

A Multi-Center Validation of the Electronic Health Record 'Admission Source' Field Against Clinical Notes for Identifying Hospitalized Patients with Long-Term Care Facility Exposure

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Background

- A current or recent long-term care facility (LTCF) stay is a strong risk factor for antibiotic-resistant bacterial colonization and infection, making LTCF exposure an important variable for infection control research and practice purposes.
- Yet, most U.S. hospital electronic health record (EHR) systems do not systematically record a patient's LTCF exposure.
- Absent manual chart review, which is resource-intensive and cannot be incorporated into automated screening algorithms, there is no definitive method for identifying LTCF-exposed inpatients from EHR data.
- As a surrogate, researchers often use 'Admission Source' to identify LTCF transfers, but this EHR field has not been previously validated for this purpose.

Objective

- To evaluate the accuracy of the EHR 'Admission Source' field against the clinical notes for identifying inpatients with current or recent LTCF exposure.

Methods

- Retrospective study of adult admissions from 2018 – 2021 across 12 hospitals in the University of Maryland Medical System
- Electronically extracted patient and encounter data and classified patients as LTCF-exposed by 'Admission Source' if they were LTCF transfers
- For 315 randomly sampled admissions, M.T. and K.G. reviewed the admission 'History & Physical' note for mention of LTCF exposure (Fig. 1)
- Assuming an indication of LTCF in either the 'Admission Source' field or clinical note represented true exposure, we estimated each method's sensitivity with 95% confidence intervals.

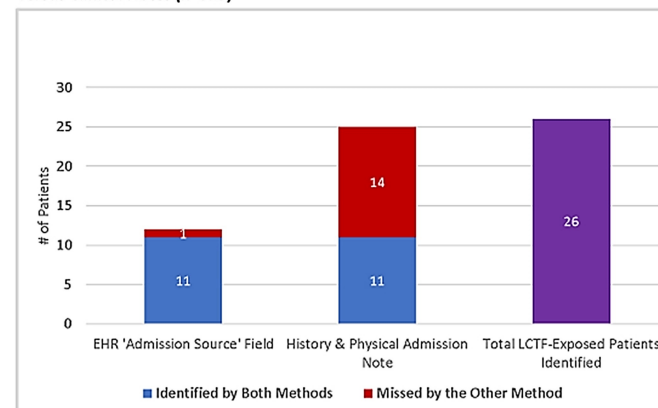
Figure 1. Definitions Used to Identify Hospitalized Patients with Long-term Care Facility (LTCF) Exposure, by Classification Method

EHR 'Admission Source' Field	History & Physical Admission Note
Transfer from: <ul style="list-style-type: none"> Long-term care facility; Skilled nursing facility (SNF); Assisted living facility (ALF); Rehabilitation facility; Chronic facility; or 'Other subacute' facility 	Mention of current or recent (< 3 mos.) residence or stay in: <ul style="list-style-type: none"> Any of the facility types listed in the 'Admission Source' transfer-from list (to the left); Facilities for patients with severe cognitive deficits who need assistance with ADLs (this transfer type is not available for 'Admission Source')

Results

- Across 280,581 admissions, 9,476 (3.4%) had an 'LTCF transfer' EHR admission source.
- In the validation sample, 26 admissions (8.3%) were classified as LTCF-exposed by either 'Admission Source' or clinical note, of which 12 were identified in the 'Admission Source' field and 25 in the notes (Fig. 2).
- The sensitivity of the EHR 'Admission Source' field for detecting LTCF exposure was 46% (95% CI: 29% – 65%) and for clinical notes was 96% (95% CI: 81% – 99%).

Figure 2. Detection of Inpatients with LTCF Exposure by EHR 'Admission Source' Field versus Clinical Notes (n=315)



Results, cont.

- Most (12/14) patients missed by 'Admission Source' were current LTCF residents (Fig. 3).

Figure 3. Characteristics of Patients Identified as 'LTCF-Exposed' by Clinical Notes but Missed by the EHR 'Admission Source' Field (n=14)

'Admission Source' coded as:

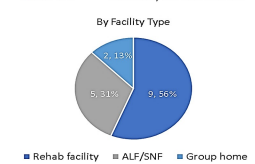
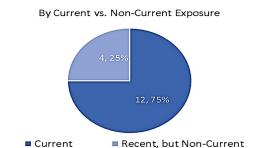
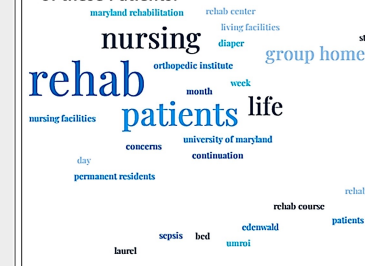
- "Home, Self Referred, Group Home, Congregate House, Foster" (n=8)
- "Transfer from another hospital" (n=4)
- "Trans From Another Health Care Facility (Psych, Rehab, Childrens)" (n=1)
- "From Clinic, Physician Office, Urgent Care" (n=1)

Distribution of LTCF Exposure Types*:

- Currently residing in rehab facility (n=5)
- Recent (< 3 mos. prior), but not current, rehab facility stay (n=4)
- Current ALF/SNF resident (n=5)
- Current group home resident with cognitive/developmental deficits (n=2)

* Sum equals 16, not 14, due to 2 patients who are current ALF residents but who also had recent rehabilitation facility exposure

A "Word Cloud" of the Most Common LTCF Terms and Phrases from the Clinical Notes of these Patients:



Conclusions

- The EHR 'Admission Source' field misses many inpatients with recent or current LTCF exposure, risking misclassification in research studies and algorithms that incorporate this variable.
- Identifying patients with recent discharge to an LTCF might improve sensitivity but further research is needed.
- Automated techniques for analyzing free-text notes, such as natural language processing, could significantly improve detection of LTCF-exposed patients to limit the spread of antimicrobial resistance in healthcare settings.**

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Funding Statement: This work was funded by AHRQ grant K01HS0283631 awarded to K.E.G.

