interaction with the criminal justice system. The resultant poverty is a virulent health risk factor for AA men. Our findings at 125% of the poverty line suggest that revision of poverty thresholds triggering eligibility for federal programs that influence quality of life, health, and equal opportunity should take into account premature mortality driven by poverty as a first step to address the vulnerability of poor AA men.

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Medical Student Use of Electronic Health Records to Track Former Patients

Medical students are increasingly using electronic health records (EHRs) in training. One educational application of EHRs involves tracking former patients after they have left one’s direct care.1 By providing longitudinal access to future clinical data, EHRs allow students to audit their diagnostic impressions and observe patient outcomes.2

Despite its potential educational value, to our knowledge, little has been written about tracking former patients, and its prevalence is unknown. Some medical students track patients, but this activity is generally extracurricular and it is unclear why they do it.1 Furthermore, tracking former patients raises ethical questions about the appropriate use of protected health information.1,3

We conducted a survey to estimate the prevalence of tracking former patients by medical students at our institution. Secondary aims were to examine the perceived value of and ethical concerns associated with such tracking.

Methods | We surveyed fourth-year medical students at an academic health center on August 9, 2013. Fourth-year students were selected because they had completed 48 weeks of clinical clerkships in their third year of medical school, giving them time to establish a pattern of EHR use. The survey was administered in paper format at a mandatory class at the start of the academic year. As participation was voluntary and anonymous, the students did not provide consent. No incentives were offered. Students had received no prior guidance on tracking patients via the EHR.

Figure. Survival Curves Based on the Cox Proportional Hazards Model of Sex, Race, and Poverty Status

Survival, Proportion

1.0

0.8

0.6

0.4

0.2

0.0

30 40 50 60 70 80 Age, y

No. at risk

Women

Men

White above poverty status

Men

Women

AA above poverty status

Men

Women

White below poverty status

Women

Men

AA below poverty status

Women

Men

Survival, Proportion

1.0

0.8

0.6

0.4

0.2

0.0

30 40 50 60 70 80 Age, y

No. at risk

Women

Men

White above poverty status

Men

Women

AA above poverty status

Men

Women

White below poverty status

Women

Men

AA below poverty status

Women

Men

AA indicates African American.
We developed a preliminary, nonvalidated survey consisting of 7 questions about tracking patients and whether it raised any ethical concerns, with space for free-text responses. Questions were informed by a literature review. Approval of the survey was waived by the Northwestern University Feinberg School of Medicine Institutional Review Board. We manually calculated descriptive statistics to estimate proportions and 95% CIs.

**Results** | A total of 103 of 169 students (60.9%) completed the survey. Of the respondents, 99 (96.1%; 95% CI, 90%-98%) affirmed use of EHRs to track former patients. Of those who track former patients, 92 students (92.9%; 95% CI, 88%-98%) found it beneficial from an educational perspective. Reasons students cited for tracking patients are displayed in the Figure, and methods they used to learn how to track patients are displayed in the Table. Most students indicated that they track patients to confirm diagnoses and follow up on their progress, and 54 students (52.4%) learned to track patients on their own.

Of the 99 respondents who track patients, 17 (17.2%; 95% CI, 9%-24%) had ethical concerns about it. Their primary concern was that it may not be appropriate to access patient records when they are no longer directly involved in the care of those patients.

**Discussion** | Nearly all respondents reported tracking former patients in the EHR. Although we had no data to guide our expectations, this result was surprising, especially since tracking patients occurs in the absence of institutional direction. And while our data are confined to a single institution, evidence suggests that tracking patients occurs at other institutions.1

Less surprising was that nearly all respondents found tracking patients to be educationally beneficial. Tracking demonstrates self-directed learning and curiosity about patient outcomes, qualities that can improve clinical reasoning.4,5

Although these results may be interpreted positively, they do not tell the whole story. Only a few respondents expressed concerns about the ethics of tracking patients, and almost half did not distinguish between tracking for education (to confirm diagnosis or follow treatment) and tracking out of curiosity about patients, an action that may not represent appropriate use of EHRs.6 These results suggest that students may benefit from guidance on tracking former patients in an ethically appropriate manner. There are limitations to this study, including small sample size, lack of a validated survey tool, and potential nonresponse bias even with a response rate of 60.9%.

Results of this survey suggest that tracking patients is a potentially valuable and widely practiced educational activity. However, it is associated with ethical problems that students may not appreciate, and it is unclear how patients view this activity. This topic merits exploration to understand how to optimize tracking for education while protecting patient privacy.

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### Table. How Medical Students Learned to Track Former Patients in the Electronic Health Record

<table>
<thead>
<tr>
<th>Survey Response</th>
<th>No. (%) of Responses [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learned on my own</td>
<td>54 (52.4) [43%-62%]</td>
</tr>
<tr>
<td>Learned from peers</td>
<td>5 (4.9) [1%-9%]</td>
</tr>
<tr>
<td>Learned from upperclassmen</td>
<td>2 (1.9) [0%-5%]</td>
</tr>
<tr>
<td>Learned from housestaff</td>
<td>13 (12.6) [6%-19%]</td>
</tr>
<tr>
<td>Learned from attending physicians</td>
<td>2 (1.9) [0%-5%]</td>
</tr>
<tr>
<td>Other[^a^]</td>
<td>1 (1.0) [0%-3%]</td>
</tr>
<tr>
<td>Multiple influences[^b^]</td>
<td>20 (19.4) [12%-27%]</td>
</tr>
</tbody>
</table>

[^a^] Multiple responses were allowed.  

[^c^] Proportion of students who selected more than 1 response; the answer was counted for the original category and for “Multiple influences.”

---

Figure. Reasons Cited by Medical Students for Tracking Former Patients in the Electronic Health Record

<table>
<thead>
<tr>
<th>Reason</th>
<th>Respondents, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up on Pending Studies or Confirm Diagnosis</td>
<td>60 (57.7) [49%-66%]</td>
</tr>
<tr>
<td>Follow Up on Patient’s Progress During Treatment</td>
<td>56 (54.3) [46%-62%]</td>
</tr>
<tr>
<td>Liked the Patient and Curious to See How He or She Was Doing</td>
<td>48 (46.6) [39%-55%]</td>
</tr>
<tr>
<td>Other Reasons[^d^]</td>
<td>17 (16.5) [11%-22%]</td>
</tr>
</tbody>
</table>

[^d^] Free-text responses cited research projects and clerkship-related assignments.
LESS IS MORE

Use of Antibiotics Among Patients Hospitalized for Exacerbations of Asthma

The Centers for Disease Control and Prevention estimates that 37% of all antibiotic use in hospitals may be inappropriate, and reducing unnecessary antibiotic prescribing is now considered an urgent national priority.1,2 In the United States alone, asthma exacerbations led to 1.8 million emergency department visits and 400 000 hospitalizations annually.3 Although guidelines recommend against prescribing antibiotics during exacerbations of asthma in the absence of concurrent infection, little is known about the use of antibiotics in routine clinical practice.4,5

Methods | We conducted a retrospective study of hospitalizations in 2013 and 2014 at 577 US hospitals that participate in the Premier Alliance database. Patients 18 years or older were included if they had a principal diagnosis of asthma (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] codes 493.0x, 493.1x, 493.2x, 493.3x, and 493.9x) or a principal diagnosis of acute respiratory failure (ICD-9-CM codes 518.81, 518.82, and 518.84) combined with a secondary diagnosis of asthma. We excluded patients with an admitting or discharge diagnosis of bronchitis, emphysema, chronic obstructive pulmonary disease, or bronchiectasis. We also excluded patients with potential indications for antibiotics, including those with admitting or present-on-admission discharge diagnoses of sinusitis, pneumonia, urinary tract infection, skin and soft-tissue infection, sepsis, or fever; those hospitalized for pneumonia within 3 months of the index admission; or those in whom blood or sputum cultures were obtained. The Institutional Review Board at Baystate Medical Center approved the study, which was considered nonhuman subjects research.

For each patient, we assessed receipt, type, and timing of antibiotic therapy. For each hospital, we computed a facility-specific rate of antibiotic treatment. We developed a hierarchical logistic regression model to identify independent patient and hospital factors associated with antibiotic treatment. In a sensitivity analysis, we further restricted the cohort by excluding patients with a diagnosis of infection regardless of present-on-admission status, those 55 years or older, and patients with a diagnosis of tobacco use.

Results | Among 51 951 patients, the median age was 52 years (interquartile range, 39-64 years), 36 527 (70.3%) were female, and 23 728 (45.7%) identified as white (Table). Antibiotics were prescribed on the first hospital day in 21 248 (40.9%) and at any point during the hospitalization in 30 226 patients (58.2%). Median duration of inpatient


Conflict of Interest Disclosures: None reported.


Editor’s Note
Teaching Medical Students to Engage Meaningfully and Judiciously With Patient Data

Electronic medical records (EMRs) are now ubiquitous and proficiency in their use is a necessary component of undergraduate medical education. Clerkship directors of medical schools have set national standards for how students should learn to access, document, and write orders in an EMR.1 However, these standards minimally address how students might use their patients’ electronic information after the clinical encounter concludes.

In this issue of JAMA Internal Medicine, Brisson and Tyler2 describe survey results in which 96.1% of medical students track patients electronically after direct patient care ends, largely to confirm diagnoses, check results of pending tests, and understand what happened during their subsequent clinical course. Although this is a single-institution survey, it is reasonable to imagine that resident and medical students across the country similarly track their former patients electronically to various degrees.

When done well, medical student tracking via EMRs can benefit patients. On my inpatient teams, students who were tracking their patients were able to follow up on postdischarge diagnostic test results that altered their patients’ courses. Also, tracking enriches learning, offering students feedback on clinical questions such as, “Did we really need to order that?” or “Did we estimate her prognosis well?,” to help them develop deliberate practice patterns.

However, there are 2 important problems with medical students tracking former patients via EMRs as it is currently practiced. First, patients do not explicitly provide consent to be tracked after their care ends, a problem that physicians and students could easily address through discussion with their patients. Second, some tracking is extracurricular. The Health Insurance Portability and Accountability Act likely only permits tracking of patients for education and quality assurance.3 However, 39.8% of medical students in the study by Brisson and Tyler tracked former patients because they were curious about what had happened or liked the patient. Medical school informatics and EMR curricula need to teach students to engage meaningfully and judiciously with patients’ data.

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Correction: This article was corrected on August 22, 2016, for a typographical error in the text.

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