

We Shape Our Tools and Then Our Tools Shape Us: OPAT and the EHR

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The US health care system is dependent on the electronic health record (EHR) to provide patient care, with 96% of hospitals and 78% of office-based physicians reporting EHR use in 2021 [1, 2]. Federal incentives for EHR adoption have aimed to improve health care quality, outcomes, and efficiency; however, EHR-based time-motion studies have revealed that physicians are at a 1:1–2:1 ratio of time spent on deskwork to direct patient care [3–6]. While documentation requirements play a role, EHR usability—the extent to which a product achieves its user goals—has also been implicated [7, 8]. The System Usability Scale (SUS) is a technology industry scale that assigns a score from 0 (lowest, grade F, unacceptable) to 100 (highest, grade A, acceptable) [7, 9, 10]. In a survey of 1250 US physicians, the EHR (neutral to vendor) rated at a mean SUS score of 45.9 (grade F) [7]. It is within reason that grade F applies to “out of the box” outpatient parenteral antimicrobial therapy (OPAT) EHR functionality. An Emerging Infections Network survey of Infectious Diseases (ID) clinicians noted

information technology and related issues, that is, gaps in access to laboratory results and team communication, as OPAT program barriers [11]. Some OPAT programs are even using platforms external to the EHR [12, 13]. The OPAT clinician is faced with Herculean labors of repurposing a tool designed for physically space-bound hospitalizations and outpatient visits for geographically variable, nonvisit care of OPAT patients.

In a pair of recent articles in *Open Forum Infectious Diseases*, clinicians from 2 large OPAT programs share their EHR OPAT retooling strategies [14, 15]. At the University of Rochester Medical Center (URMC), New York, a multidisciplinary team of an ID physician, an ID pharmacist, and information technology analysts created and implemented a multimodal OPAT EHR intervention bundle. The bundle included an OPAT patient report and flowsheet form, “OPAT monitoring view,” shared patient lists, standardized note templates, OPAT order set, and automatic electronic notifications to the OPAT team. OPAT patient care rounds were held once weekly. Review of 3402 OPAT episodes from January 2019 to December 2022 revealed a >50% increase in patient volumes and a weekly program census of 130–145 patients. The most common antimicrobial was vancomycin (22.7% of episodes), bone/joint and bacteremia/endocarditis were the most frequent infection types, and 10% of the episodes involved oral antimicrobials. Coordination of care was needed with 60 skilled nursing facilities, 30 hemodialysis sites, 39 home health care agencies, and 16 infusion pharmacies.

At Yale University, an OPAT episode of care-based EHR registry was built that collects and visualizes data from information entered into a flowsheet. In this model, an ID consultant activates the OPAT episode of care and enters OPAT-related data into the flowsheet form. Arising complications are recorded by clinicians using templated lists with embedded mineable data elements, and the episode is resolved at the end of OPAT care. A reporting workbench and dashboard were created for summary analysis that refreshes automatically once weekly. The registry was validated, with 137 OPAT episodes of care demonstrating >90% accuracy. Over 4 years, there were 4710 OPAT episodes with 400 complications; the most common antimicrobial was vancomycin (31.8% of episodes), oral antimicrobials were prescribed in 33.6% of episodes, and the most common infectious syndrome was osteomyelitis. The OPAT program reduced hospital length of stay by an estimated 88 820 days (22 000 days/year).

Cumulatively, there are data from a total of 8112 OPAT episodes and 2 different OPAT EHR playbooks that can be drawn upon. Both involve an OPAT flowsheet: One focuses on patients lists and order sets, the other on episodes of care with a registry. A shared key feature is automation, applied in the OPAT dashboard and electronic messages. OPAT program leaders are wise to maximize OPAT task automation wherever possible. Another commonality is the incorporation of oral antimicrobials for treating complex infections, coined

Received 27 November 2023; editorial decision 26 December 2023; accepted 08 January 2024; published online 12 January 2024

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Open Forum Infectious Diseases[®]

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<https://doi.org/10.1093/ofid/ofae006>

“COPAT.” EHR functionality that captures COPAT work is vital to the future of OPAT programs. Patient-days saved from hospitalization may not equate for patients discharging on oral antimicrobials, necessitating creation of COPAT-specific metrics [16].

The range of potential EHR improvements lends insight for those with the same EHR vendor. One must also consider, what of those without the same EHR vendor? When imagining an ideal OPAT build non-specific to vendor, patient care management function and OPAT metrics would be housed together and embedded in the EHR. A program landing page would contain hyperlinks to OPAT patient lists and visualizations of real-time and longitudinal program metrics. Patients would be auto-enrolled in the OPAT program with a single click or order, driven by referring providers through their usual workflows. The OPAT patient lists show patient-specific laboratory results (visually coded by urgency level, most recent and trended over time), microbiology, links to view relevant chart notes, antibiotic orders, patient disposition, ID follow-up appointment dates, estimated completion date, and a modifiable task list that can cascade and autocomplete. External laboratory results seamlessly integrate into laboratory results in the patients’ chart without manual upload. Comprehensive OPAT order sets are suggested to prescribers that search for an outpatient intravenous antimicrobial order. Care teams across organizations can view OPAT care plan notes and communicate electronically. Program metrics

are generated from discrete data elements available in the EHR (medication orders, laboratory results, readmission, ED visit, etc.) wherever possible. Autogenerated reports of program metrics are delivered on a quarterly basis to program leaders by email. Historical data would be electronically warehoused for research and quality improvement initiatives.

A fundamental theorem of informatics is “a person working in partnership with an information resource is ‘better’ than that same person unassisted,” or simply Person + Computer > Person [17]. We need for the EHR to better the care of OPAT patients, not serve as a barrier. These publications represent steps toward optimal OPAT EHR tools. As the health care community further embraces telemedicine, hospital in the home, and nonvisit care models, OPAT clinicians may be leaders in shaping the future EHR.

Acknowledgments

Potential conflict of interest. The author certifies no potential conflicts of interest.

Patient consent. This publication does not include factors necessitating patient consent.

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