Counting the Ways to Count Medications: The Challenges of Defining Pediatric Polypharmacy

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Polypharmacy, the practice of taking multiple medications to manage health conditions, is common for children. Many children today have a higher burden chronic illness and an increasing number of pharmaceuticals—often delivered in various doses throughout the day. Polypharmacy has been linked to a variety of pediatric and adult outcomes, including medication errors and readmission.[1-3] Consequently, the Society of Hospital Medicine recognizes polypharmacy as a risk factor for readmission for adult populations.[4] These adverse outcomes are related to both the human elements of polypharmacy (eg, cognitive burden, adherence) and the pharmacologic elements, including drug–drug interactions. For many children, the safety implications of polypharmacy may be more consequential due to the reliance of multiple caregivers to administer medications, which requires additional coordination to ensure that medications are administered and not duplicated. Dual administration of the same medication by both parents is the most common reason for pediatric calls to Poison Control Centers.[5] Yet, there is a paucity of research in this area, with most of the pediatric literature focusing on the outpatient setting and specific populations, including epilepsy and mental health.[6-8]

How providers, patients, and families translate medication lists to counts of medications—and hence the burden of polypharmacy—is not clearly or consistently described. Often in studies of polypharmacy, researchers utilize medication claims data to count the number of medications a patient has filled from the pharmacy. However, in routine clinical practice, clinicians rarely have access to medication claims and thus rely on patient or family report, which may or may not match the list of medications in the patients' medical records.

Therefore, linking polypharmacy research to the pragmatic complexities of clinical care requires greater clarity and consistent application of concepts. At hospital discharge, families receive a list of medications to take, including home medications to resume as well as newly prescribed medications. How-

ever, not all medications are equally essential to patients' care regarding importance of administration (eg, hydrocortisone ointment versus an anticonvulsant medication). Patients, parents, and caregivers are ultimately responsible for determining which medications to prioritize and administer.

Although there is no standard numerical definition for how to identify polypharmacy, five medications is commonly considered the threshold for polypharmacy.[9] A recent review of the pediatric polypharmacy literature suggested a lower threshold, with any two concurrent medications for at least a day.[7] Yet, the best approach to "count" medications at hospital discharge is unclear. The simplest method is to tally the number of medications listed in the discharge summary. However, medications are sometimes listed twice due to different dosages administered at different times. Frequently, medications are prescribed on an as-needed basis; these medications could be administered routinely or very infrequently (eg, epinephrine for anaphylaxis). Over-the-counter medications are also sometimes included in discharge summaries and consideration should be given as to whether these medications count toward measures of polypharmacy. Over-the-counter medications would not be counted by a polypharmacy measure that relies on claims data if those medications are not paid by the insurer.

We sought consensus on how to count discharge medications through a series of informal interviews with hospitalists, nurses, and parents. We asked the seemingly simple question, "How many medications is this child on?" across a variety of scenarios (Figure). For panel A, all stakeholders agreed that this medication list includes two medications. All other scenarios elicited disagreement. For panel B, many people responded three medications, but others (often physicians) counted only clindamycin and therefore responded one medication.

For panel C, stakeholders were split between one (only topiramate), two (topiramate and rectal diazepam), and three medications (two different doses of topiramate, which counted as two different medications, plus rectal diazepam). Interestingly, one parent reflected that they would count panel C differently, depending on with whom they were discussing the medications. If the parent were speaking with a physician, they would consider the two different doses of topiramate as a single medication; however, if they were conveying a list of medications to a babysitter, they would consider them as two different medications. Finally, panel D also split stakeholders

How many medications is this child on?

Panel A

Amoxicillin twice a day by mouth

Fluticasone twice a day by inhaler

Panel C

Topiramate 3 mL by mouth each morning

Topiramate 5 mL by mouth each evening

Diazepam by rectum as needed for seizure

Panel B

Clindamycin three times a day by mouth

Ibuprofen every 4 hours as needed by mouth

Acetaminophen every 4 hours as needed by mouth

Panel D

Oxycodone SR 20 mg twice a day

Oxycodone 5 mg every 4 hours as needed by mouth

FIG. Clinical scenarios where stakeholders were asked to count the number of medications*

*Seven scenarios were presented to stakeholder groups. Individuals had an opportunity to answer for themselves and then participated a facilitated discussion of the different answers and rationale. Two physician groups (each with ~10 participants), one parent group (with ~20 participants), and six discussions with individual bedside nurses informed this perspective. Abbreviation: SR, sustained-release formulation.

between counting one and two medications, with some parents expressing confusion as to why the child would be prescribed the same medication at different times.

While our informal conversations with physicians, nurses, and families should not be construed as rigorous qualitative research, we are concerned about the lack of a shared mental model about the best way to count discharge polypharmacy. In reviewing the comments that we collected, the family voice stands out—physicians do not know how a parent or a caregiver will prioritize the medications to give to their child; physicians do not know whether families will count medications as a group or as separate entities. Although providers, patients, and families share a list of medications at discharge, this list may contain items not considered as "medications" by physicians.[10] Nevertheless, the medication list provided at discharge is what the family must navigate once home. One way to consider discharge polypharmacy would be to count all the medications in the discharge summary, regardless of clinicians' perceptions of necessity or importance. Electronic health record based tools should sum medications counts. Ultimately, further research is needed to understand the cognitive and care burden discharge polypharmacy places on families as well as understand this burden's relationship to safety and transition outcomes. Clinicians should recognize that the perceived care burden from polypharmacy will likely vary from family to family. Research is needed to develop and validate tools to assess family capacity and polypharmacy-related burden and to make shared decisions regarding medication prescribing and deprescribing[11,12] in this context.

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