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A QUALITATIVE REPORT OF RESIDENTS' IMPRESSIONS OF A HIGH-VALUE CARE CURRICULUM

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Nearly 30% of U.S. healthcare spending is considered wasteful and potentially avoidable, and physicians are responsible for helping curtail these costs.[1] Internal medicine (IM) programs are mandated to train residents in high-value care (HVC), but optimal methods for teaching these concepts are not established.[2,3] We implemented a hospital bill review curriculum to teach IM residents about HVC in the inpatient setting. Previous approaches using patient bills and cost data to teach HVC have had mixed results, including inconsistent associations with reduced costs or improved patient care.[4,5] Given the limited impact of prior interventions, we took a qualitative approach to better understand how this curriculum impacted residents' understanding of HVC concepts. Specifically, we aimed to explore residents' perceptions of the curriculum and expectations of how the curriculum would impact their clinical practice.

PGY1-3 residents participated in the curriculum while rotating on general internal medicine (GIM) inpatient services at the University of Pittsburgh Medical Center, where GIM teams consist of 1 attending, 1 resident, 2 interns, and 2-3 medical students. Each GIM team was provided with the hospital bill for a patient recently discharged from their service. The bill included all itemized charges from the patient's hospitalization, excluding physician charges. The charges represented the initial price requested from insurance payors. The bill did not include out-of-pocket costs or reimbursement amounts negotiated by insurance companies, as these were unavailable. Attendings received a curriculum guide and attended a faculty development session. Each GIM team met to reflect on and discuss their hospital bill. This exercise occurred monthly for approximately 30 minutes.

We conducted one-on-one semi-structured interviews with residents who received the curriculum during November 2014. Interviews of 10-15 minutes in length were conducted by qualitative experts. Two investigators reviewed interview transcripts, developed a preliminary codebook, and refined the codebook iteratively as additional transcripts were reviewed. Thematic saturation was achieved after 10 transcripts. Investigators independently applied the final codebook to all transcripts using ATLAS.ti (version 7, Scientific Software, Berlin, Germany). Cohen's Kappa statistic was 0.86, indicating almost perfect agreement between coders. Overarching themes and key quotations were identified by investigators. The study was determined to be exempt by the Institutional Review Board of the University of Pittsburgh.

Twenty of 21 eligible residents completed interviews, for a participation rate of 95%. Most participants were early in their training: 60% were PGY1, 25% were PGY2, and 15% were PGY3.

Themes corresponded to the following two domains: Reflection on the hospital bill and reflection on clinical practice.

1. **Refection on the Hospital Bill:** During the exercise, nearly all residents expressed surprise at the magnitude of charges, especially for commonly ordered studies like daily laboratory tests, blood cultures, and chest x-rays. For instance, one resident reflected: "Some of the charges were just surprising. I had some numbers in mind about the cost of an admission, say the cost of the room and bed. And my numbers were totally different from the number seen on the bill."

   Residents also reflected on the lack of transparency surrounding healthcare costs. Residents appropriately struggled to understand the relationship between a charge on the hospital bill, the out-

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of-pocket cost to the patient, and the "true" cost of the test. Residents indicated that having access to out-of-pocket costs at the time of order placement would impact their practice more substantially. "I think what would ultimately dramatically impact things is if we had real time access to that data. [...] If you were online shopping. If you clicked on something and saw a price tag right away, I think that would much more influence my management." Several residents reflected on how this lack of transparency made it difficult for patients to understand healthcare costs: "We talked about how difficult it is for us as physicians to really navigate these different costs and how confusing it must be or difficult for patients as well."

2. **Reflection on Clinical Practice:** Residents identified strategies to minimize costs associated with inpatient care. Some residents favored broadly ordering fewer tests. As one resident described, "We talked about limiting extra tests and being conservative." Specific strategies included decreasing daily laboratory testing, limiting telemetry use, pursuing outpatient over inpatient testing, and discontinuing outpatient medications during hospitalization.

   Residents also reflected on ways to maximize the value of testing. For example, residents identified testing that did not influence clinical management, and discussed whether the testing was avoidable. One resident stated, "We discussed how these labs affect our management. And if they wouldn't affect our management in any way [...] it's not necessary to check a certain lab every day." Several residents reported that this discussion influenced their clinical practice: "Even that day I actually ended up ordering less labs for some patients just thinking, 'Do I really need to order this? Am I really following it or is it just something I was just ordering because?' I think I ended up ordering less things for my patients for the rest of the rotation." Residents also discussed the importance of considering indications for various tests. "We did talk about not ordering labs when they're not indicated. Not doing a daily phosphorous or magnesium unless we need to, and telemetry was a big thing that we talked about."

The hospital bill review curriculum was a focused intervention that fostered discussion of healthcare costs and reflection on clinical practice among IM residents. Residents identified examples of low-value care received by their patients and named strategies to reduce healthcare waste. Prior work indicates that providing residents with feedback on costs can improve attitudes towards HVC and reduce spending.[4,5]

Through resident interviews, we identified several lessons unintentionally transmitted in this curriculum. First, some residents over-emphasized cost reduction without considering test appropriateness. For instance, residents discussed "being conservative" in testing and pursuing outpatient testing to reduce hospital costs. These strategies are unlikely to create less costly care and may result in failure to perform necessary testing. Residents were surprised by the magnitude of hospital charges and this 'sticker shock' may have led to a disproportionate focus on reducing spending.

Second, residents infrequently discussed the utility of higher-cost items, such as procedures or radiology studies, which are potentially costly and harmful. Instead, residents focused on lower-cost items, such as daily laboratory tests. Likewise, Sommers, et al, evaluated an HVC intervention for IM residents that included reflection on a patient bill and found that costs of laboratory tests declined while there was no change in radiology or total admission costs.[5] In our study, most residents were early in their training and may have lacked the medical knowledge or autonomy to drive decisions about high-stakes testing, leading to a focus on lower-cost items.

Using hospital bills to teach HVC to early trainees can be challenging, and we identified strategies to improve similar curricula. First, discussions must focus on ordering the *right* tests rather than *fewer* tests while decreasing waste. This can be accomplished through training on incorporating evidence-based medicine with HVC practice and discussion questions to achieve this focus. Second, increased cost transparency and cost availability at point-of-care would increase the educational yield of similar interventions.

This study has several limitations. One limitation of our curriculum is that we provided residents with charges rather than costs after insurance reimbursement. Unfortunately, post-reimbursement costs were unavailable and continue to be difficult to obtain. Nonetheless, this curriculum provided an opportunity for residents to reflect on all testing ordered for their patients during a hospital stay and discuss whether any testing was low-value. Participants were also early in their training and from a single institution, limiting generalizability. Finally, we did not measure the impact of the curriculum on spending, but this had been assessed in other studies.[5]

In conclusion, when provided with their patients' hospital bills, residents reflected on HVC concepts and identified strategies to reduce healthcare waste. However, residents

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focused predominantly on lower-cost items, and some focused on cost-reduction without considering test appropriateness. To our knowledge, this is the first qualitative evaluation of a hospital bill review curriculum. Our findings may inform future curricular content in this important area.

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