inclusion.
5. Concatenate time-stamped data
	1. All time stamped data was evaluated for how close in time each event was, and those that occurred within 15 of the next one were combined in time. For example, if there was a medication administration, vital signs were taken, and a specimen collected all by the same HCP where each event occurred <15 after the prior one, they would all be concatenated to find the estimated start and end time of the “interaction”. For example, in table 1 there are five sample events by the same provider on the same patient that occurred over the day that we group into two “interactions” one that is 5 minutes long and one that is 14 min long.
	2. The total amount of time was then summed to generate an estimated contact time. In the example in table 1, assuming this was all the listed contacts with this provider, the provider would have a contact time of 19 minutes.

|  |
| --- |
| Table 1. Example of event concatenation and estimated contact time |
| Patient ID | Provider ID | Event | Date/Time | Est. Contact Time |
| 76782 | GHKK87 | Medication Administration | May 31, 10:53 AM | Tot time: 5 min |
| 76782 | GHKK87 | Lab Collection | May 31, 10:57 AM |
| 76782 | GHKK87 | Medication Administration | May 31, 2:41 PM | Tot Time: 14 min |
| 76782 | GHKK87 | Vital Sign  | May 31, 2:51 PM |
| 76782 | GHKK87 | Vital Sign | May 31, 2:55 PM |

1. Create contact score
	1. The algorithm weighted longer contact times more heavily, with more than 90 minutes given 5 points, 30-90 minutes given 4 points, 15-30 minutes given 3 points, 1-15 minutes giving 2 points, and zero minutes (e.g., only a single event was noted) was given 1 point. Additionally, a point was given for each note likely to have been written after having seen a patient (e.g., some plan of care, progress noes) as well as transports.
2. Report
	1. Non-human providers were removed and the results returned as a list.