

# Categorization of National Pediatric Quality Measures

Samantha A. House, DO, MPH,<sup>a,b</sup> Eric R. Coon, MD, MS,<sup>c</sup> Alan R. Schroeder, MD,<sup>d</sup> Shawn L. Ralston, MD, MS<sup>a,b</sup>

abstract

**BACKGROUND AND OBJECTIVE:** The number of quality measures has grown dramatically in recent years. This growth has outpaced research characterizing content and impact of these metrics. Our study aimed to identify and classify nationally promoted quality metrics applicable to children, both by type and by content, and to analyze the representation of common pediatric issues among available measures.

**METHODS:** We identified nationally applicable quality measure collections from organizational databases or clearinghouses, federal Web sites, and key informant interviews and then screened each measure for pediatric applicability. We classified measures as structure, process, or outcome using a Donabedian framework. Additionally, we classified process measures as targeting underuse, overuse, or misuse of health services. We then classified measures by content area and compared disease-specific metrics to frequency of diagnoses observed among children.

**RESULTS:** A total of 386 identified measures were relevant to pediatric patients; exclusion of duplicates left 257 unique measures. The majority of pediatric measures were process measures (59%), most of which target underuse of health services (77%). Among disease-specific measures, those related to depression and asthma were the most common, reflecting the prevalence and importance of these conditions in pediatrics. Conditions such as respiratory infection and otitis media had fewer associated measures despite their prevalence. Other notable pediatric issues lacking associated measures included care of medically complex children and injuries.

**CONCLUSIONS:** Pediatric quality measures are predominated by process measures targeting underuse of health care services. The content represented among these measures is broad, although there remain important gaps.



<sup>a</sup>Department of Pediatrics, Geisel School of Medicine at Dartmouth, Hanover, New Hampshire; <sup>b</sup>Department of Pediatrics, Children's Hospital at Dartmouth-Hitchcock, Lebanon, New Hampshire; <sup>c</sup>Department of Pediatrics, University of Utah, Salt Lake City, Utah; and <sup>d</sup>Department of Pediatrics, Stanford University, Stanford, California

Dr Ralston conceptualized and designed the study, coordinated data collection and analysis, and reviewed and revised the manuscript; Dr House was involved in study design, participated in all data analysis, and drafted the manuscript; Drs Coon and Schroeder contributed to study design, performed a portion of the data collection, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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Address correspondence to Samantha House, DO, MPH, Department of Pediatrics, Dartmouth-Hitchcock Medical Center, 1 Medical Center Dr, Lebanon, NH 03756. E-mail: samantha.a.house@hitchcock.org

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**WHAT'S KNOWN ON THIS SUBJECT:** The number of quality measures and their centrality in health care is increasing. There has been no synthesis of the type and content of measures applying to pediatric populations.

**WHAT THIS STUDY ADDS:** Our study found an abundance of process measures targeting underuse of services among national measures. We also suggest that there may be discordance between the frequency and potential impact of some pediatric conditions and the number of applicable measures.

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Over recent decades, quality improvement has become a major focus in health care.<sup>1</sup> Measurement is a key component of advancing health care quality, intended to provide an objective picture of services rendered and allow for meaningful comparisons across institutions and providers to drive improvement. Many organizations have devoted resources to the development of measures with the aim of facilitating transparency, higher value care, and improved outcomes.<sup>2-4</sup>

Nevertheless, some experts have expressed concern about the centrality that quality measures have taken in revamping health care delivery systems, raising the possibility of unintended negative consequences.<sup>5,6</sup> Questions remain regarding the value of quality measurement, specifically around the balance of benefit accrued weighed against the financial and opportunity costs of implementation.<sup>3</sup> The rapidity with which measures have been developed has outpaced research examining the associated outcomes, and the sheer number of measures is felt by some to be excessive.<sup>7</sup> A focus on measurement without a clear understanding of consequences has been suggested to be detrimental to physicians, patients, and broader health systems.<sup>4,6</sup>

A small number of researchers have aimed to describe available quality measures in detail. Some have focused on those pertaining to particular areas or fields to determine whether these adequately represent the quality of care delivered in these domains,<sup>8-10</sup> whereas others have attempted broader classifications.<sup>5</sup> Although setting-specific research evaluating pediatric quality measurement has been performed,<sup>10</sup> a characterization of the measures applying to broad pediatric populations, either by type or by content, has not been performed. The aim of this study is

to quantify nationally promulgated quality measures applicable to pediatric populations and to characterize the prevalence of measures by domain and content area.

## METHODS

### Identification of Measures

We identified candidate national clinical quality measure collections available in databases or clearinghouses (eg, the National Quality Forum and the Joint Commission), federal government Web sites (eg, the Center for Medicare and Medicaid Services and the Agency for Healthcare Research and Quality) and by using key informant interviews with experts in health services research and health care operations. Key informants included a chief quality officer, hospital chief executives, and several health services researchers. We then made a master list of all measures extracted from the identified resources applicable to pediatric populations as of December 31, 2015. Screening for pediatric applicability included first assessing any age restrictions contained within the measure definition (ie, use of the word “adult” or a statement of applicability to age >18 years or Medicare-only populations) and then applying a qualitative assessment of whether the measure pertained to a disease or condition of children. Diseases designated as not relevant for children’s health care quality through our qualitative assessment included: myocardial infarction, coronary artery disease, ischemic vascular disease, abdominal aortic aneurysm, atrial fibrillation, chronic obstructive pulmonary disease, dementia, cataracts, colon cancer, breast cancer, melanoma, prostate cancer, cervical cancer, hypertension, stroke, Parkinson’s disease, amyotrophic lateral sclerosis,

osteoarthritis, low back pain, and osteoporosis.

### Classification of Measures

We classified measures as relating to structure (those focused on static aspects of an organization’s setting, systems, or providers), process (the activities carried out by providers in the delivery of health care), or outcome (changes in patient health) using a Donabedian framework and additionally delineated by the Agency for Healthcare Research and Quality.<sup>11,12</sup> We additionally classified process measures as intended to address underuse (too little care provided), overuse (too much care provided), or misuse (provision of incorrect care) of health services based on definitions specified by Newton et al.<sup>5</sup>

All measures were independently classified by at least 2 of the 4 authors, with priority given to existing classifications in published studies or by the measure developer. In areas where disagreement existed, resolution was achieved through an iterative process involving group consensus. Analyses were initially conducted on all measures; subsequently, duplicates were removed and additional analyses were performed using unique measures.

Measures were then characterized based on content. Six main content groups were identified through consensus of the authors: condition-specific metrics, other diagnostics and therapeutics, preventive care, hospital-based outcomes, systems of care, and surgical. Measures were placed into the group determined to best fit the intent of the specific metric.

### Comparison of Measures to Frequency of Pediatric Presentations

Specific health conditions represented within the identified measures were ranked based on the number of associated metrics (ranking system included both the total number of

**TABLE 1** National Quality Measure Collections Pertaining to Pediatric Providers

| Source                                       | Collection   | No. of Measures Reviewed | Relevant to Pediatric Providers |
|--|--|--------------------------|---------------------------------|
| Center for Medicare and Medicaid Services    | Child Core Set   | 24                       | 19                              |
|  | Hospital Inpatient Quality Reporting                                 | 42                       | 16                              |
|  | Hospital Outpatient Quality Reporting                                | 26                       | 13                              |
|  | Hospital Compare   | 118                      | 25                              |
|  | Physician Quality Reporting System                                   | 254                      | 55                              |
| Agency for Healthcare Research and Quality   | Pediatric Quality Indicators   | 24                       | 17                              |
| National Quality Forum Joint Commission      | Endorsed   | 626                      | 105                             |
|  | Core Measures  | 46                       | 17                              |
|  | Outpatient Core Measures   | 33                       | 12                              |
| National Committee for Quality Assurance     | Healthcare Effectiveness Data and Information Set Physician Measures | 51                       | 25                              |
| Health Resources and Services Administration | Uniform Data System  | 13                       | 7                               |
| American Medical Association                 | Physician Consortium for Performance Improvement                     | 325                      | 49                              |
| Children's Hospital Association              | Solutions for Patient Safety   | 10                       | 9                               |
|  | Whole System Measures  | 11                       | 11                              |
| Centers for Disease Control and Prevention   | National Healthcare Safety Network                                   | 10                       | 6                               |

measures and the unique number of measures associated with that condition). We then compared the content of quality measures to conditions estimated as most common to the pediatric population in outpatient, inpatient, and emergency settings.<sup>13-15</sup> The rankings of outpatient diagnoses were obtained from a 2007 report of 20 practice-based research networks; we also evaluated National Ambulatory Care Survey data, however, we chose the former because 53% of participating physicians were pediatricians, whereas only 20% of National Ambulatory Care Survey providers were pediatricians.<sup>13</sup> Emergency department diagnoses were ascertained from a 2012 study categorizing nearly 6 million emergency visits among Medicaid-insured children.<sup>14</sup> Inpatient visit diagnosis frequency was taken from a recently published 2012 analysis of admissions to both children's hospitals and community hospitals by using the Kids' Inpatient Database.<sup>15</sup> For inpatient presentations, major depression, episodic mood disorders, and bipolar disorder are grouped together. Appendicitis with and without peritonitis and acute

**TABLE 2** Measure Classification by Domain

| Measure Category         | All Measures, N (%) | Unique Measures (Duplicates Removed), N (%) |
|--------------------------|---------------------|---|
| Total                    | 386                 | 257   |
| Outcome                  | 118 (31)            | 83 (32)                                     |
| Structure                | 28 (7)              | 22 (9)                                      |
| Process                  | 240 (62)            | 152 (59)                                    |
| Process measures by type |                     |   |
| Underuse                 | 179 (74)            | 117 (77)                                    |
| Overuse                  | 35 (15)             | 20 (13)                                     |
| Misuse                   | 26 (11)             | 15 (10)                                     |

appendicitis with abscess are all represented under "appendicitis."

## RESULTS

Across 15 measure collections, 386 measures (24%) were broadly applicable to pediatric populations. Table 1 presents the included measure collections. Exclusion of duplicates left 257 unique measures. Supplemental Tables 5 through 7 list all structure, process, and outcome measures, respectively. The majority of unique pediatric quality measures are process measures (59%), most of which target underuse of health services (77%) (Table 2). Table 3 demonstrates measures categorized by content, providing an overview of the aspects of pediatric care

represented among national quality measures. Among underuse metrics, those focused on vaccinations, depression, asthma, and well-child care were the most frequently observed. Of the 20 unique overuse metrics, a majority were related to minimization of medication and radiation exposure. Of the 15 unique misuse metrics, nearly half concerned emergency department flow.

Table 4 compares the relative amount of condition-specific content identified among available quality metrics to published accounts of their prevalence in the outpatient, inpatient, and emergency settings.<sup>13-15</sup> This table includes only conditions identified as the most common in these settings by using available references.<sup>13-15</sup>

**TABLE 3** Quality Measures Characterized by Content Area

| Content Area   | Total | Unique | Content Area                       | Total | Unique |
|--|-------|--------|------------------------------------|-------|--------|
| Condition-specific measures  |       |        | Preventive care                    |       |        |
| Depression   | 20    | 11     | Immunizations                      | 24    | 8      |
| Asthma   | 17    | 10     | Nutrition/physical activity        | 9     | 4      |
| Dental health  | 14    | 11     | Developmental screening            | 3     | 2      |
| HIV/AIDS   | 12    | 10     | Well-child visits                  | 8     | 3      |
| Renal disease  | 11    | 8      | Hearing/vision screening           | 4     | 4      |
| Otitis media with effusion   | 8     | 5      | Other screening                    | 2     | 2      |
| Lower respiratory infection<br>(includes community-acquired pneumonia) | 7     | 6      | Hospital-based outcomes            |       |        |
| Acute otitis externa   | 7     | 3      | Readmission                        | 4     | 2      |
| Acute gastroenteritis  | 6     | 5      | Length of stay                     | 1     | 1      |
| Substance abuse (tobacco/alcohol)                                      | 5     | 3      | Mortality                          | 10    | 7      |
| Atopic dermatitis  | 4     | 4      | General quality/safety             | 4     | 4      |
| Diabetes mellitus  | 4     | 3      | Hospital-acquired infections       | 20    | 11     |
| Attention-deficit/hyperactivity disorder                               | 4     | 1      | Adverse conditions/events          | 20    | 13     |
| Chlamydia  | 4     | 1      | Systems of care                    |       |        |
| DVT management   | 3     | 3      | Nursing care                       | 4     | 4      |
| Oncologic diagnoses  | 3     | 3      | Care coordination                  | 8     | 7      |
| Upper respiratory infection  | 3     | 1      | Transitions/discharges             | 6     | 6      |
| Pharyngitis  | 3     | 1      | Access to care                     | 8     | 7      |
| Appendicitis   | 1     | 1      | Emergency visits and processes     | 24    | 10     |
| Urinary tract infection  | 1     | 1      | Environmental                      | 4     | 4      |
| Ventriculoperitoneal shunts  | 1     | 1      | Patient satisfaction/surveys       | 9     | 7      |
| Retinopathy of prematurity   | 1     | 1      | Other diagnostics and therapeutics |       |        |
| Other condition specific   | 6     | 6      | Radiation studies                  | 20    | 14     |
|  |       |        | Surgical                           |       |        |
|  |       |        | Cardiac                            | 7     | 7      |
|  |       |        | General                            | 30    | 19     |
|  |       |        | Total measures                     | 386   | 257    |

**DISCUSSION**

Within the nationally promoted or required quality measure sets, we found approximately one-quarter were applicable to the pediatric population. The majority of these

pediatric measures are process measures, similar to the pattern previously described in adult populations.<sup>5</sup> Process measures consistently dominate the modern landscape of quality measurement,

reflective of the fact that they generally provide actionable targets and/or are conducive to data gathering over relatively short time cycles.<sup>16</sup> However, some skepticism remains surrounding the linkage of compliance with process measures and improved outcomes. Certainly, the use of vaccines to prevent life-threatening illness has been well-established<sup>17</sup>; in contrast, documentation of BMI has not clearly been linked to weight reduction, or even to the provision of more nutritional counseling.<sup>18,19</sup> Similarly, annual physical exams have not been distinctly linked to improved health outcomes in adult populations.<sup>20</sup> Within the category of process measures, we found that over three-quarters were intended to address underuse of services. This is despite the fact that estimates of waste in health care place medical overuse as one of the largest problems in both private and public sector care,<sup>21-23</sup> emphasizing an opportunity for more careful evaluation of the linkage between measurement and health services utilization. Given that resources to address gaps in care are directed toward those areas we are measuring and reporting, the paucity of overuse metrics may be 1 driver for why deimplementation of contradicted and unproven practices has lagged behind other efforts.<sup>24</sup> For instance, recent studies in adult

**TABLE 4** Comparison of Quality Measure Content to Prevalence of Pediatric Conditions Across Care Settings

| Condition  | Rank Among Condition-Specific Measures | No. of Total Measures/% Total | Rank Among Outpatient Visits | Rank Among Inpatient Visits      | Rank Among Emergency Visits |
|--|--|-------------------------------|------------------------------|----------------------------------|-----------------------------|
| Routine health maintenance   | —                                      | 50/13.0                       | 1                            | NR                               | NR                          |
| Depression/anxiety   | 1                                      | 20/5.2                        | 6                            | 10                               | NR                          |
| Asthma   | 2                                      | 17/4.4                        | 7                            | 2                                | 5                           |
| Otitis media   | 6                                      | 8/2.1                         | 4                            | NR                               | 3                           |
| Lower respiratory infection<br>(includes community-acquired pneumonia) | 7                                      | 7/1.8                         | 11                           | Pneumonia: 1<br>Bronchiolitis: 3 | 10                          |
| Gastroenteritis  | 9                                      | 6/1.6                         | NR                           | Dehydration: 6                   | Nausea/vomiting: 6          |
| Oncologic diagnoses  | 13                                     | 3/0.8                         | NR                           | Chemotherapy: 8                  | NR                          |
| Diabetes mellitus  | 11                                     | 4/1.0                         | 5                            | NR                               | NR                          |
| Upper respiratory infection  | 15                                     | 3/0.8                         | 2                            | NR                               | 1                           |
| Appendicitis   | 16                                     | 1/0.3                         | NR                           | 4                                | NR                          |
| Urinary tract infection  | 16                                     | 1/0.3                         | NR                           | 7                                | NR                          |

NR, not ranked; —, not categorized as condition-specific (represents all general preventive care).

populations have identified greater gains in physician performance on underuse metrics than those related to overuse.<sup>22</sup> Encouragingly, we did find a greater percentage of process metrics devoted to overuse of services in pediatrics (13%) than was identified in the categorization of adult measures (7%).<sup>5</sup>

Although outcome measures are often viewed as superior to process measures given that they more directly reflect patient health status, such measures also pose some challenges. There are many factors that influence patient outcomes, requiring risk adjustment to meaningfully interpret performance.<sup>16</sup> Data must be collected over longer periods of time, and the outcomes measured are sometimes quite rare, especially in children. Twenty-nine of the 83 unique (45/118 total) outcome measures we identified were related to hospital-acquired conditions or surgical complications; 7 additional unique measures (9 total) focused specifically on mortality. Such outcomes are undeniably important, but reflect a small component of pediatric health care, and low event rates make detection of true differences in quality a challenge.<sup>25</sup> A vast majority of children are in excellent or very good health<sup>26</sup>; mortality in pediatrics is fortunately quite rare,<sup>27</sup> and hospitalization for illness is rare when compared with adults.<sup>28</sup> Outcome measures are also not specific; identifying an adverse outcome does not necessarily clearly identify a target area for improvement given the complexity of the processes leading to such events. With many existing outcome measures focusing on infrequent childhood events, we are left with lingering questions as to whether these measures truly are superior indicators of children's health care quality.

Our evaluation of measure content is intended to provide a broad overview of conditions represented among

available metrics. We do not suggest that a direct correlation should exist between pediatric disease frequency and representative measures, nor would we propose that greater numbers of measures are always advantageous. However, given the focus currently placed on quality measurement, it is important to understand what areas of pediatric health care are being captured across measure sets. We found strong representation of several prevalent and impactful pediatric conditions. Twenty total measures (11 unique) were devoted to depression; mental health diagnoses rank sixth among outpatient visits and tenth among inpatient visits and are increasing in prevalence among children and adolescents.<sup>13,15,29</sup> Seventeen total measures (10 unique) were devoted to asthma, which ranks among the top 10 diagnoses seen in inpatient, outpatient, and emergency department settings among children.<sup>13-15</sup> There are measures designed to discourage excessive antibiotic use in common pediatric conditions, such as acute otitis media, otitis externa, upper respiratory infection, and pharyngitis, representing a focus on antimicrobial stewardship in light of increasing concerns for antibiotic resistance and other concerns associated with antibiotic overuse.<sup>30,31</sup> The preponderance of measures addressing health care maintenance is understandable given the frequency of pediatric well-child care, although the relationship between well-child care (apart from vaccinations) and health outcomes remains unclear.<sup>20</sup> The 24 total (8 unique) measures related to immunizations represent a critically important component of pediatric well-child care.

Despite the above, we feel there are likely important gaps in the identified measure sets. For instance, there are comparatively few metrics devoted to otitis media, one of the

most common pediatric diagnoses, ranking third among pediatric emergency visits and fourth in outpatient visits. Improvement in rigor around diagnostic criteria for otitis media has been suggested as an area of focus for additional gains in combatting antibiotic overuse,<sup>32,33</sup> and such efforts could be spurred by measure development. In addition, community-acquired pneumonia and bronchiolitis may be underrepresented given their prevalence and well-documented variation in care, as well as the proven effectiveness of quality improvement initiatives for these conditions.<sup>15,34-36</sup> Attention-deficit/hyperactivity disorder also has comparatively few associated measures; this is an increasingly common and costly pediatric disorder associated with significant morbidity.<sup>37,38</sup> Of the 10 American Academy of Pediatrics' *Choosing Wisely* recommendations, which are intended to discourage low-value care practices, only 1 (avoidance of antibiotics for apparent viral respiratory illnesses) is addressed within the identified measure sets.<sup>39</sup> Important pediatric issues, such as avoidance of inappropriate pharmacologic management of gastroesophageal reflux and avoidance of cough and cold medications in young children, are absent. None of the 5 perinatal *Choosing Wisely* topics are addressed.<sup>40</sup> Measures relating specifically to medically complex children are scarce; this area was prioritized for measure development >10 years ago, and yet remains underrepresented.<sup>3</sup> Medically complex children account for a high proportion of hospital admissions and health care costs, and their care has been shown to be quite variable.<sup>15,41</sup> Focus on this population has the potential to improve quality and substantially reduce costs. There are no measures that specifically address injury, an important pediatric topic that accounts for



significant emergency department visits and is the leading cause of death in children in the United States.<sup>14,42</sup>

Despite the inherent complexity of the task, objective measurement of quality should remain a priority in pediatrics, and we intend for this analysis to contribute to additional improvement and innovation. In a recent commentary, Berwick<sup>7</sup> called for an overall reduction of quality measures in use by 75% over a 6-year time span. The pediatric-relevant measures we have described in this article represent only a fraction of the total measures, but among these, we feel there may still be room for substantial reduction. The systems required to gather and analyze data on such a large number of measures are complex and costly, and the volume of measures in use may diminish any ability to address local concerns. We would suggest first eliminating redundancy by targeting metrics designed to measure similar aspects of care, but using subtly differing methodology. Careful analysis of measures developed for adult populations yet extrapolated to pediatrics without additional study should also be performed. For instance, we identified 3 measures related to hospital readmissions; this is a topic that has not been carefully examined in pediatric populations, and there is conflicting data surrounding the appropriateness of these measures in children's health care.<sup>43-45</sup> Process measures should be assessed for linkage to outcomes, and those that do not clearly contribute to improved outcomes could be eliminated. Finally, measures should

also be evaluated for association with unintended consequences. Many have expressed concerns about measurement "gaming," or manipulating documentation intentionally to improve performance on measures without altering the actual care delivery. For example, might physicians intentionally classify an illness incorrectly to justify antibiotic use? Careful study of practice patterns may be able to elucidate such trends, and measures associated with detrimental changes should be revised or eliminated.

With regard to the development of new measures, we would advocate for a careful avoidance of simple extrapolation of adult metrics. Development of measures related to prevalent and costly areas of pediatric care should be prioritized, as should those with the ability to impact long-term health outcomes. We identified some measures addressing social determinants of health, such as those assessing children who live in communities or attend schools that are perceived as safe. Although these components of pediatric care are inherently difficult to measure, they address key issues that may be overlooked by focusing only on physical health, and their potential role to effect positive changes that may impact future health outcomes should be carefully considered. Measures should be adopted as national quality metrics only when they are well-grounded in pediatric-specific literature, and ideally after they have been tested and validated in multiple settings.

Our study has some limitations. First, we excluded fully condition-specific

measure sets from our analysis, such as those developed by specialty groups for cystic fibrosis or inflammatory bowel disease. Additionally, we included measures for diseases that are rare in pediatric patients if there were no explicit age exclusions within the measure; for example, HIV/AIDS. In this case, what may seem to be an overrepresentation of measures for a pediatric population is reflective of the importance of this condition in adult populations. Categorization of measures will always be at least partially subjective, and there were many metrics that may have fit well into >1 category; to add rigor to this process, the measures were reviewed independently by at least 2 authors and discrepancies were resolved through full author group consensus.

## CONCLUSIONS

Quality measures applicable to children in the United States are mostly process measures and are mostly intended to measure underuse of health care services. Although some areas of pediatric health care are well represented, many common and costly pediatric conditions have few or no available measures, and not all measures are linked to improved health outcomes. A careful analysis of the impact of quality measures, specifically on pediatric health care, is warranted.

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## REFERENCES

- Institute of Medicine; Committee on Quality of Health Care in America. *Crossing the Quality Chasm: a New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.
- Mathias JS, Baker DW. Developing quality measures to address overuse. *JAMA*. 2013;309(18):1897–1898
- Shaller D. Implementing and using quality measures for children's health care: perspectives on the state of the practice. *Pediatrics*. 2004;113(1 pt 2):217–227
- McGlynn EA, Kerr EA. Creating safe harbors for quality measurement innovation and improvement. *JAMA*. 2016;315(2):129–130
- Newton EH, Zazzera EA, Van Moorsel G, Sirovich BE. Undermeasuring overuse—an examination of national clinical performance measures. *JAMA Intern Med*. 2015;175(10):1709–1711
- Kizer KW, Kirsh SR. The double edged sword of performance measurement. *J Gen Intern Med*. 2012;27(4):395–397
- Berwick DM. Era 3 for medicine and health care. *JAMA*. 2016;315(13):1329–1330
- Narayan A, Cinelli C, Carrino JA, et al. Quality measurements in radiology: a systematic review of the literature and survey of radiology benefit management groups. *J Am Coll Radiol*. 2015;12(11):1173–1181.e23
- Haller G, Stoelwinder J, Myles PS, McNeil J. Quality and safety indicators in anesthesia: a systematic review. *Anesthesiology*. 2009;110(5):1158–1175
- Alessandrini E, Varadarajan K, Alpern ER, et al; Pediatric Emergency Care Applied Research Network. Emergency department quality: an analysis of existing pediatric measures. *Acad Emerg Med*. 2011;18(5):519–526
- Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q*. 1966;44(3):166–206
- Agency for Healthcare Research and Quality. National Quality Measures Clearinghouse: Domain Definitions. Available at: <https://www.qualitymeasures.ahrq.gov/help-and-about/summaries/domain-definitions>. Accessed June 20, 2016
- Binns HJ, Lanier D, Pace WD, et al; Primary Care Network Survey (PRINS) Participants. Describing primary care encounters: the Primary Care Network Survey and the National Ambulatory Medical Care Survey. *Ann Fam Med*. 2007;5(1):39–47
- Montalbano A, Rodean J, Kangas J, Lee B, Hall M. Urgent Care and Emergency Department Visits in the Pediatric Medicaid Population. *Pediatrics*. 2016;137(4):e20153100
- Leyenaar JK, Ralston SL, Shieh MS, Pekow PS, Mangione-Smith R, Lindenauer PK. Epidemiology of pediatric hospitalizations at general hospitals and freestanding children's hospitals in the United States. *J Hosp Med*. 2016;11(11):743–749
- Rubin HR, Pronovost P, Diette GB. The advantages and disadvantages of process-based measures of health care quality. *Int J Qual Health Care*. 2001;13(6):469–474
- Enhancing the work of the Department of Health and Human Services national vaccine program in global immunization: recommendations of the National Vaccine Advisory Committee: approved by the National Vaccine Advisory Committee on September 12, 2013. *Public Health Rep*. 2014;129(suppl 3):12–85
- Shungu N, Miller MN, Mills G, et al. Reminder cards improve physician documentation of obesity but not obesity counseling. *Fam Med*. 2015;47(10):789–793
- Shaikh U, Nelson R, Tancredi D, Byrd RS. Presentation of body mass index within an electronic health record to improve weight assessment and counselling in children and adolescents. *Inform Prim Care*. 2010;18(4):235–244
- Krogsbøll LT, Jørgensen KJ, Grønhøj Larsen C, Gøtzsche PC. General health checks in adults for reducing morbidity and mortality from disease. *Cochrane Database Syst Rev*. 2012;(10):CD009009
- Berwick DM, Hackbarth AD. Eliminating waste in US health care. *JAMA*. 2012;307(14):1513–1516
- Kale MS, Bishop TF, Federman AD, Keyhani S. Trends in the overuse of ambulatory health care services in the United States. *JAMA Intern Med*. 2013;173(2):142–148
- Morgan DJ, Brownlee S, Leppin AL, et al. Setting a research agenda for medical overuse. *BMJ*. 2015;351:h4534
- Prasad V, Ioannidis JP. Evidence-based de-implementation for contradicted, unproven, and aspiring healthcare practices. *Implement Sci*. 2014;9:1
- Berry JG, Zaslavsky AM, Toomey SL, et al. Recognizing Differences in Hospital Quality Performance for Pediatric Inpatient Care. *Pediatrics*. 2015;136(2):251–262
- Centers for Disease Control and Prevention. Summary health statistics: National Health Interview Survey. Available at: [https://ftp.cdc.gov/pub/Health\\_Statistics/NCHS/NHIS/SHS/2014\\_SHS\\_Table\\_C-5.pdf](https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2014_SHS_Table_C-5.pdf). Accessed January 10, 2017
- Centers for Disease Control and Prevention. National Center for Health Statistics FastStats. Child health. Available at: <https://www.cdc.gov/nchs/fastats/child-health.htm>. Accessed December 12, 2016
- Witt WP, Weiss AJ, Elixhauser A. Overview of hospital stays for children in the United States, 2012. Healthcare Cost and Utilization Project Statistical Brief 127. Available at: [www.hcup-us.ahrq.gov/reports/statbriefs/sb187-Hospital-Stays-Children-2012.jsp](http://www.hcup-us.ahrq.gov/reports/statbriefs/sb187-Hospital-Stays-Children-2012.jsp). Accessed January 12, 2017
- Perou R, Bitsko RH, Blumberg SJ, et al; Centers for Disease Control and Prevention. Mental health surveillance among children—United States, 2005–2011. *MMWR Suppl*. 2013;62(2):1–35
- Goldman JL, Newland JG. New horizons for pediatric antibiotic stewardship. *Infect Dis Clin North Am*. 2015;29(3):503–511
- Langdon A, Crook N, Dantas G. The effects of antibiotics on the

- microbiome throughout development and alternative approaches for therapeutic modulation. *Genome Med.* 2016;8(1):39
32. Grevers G; First International Roundtable ENT Meeting Group. Challenges in reducing the burden of otitis media disease: an ENT perspective on improving management and prospects for prevention. *Int J Pediatr Otorhinolaryngol.* 2010;74(6):572–577
  33. Lieberthal AS, Carroll AE, Chonmaitree T, et al. The diagnosis and management of acute otitis media [published correction appears in *Pediatrics*.133(2):346]. *Pediatrics.* 2013;131(3). Available at: [www.pediatrics.org/cgi/content/full/131/3/e964](http://www.pediatrics.org/cgi/content/full/131/3/e964)
  34. Quinonez RA, Garber MD, Schroeder AR, et al. Choosing wisely in pediatric hospital medicine: five opportunities for improved healthcare value. *J Hosp Med.* 2013;8(9):479–485
  35. Parikh K, Biondi E, Nazif J, et al; Value in Inpatient Pediatrics Network Quality Collaborative For Improving Care In Community Acquired Pneumonia. Multicenter collaborative to improve community-acquired pneumonia care in hospitalized children [published online ahead of print February 1, 2017]. *Pediatrics.* doi:10.1542/peds.2016-1411
  36. Ralston SL, Garber MD, Rice-Conboy E, et al; Value in Inpatient Pediatrics Network Quality Collaborative for Improving Hospital Compliance with AAP Bronchiolitis Guideline (BQIP). A multicenter collaborative to reduce unnecessary care in inpatient bronchiolitis. *Pediatrics.* 2016;137(1):e20150851
  37. Visser SN, Danielson ML, Wolraich ML, et al. Vital signs: National and state-specific patterns of attention deficit/hyperactivity disorder treatment among insured children aged 2-5 Years - United States, 2008-2014. *MMWR Morb Mortal Wkly Rep.* 2016;65(17):443–450
  38. Bui AL, Dieleman JL, Hamavid H, et al. Spending on children's personal health care in the United States, 1996-2013. *JAMA Pediatr.* 2017;171(2):181–189
  39. American Academy of Pediatrics. Ten things physicians and patients should question. Available at: [www.choosingwisely.org/societies/american-academy-of-pediatrics/](http://www.choosingwisely.org/societies/american-academy-of-pediatrics/). Accessed September 2, 2016
  40. Ho T, Dukhovny D, Zupancic JA, Goldmann DA, Horbar JD, Pursley DM. Choosing wisely in newborn medicine: five opportunities to increase value. *Pediatrics.* 2015;136(2). Available at: [www.pediatrics.org/cgi/content/full/136/2/e482](http://www.pediatrics.org/cgi/content/full/136/2/e482)
  41. Ralston SL, Harrison W, Wasserman J, Goodman DC. Hospital variation in health care utilization by children with medical complexity. *Pediatrics.* 2015;136(5):860–867
  42. Centers for Disease Control and Prevention. Ten leading causes of death and injury. Available at: [www.cdc.gov/injury/wisqars/leadingcauses.html](http://www.cdc.gov/injury/wisqars/leadingcauses.html). Accessed September 2, 2016
  43. Berry JG, Toomey SL, Zaslavsky AM, et al. Pediatric readmission prevalence and variability across hospitals [published correction appears in *JAMA*. 2013;309(10):986]. *JAMA.* 2013;309(4):372–380
  44. Bardach NS, Vittinghoff E, Asteria-Peñaloza R, et al. Measuring hospital quality using pediatric readmission and revisit rates. *Pediatrics.* 2013;132(3):429–436
  45. Auger KA, Simon TD, Cooperberg D, et al. Summary of STARNet: Seamless Transitions and (Re) admissions Network. *Pediatrics.* 2015;135(1):164–175



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