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Introduction

- Conventional exposure investigations are time-consuming, prone to recall bias and labor intensive
- The electronic health record (EHR) serves as a chronicle of healthcare personnel (HCP) interactions.
- We developed an algorithm to both identify index-patient-HCP interactions and rank those interactions based on likelihood of exposure
- We retrospectively applied this EHR algorithm to real-world COVID-19 exposure investigations

Objectives

- Develop an electronic algorithm that rapidly defines potential HCP exposure to an index patient with a transmissible infectious disease
- Validate and enhance the algorithm using data on patient- HCP interactions in the hospital detected in an exposure investigation

Materials and Methods

- The EHR method was compared to seven prior conventional exposure investigations completed at the Johns Hopkins Hospital between 2022 and 2022.
- The algorithm used data from EPIC from the clinical reporting database
- Potentially exposed HCP were detected based on both time-stamped data as well as non-time stamped HER records (Figure 2).
- Contact scores were used to rank the potential HCP-patient interactions with higher scores suggesting increased likelihood of exposure.
- Conventional exposure investigations were completed on all patients who tested positive for COVID-19 who were not previously on airborne precautions.
- Genomic sequencing was performed to confirm transmission on available samples.

Results

Exposure investigation	# exposed HCP identified by traditional investigations	# exposed HCP identified by EHR	% of HCP identified through traditional methods also identified by EHR	# exposed HCP with subsequent positive tests	Comments/findings
#1	12	74	91.6	0	Lead Clinical RN not identified through EHR
#2	6	82	16	0	All HCP not identified through EHR were EVS
#3	10	82	80	0	Student, RN not identified through EHR
#4	15	55	73	0	Unit Associate, PA Resident, Customer Service Representative not identified through EHR
#5	23	98	65	7	Unit Associate, RN, Nutrition, Medical Coordinator, and Transport not identified through EHR
#6	9	119	100	3	All HCP identified
#7	4	50	100	0	All HCP identified

Abbreviations: HCP, healthcare personnel; EHR, electronic health record; RN, nurse; EVS, environmental services; PA, physician assistant.

Table 1. Comparison of EHR Generated Exposed List to Conventional Exposure Investigations

- Conventional exposure investigations found a median of 10 (Range 4-23) exposed HCP (Table 1).
- EHR based method identified a median of 82 (Range 50-119) of potentially exposed HCP (Table 1).
- Every known HCP identified through conventional methods who tested positive after a patient exposure was identified in the HER-based list (Figure 1).
- Two of seven infection clusters were confirmed by genomic sequencing.
- Median contact score of HCP with a confirmed transmission was 14 (Range 3-33).
- Median contact score of HCP identified at risk but without documented evidence of COVID-19 infection was 4 (Range 0-47).

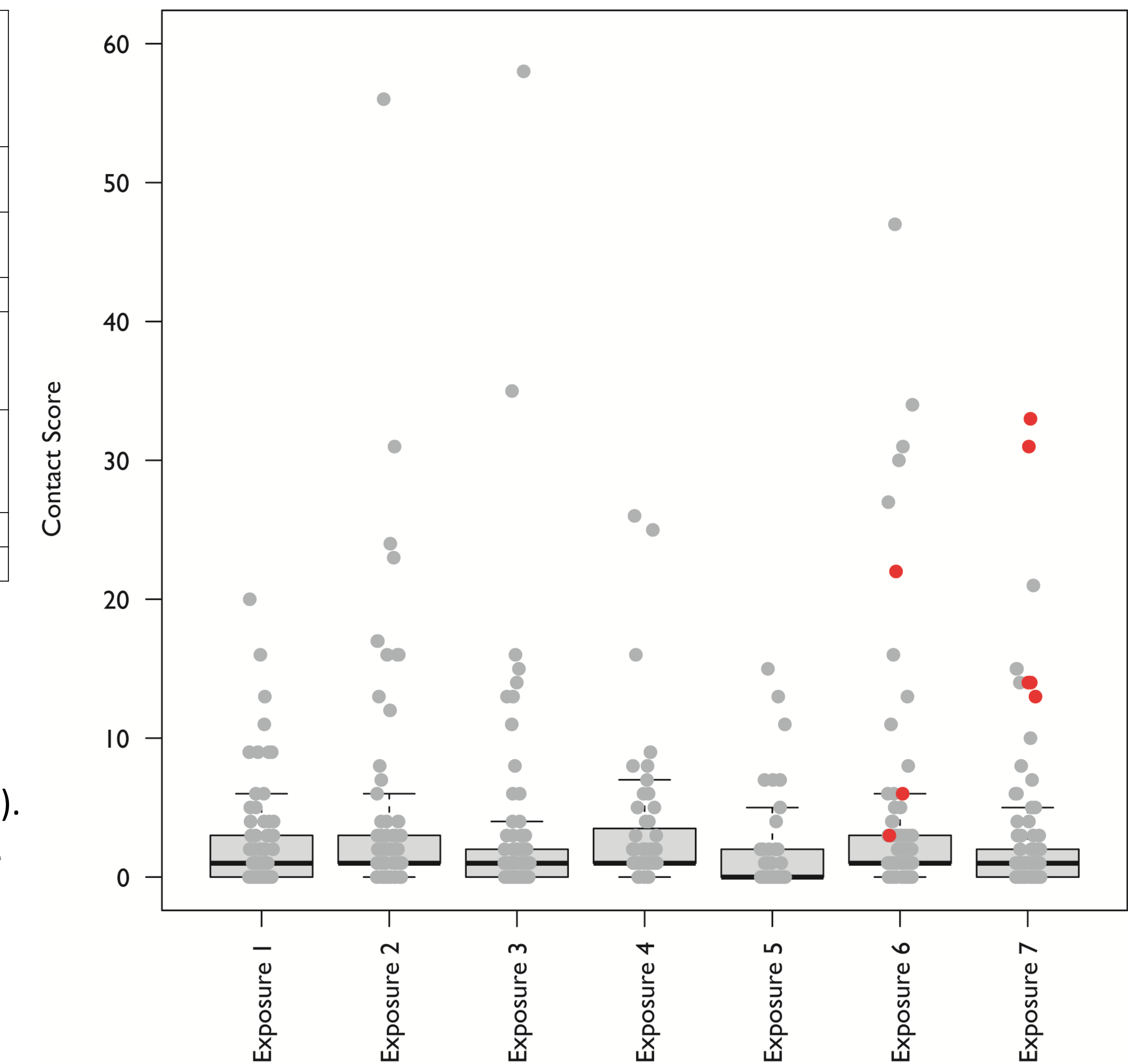


Figure 1. HCP Contact Scores in Exposure Investigations. These boxplots show the spread of contact scores for each exposure investigation that was performed. Only exposed HCP identified through EHR are included. The red dots represent HCP who tested positive for SARS-CoV-2 and all appear above the median contact score for these exposure investigations. The grey dots represent exposed HCP who did not have a recorded positive test.

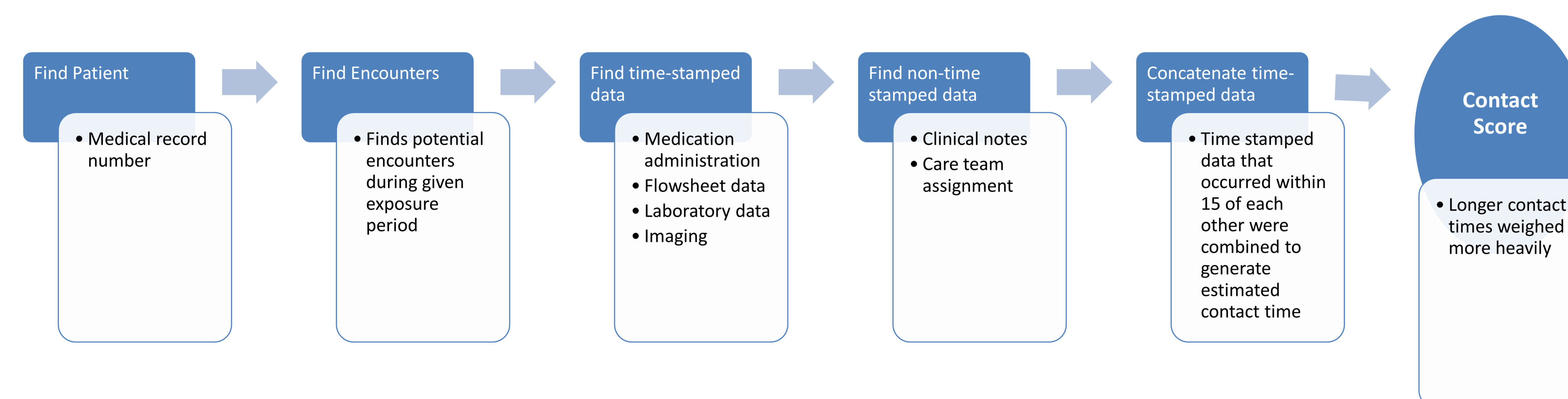


Figure 2. Automated EHR-based Algorithm

The above approach is performed through a stored procedure in the reporting database.

Conclusion

- Clinical EHR data is comprehensive and, for certain events, highly time-specific, making it ideal for conducting IPC exposure investigations.
- This technique can be generalized to other transmissible infectious diseases in healthcare settings.
- Conventional exposure investigations are still necessary to identify HCP whose patient interactions are not recorded in the EHR.