Deimplementation of Established Medical Practice Without Intervention: Does It Actually Happen?

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In this edition of the *Journal of Hospital Medicine*, Fenster and colleagues evaluate the trend of postdischarge intravenous (IV) antibiotic therapy for children with osteomyelitis, complicated pneumonia, and complicated appendicitis.[1] Children requiring prolonged antibiotic therapy were historically discharged home with a peripherally inserted central catheter (PICC) for IV antibiotics. Recent studies suggest that treatment failure occurs uncommonly, and that oral antibiotics are as effective as those administered intravenously.[2-4] Oral antibiotics also avoid the additional risk of PICC-related complications, such as line malfunction, infections, and thrombi, which all lead to increased re-visits to hospital.

QUESTIONING ESTABLISHED MEDICAL PRACTICE

New research seldom leads to rapid change in clinical practice.[5] This is particularly the case when new evidence favors the abandonment of accepted medical practices or supports the deimplementation of low-value care. The mounting body of evidence suggests that postdischarge IV antibiotic therapy is low-value care for children with osteomyelitis, complicated pneumonia, and complicated appendicitis, and that overuse is associated with unnecessary harm. Fenster and colleagues sought to evaluate the extent to which the management of these conditions has changed over time in the United States. They conducted a retrospective cohort study of children discharged from hospitals contributing data to the Pediatric Health Information System (PHIS) database. Validated algorithms using discharge diagnosis and procedure codes were used to identify children with the three conditions who were discharged home with IV antibiotic therapy.

Between January 2000 and December 2018 and across 52 hospitals, there were 24,753 hospitalizations for osteomyelitis, 13,700 for complicated pneumonia, and 60,575 for complicated appendicitis. Rates of postdischarge IV antibiotic therapy decreased over time for all conditions, from 61% to 22% for osteomyelitis, from 29% to 19% for complicated pneumonia, and from 13% to 2% for complicated appendicitis. Rather than a gradual reduction over time, the authors used piecewise linear regression to identify an inflection point when the decrease started: the inflection points for all three occurred around 2009 or 2010. Despite the observed decrease over time, there was significant variation in practice patterns among hospitals in 2018. For example, while the median rate of postdischarge IV antibiotic therapy for osteomyelitis was 18%, the interquartile ranged from 9% to 40%.

The authors conducted several sensitivity analyses, with the exclusion of hospitals that provided data only for certain years, which supported the robustness of the findings. Yet there are important limitations, most notably the lack of data on outcomes related to overuse and efficiency: type of antibiotics used (narrow vs broad spectrum) and total duration of antibiotics or variation in length of stay. The validated algorithms were also based on older ICD-9 codes and may perform less well with ICD-10 or from 2015 onwards. Lastly, the findings are limited to children's hospitals and may not apply to general hospitals that care for many children.

CAN DEIMPLEMENTATION HAPPEN WITHOUT INTERVENTIONS?

The authors suggest that the deimplementation of postdischarge IV antibiotic therapy for the three conditions occurred spontaneously. Yet it is worth considering the different levels of agents of change that may have influenced these observations, such as research evidence, national condition guidelines, national efforts at reducing overuse and improving safety, local hospital efforts, and shared decision-making.

Postdischarge antibiotic therapy options for osteomyelitis, complicated pneumonia, and complicated appendicitis are supported by weak research evidence. Oral and parenteral therapy are equally effective but based on observational data; a randomized controlled trial is unlikely to ever be conducted because of uncommon outcomes, such as treatment failures. For these scenarios, greater emphasis should be placed on factors other than effectiveness, such as harms, availability of alternative options, and cost.[6] For postdischarge IV antibiotic therapy, one potential explanation for the observed deimplementation is the greater awareness of harm, with up to 20% of cases with IV antibiotics requiring PICC removal.[7] There is also a readily available alternative (oral antibiotics) with a favorable cost and effectiveness profile.

National condition guidelines advocating early transition to oral antibiotic therapy began to appear before and during the

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observed inflection point of 2009 and 2010. The 2002 British Thoracic Society guidelines for community-acquired pneumonia suggested considering oral agents after clear evidence of improvement,[8] and the 2010 Infectious Diseases Society of America guidelines recommended oral antibiotic options for children discharged home with intra-abdominal infections.[9] A systematic review published in 2002 also questioned the need for prolonged IV antibiotic therapy compared with early transition to oral agents in osteomyelitis.[10] While no targeted national interventions to drive practice change existed, widespread national efforts at reducing overuse (eg, *Choosing Wisely*®) and improving safety (eg, reducing central line complications) have increased in the past decade.[11]

An important agent of change that Fenster and colleagues were not able to tease out was the impact of local hospital level efforts. In parallel to national efforts, there has likely been targeted hospital-level interventions that are disease specific (eg, order sets, pathways/guidelines, shared–decision-making tools) or focused on reducing adverse events (eg, reducing inappropriate PICC use). For example, between 2010 and 2012, one US children's hospital increased the number of children with osteomyelitis discharged on oral antibiotics from a median of 0% to 100% with a bundle of quality improvement interventions, including standardized treatment protocols and shared decision-making.[12]

Despite the encouraging results, up to 22% of children were discharged from hospitals with postdischarge IV antibiotic therapy, and significant variation persists in 2018. Evidence of harm or even strong recommendations to change practice are themselves inadequate for behavior change.[13] While it is clear that some element of deimplementation may have occurred organically over the past two decades, it is time for concerted deimplementation strategies that focus on practitioners or hospitals with "entrenched practices."[6]

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