Current Psychiatry Reports (2019) 21: 6
https://doi.org/10.1007/s11920-019-0986-3

PUBLIC POLICY AND PUBLIC HEALTH (G NORQUIST, SECTION EDITOR)

National Child Mental Health Quality Measures: Adherence Rates and Extent of Evidence for Clinical Validity

Bonnie T. Zima[1] · Juliet B. Edgcomb[1] · Samantha A. Shugarman[2]

Published online: 31 January 2019

Abstract

Purpose of Review To provide an overview of the selection process and annual updates of the child mental health measures within the Child Core Set, describe national and statewide adherence rates, and summarize findings from a systematic literature review examining measure adherence rates and whether adherence is associated with improved clinical outcomes.

Recent Findings Five national quality measures target child mental health care processes. On average, national adherence varied widely by state, and performance did not substantially improve during the past 5 years. Mean national adherence rates for the two measures related to timeliness of care were below 50%. For each measure, scientific evidence to support the association between adherence and improved clinical outcomes was scarce.

Summary Investment in academic-agency partnered research to standardize methods for publicly reporting adherence to national child mental health quality measures and validation of these measures should be a national priority for child healthcare research.

Keywords Child mental health · Quality measures · Adherence · Validity

Introduction

Quality measurement is envisioned as a key driver for the transformation of the health care system [1•, 2], yet measuring the quality of mental health care, particularly among children, lags behind other disciplines [3, 4]. The limited number of well-accepted mental health quality measures places psychiatry "at a disadvantage in demonstrating value and moving forward with the implementation of meaningful provider performance ratings and pay for performance" [5••]. For children, priority is placed on prevention and early intervention [6, 7], thus demonstration of the value of quality mental health care ideally requires examining the association between measure adherence and long-term outcomes, such as lack of progression from symptoms to psychiatric disorder and reduction of risk for adverse adult outcomes. Quality measurement of child mental health care also poses additional methodologic challenges such as adjusting for development, parent- and family-level contextual factors (e.g., maternal depression), and use of multiple child-serving care sectors (e.g., schools, child welfare).

Findings from earlier studies suggest that the strength of scientific evidence supporting the clinical validity of mental health quality measures is weak [8••, 9, 10]. Using the Oxford Centre for Evidence-based Medicine to rate the strength of scientific evidence, the child mental health measure related to follow-up care after hospitalization for a mental illness received a B rating corresponding to individual cohort studies or systematic reviews, and the ADHD follow-up care measure received a D rating, corresponding to inconsistent or inclusive evidence [4]. In addition, very few mental health quality measures assess outcomes [5••], and for children, the five national quality measures are related to adherence to recommended care processes. Together with our medical colleagues, there is a national call to simplify quality measurement by shifting the focus to assessment of functional outcomes [11], such as "recovery" for adults [5••] and healthy development for children [12].

This article is part of the Topical Collection on *Public Policy and Public Health*

✉ Bonnie T. Zima
bzima@mednet.ucla.edu

[1] UCLA-Semel Institute for Neuroscience and Human Behavior, Los Angeles, CA, USA

[2] American Psychiatric Association, Washington, DC, USA

To accelerate quality measurement for children, provisions within the Children's Health Insurance Program Reauthorization Act (CHIPRA) of 2009 stipulated improvements to the delivery of quality of care and health outcomes for children under the Child Health Insurance Program (CHIP) and Medicaid state program [13]. This landmark legislation impacts more than 35 million children which comprise 50.6% of all CHIP and Medicaid beneficiaries [14]. Within a relatively short timeframe, CHIPRA required the Department of Health and Human Services (HHS) to publish the initial Children's Core Set of measures in 2011, with annual updates released beginning in 2013 [15]. Since the release of the initial Child Core Set in 2011, Medicaid and CHIP state programs have voluntarily reported quality data to CMS on up to 27 measures related to primary care and preventive care (n = 10), maternal and perinatal health (n = 7), behavioral health (n = 5), care for acute and chronic conditions (n = 2), dental and oral health (n = 2), and experiences of care (n = 1) [15]. Beginning in 2024, state reporting of quality measures from the Child Core Set will be mandatory, as stipulated by the 2018 Bipartisan Budget Act which included a 4-year funding extension to CHIP [16].

Yet, despite these health policy levers to stimulate measurement-driven quality care for children, the following questions remain: Does measurement of recommended child mental health care processes substantially drive improvement? If so, does adherence to child mental health quality measures relate to improvement in clinical outcomes that are meaningful? To begin to address these questions, we (1) provide an overview of the selection process and annual updates of the child mental health measures within the Child Core Set, (2) describe national and statewide adherence rates, and (3) summarize findings from a systematic literature review examining measure adherence rates and whether adherence is associated with improved clinical outcomes. Together, implications from these findings are synthesized to identify key challenges for achieving the national vision of healthcare system transformation through measurement-driven quality care for child mental health.

Selection and Annual Updates of Mental Health Measures in the Child Core Set

To bolster the quality of the measures considered for inclusion in the Child Core Set, and to align with existing policies and procedures in other public and private payer quality programs, the Department of Health and Human Services (HHS) receives recommendations from the congressionally appointed National Quality Forum (NQF)-convened Measures Application Partnership (MAP). MAP is a multi-stakeholder partnership which provides guidance to HHS on the selection of performance measures for use in federal health programs [17]. Each year, through the Medicaid Child Task Force, MAP makes recommendations to strengthen the Child Core Set. These recommendations are informed by MAP's Measure Selection Criteria which place priority on NQF endorsement, addressing the National Quality Strategy's Triple Aims, responsiveness to specific program goals and requirements, appropriate mix of measure types, capacity to measure person- and family-centered care and services, consideration for healthcare disparities and cultural competency, and parsimony and alignment (e.g., efficient use of resources for data collection and reporting, alignment across programs) [17]. Weighed into the selection decision process are also the experiences of the States regarding implementation of data collection, analysis, and reporting of measure adherence rates.

From this process, five child mental health quality measures are in the 2018 Child Core Set, of which two were from the initial core set and three were added respectively to the 2016, 2017, and 2018 core sets [15]. The original two measures were related to follow-up care for stimulant medication treatment for children with attention deficit hyperactivity disorder (ADHD), and follow-up care after hospitalization for mental illness at 7 and 30 days. The newly added measures focus on use of multiple concurrent antipsychotic medications, trial of first-line psychosocial care prior to prescription of an antipsychotic medication, and screening for depression and follow-up care that was adapted for adolescents. In 2017, a measure related to suicide risk assessment for children and adolescents with major depression was removed because its impact was reduced due to a narrowly defined target population and was replaced with a more recently developed measure on depression screening and follow-up care [17].

Since MAP's initial set of recommendations on the 2015 Child Core Set, mental health has been included as a high priority gap area, targeting "access to outpatient and ambulatory mental health services, emergency department use for behavioral health, and behavioral health functional outcomes that stem from trauma-informed care" [18]. NQF's convened MAP final report released in August 2017, "Strengthening the Core Set of Healthcare Quality Measures for Children Enrolled in Medicaid and CHIP, 2017" [17], also included information on Early and Periodic Screening, Diagnostic and Treatment (EPSDT) coverage, and Child Core Set measure alignment. However, the alignment did not include mental health measures.

State-Reported Measure Adherence Rates

For each national child mental health quality measure, the most recently reported mean national adherence rates and statewide range are summarized in Table 1. For the ADHD follow-up care measure, the national mean percentage of children ages 6 to 12 years who received at least one follow-up

Table 1 National mean adherence rates and statewide variation by national child mental health quality measure in FFY 2016

Measure name	Child core set year	NQF no.	Measure steward	Level of measurement	Description	Mean adherence (%)		
						National	Statewide range	Change from FFY 2012[a]
						(*n* = 40 states)		(*n* = 29 states)
Follow-up care for children prescribed attention-deficit/-hyperactivity disorder (ADHD) medication	2011	0108	NCQA	Health plan	Percentage of children 6–12 years of age and newly dispensed a medication for attention-deficit/hyperactivity disorder (ADHD) who had appropriate follow-up care. Two rates are reported:			
					Initiation phase: percentage of children who had one follow-up visit with a practitioner with prescribing authority during the 30-day initiation phase	48.0	13.9–66.7	+ 5.9
					Continuation and maintenance phase: percentage of children who remained on ADHD medication for at least 210 days and who, in addition to the visit in the initiation phase, had at least two additional follow-up visits with a practitioner within 270 days (9 months) after the initiation phase ended	58.6[b]	34.4–97.5[b]	+ 5.7
						(*n* = 42 states)		(*n* = 27 states)
Follow-up after hospitalization for mental illness: ages 6–20	2011	0576	NCQA	Health plan	Percentage of discharges for children ages 6–20 who were hospitalized for treatment of selected mental illness diagnoses and who had a follow-up visit with a mental health practitioner. Two rates are reported:			
					7-day follow-up: percentage of discharges for which children received follow-up within 7 days after discharge	47.5	6.4–88.9	− 2.5
					30-day follow-up: percentage of discharges for which children received follow-up within 30 days after discharge	66.7	28.1–93.2	− 0.2
						(*n* = 32 states)		
Use of multiple concurrent antipsychotics in children and adolescents	2016	Not endorsed	NCQA	Health plan	Percentage of children and adolescents ages 1 to 17 who were treated with antipsychotic medications and who were on two or more concurrent antipsychotic medications for at least 90 consecutive days during the measurement year	4.6[c]	0–39.0	Not available
Use of first-line psychosocial care for children and adolescents on antipsychotics	2017	2801	NCQA	Health plan	Percentage of children and adolescents ages 1–17 who had a new prescription for an antipsychotic medication and had documentation of psychosocial care as first line treatment	Not available		
Screening for depression and follow-up plan: ages 12–17	2018	0418/0418e[d]	CMS[e]	Youth	Percentage of beneficiaries ages 12–17 screened for clinical depression on the date of the encounter using an age appropriate standardized depression screening tool, and if positive, a follow-up plan is documented on the date of the positive screen	Not available		

Data source: 2017 Annual Reporting on the Quality Care for Children in Medicaid and CHIP (FFY 2016): Performance on the Child Core Set Measures for FFY 2016, 2015, 2014, 2013 (zip files)

FFY federal fiscal year (begins October 1st in prior year and ends on September 30th of index year), *NQF* National Quality Forum, *NCQA* National Committee for Quality Assurance, *CMS* Centers for Medicare & Medicaid Services

[a] Difference between national mean adherence rates for FFY 2016-FFY 2012

[b] Overestimate rate for total sample because denominator excludes children who did not complete 210 days of continuous stimulant medication treatment

[c] Lower rates are better

[d] Measure also includes a version for adults with same name but specifies: "Ages 18 and older." Both versions are conceptualized as one measure in the 2018 Behavioral Health Core Set

[e] Developed by Quality Insights, Inc. as a special project under the Quality Insights' Medicare Quality Improvement Organization (QIO) contract HHSM-500-2005-PA001C with the Centers for Medicare & Medicaid Services

visit within the initiation phase (IP), as defined as 30 days since start date of newly prescribed ADHD medication, was only 48%, and the mean percentage varied widely by state ranging from 13.9% in Iowa to 66.7% in Wyoming. This reported adherence rate should be interpreted cautiously because it is reported with the caveat that the "State had challenges tracking continuous enrollment due to difficulties with integrated eligibility system" [19]. For the 9-month Continuous and Maintenance (C&M) phase, an average of 58.6% of children had at least two follow-up visits within the 270 days (9 months) after the 30-day initiation phase. The mean percentage rate also varied by state, ranging from 34.4% in Colorado to 97.5% in Alabama.

However, these rates of follow-up ADHD medication care are potentially overestimated because the denominator excludes a substantial proportion of children that do not receive continuous ADHD medication treatment, an important indicator of quality ADHD care. In a large managed care Medicaid plan, 60% of children receiving care in primary care or specialty mental health had poor stimulant medication prescription persistence (i.e., < 67% of total day supply available) [20]. Using claims data from Alabama's Children's Health Insurance Program, 64% did not meet criteria for continuous medication treatment [21••]. Further, the specifications allow for one of the follow-up visits to occur by telephone, raising the question of whether medication safety monitoring during the 9-month follow-up time period is sufficient [22].

In comparison to the national mean adherence rate in federal fiscal year (FFY) 2012, the average percentage for adherence to the ADHD follow-up care measure at both phases in FFY 2016 improved by almost 6% (IP 5.9%; C&M 5.7%). During the 5-year time period, mean measure adherence rates by year varied and there were overall small changes by year ranging from − 1.4 to 3.5% for the IP and − 0.1 to 5.3% for the C&M phase (FFY 2012–2013: IP 3.5%, C&M 1.1%; FFY 2013–2014: IP − 1.4%, C&M − 0.1%; FFY 2014–2015: IP 0.7%, C&M − 0.6%; FFY 2015–2016: IP 3.1%, C&M 5.3%).

For the follow-up visit after hospitalization for mental illness measure, on average, 47.5% of children had a follow-up visit within 7 days of discharge and 66.7% had at least one visit within 30 days of discharge. Statewide variation was wide, ranging from 6.4% in Alaska to 88.9% in Alabama for 7-day follow-up visits and from 28.1% in Alaska to 93.2% in Alabama for 30-day follow-up visits. Since FFY 2012, the mean adherence rate for seven-day follow-up slightly decreased by 2.5%, and there was very little change in the difference of the 30-day follow-up mean adherence rates (7-day − 2.5; 30-day − 0.2). Across the 5-year time period, changes in mean adherence rates were very small ranging from − 3.4 to 4.3% for 7-day follow-up and − 1.4 to 3.9% for 30-day follow-up (FFY 2012–2013: 7-day − 3.4%, 30-day − 1.8%; FFY 2013–2014: 7-day − 1.8%, 30-day − 0.9%; FFY 2014–2015: 7-day 4.3%, 30-day 3.9%; FFY 2015–2016: 7-day − 1.6%, 30-day − 1.4%).

Using these data to identify target areas for quality improvement is problematic because delivery of Medicaid-funded follow-up care in the community may include school-based programs and primary care that may underreport provision of specialty mental health care services. The hospital may also have little authority over the delivery of publicly funded community mental health programs including scheduling of outpatient follow-up appointments prior to discharge. This measure serves as an excellent example of a quality measure developed for use at the health plan level that assumes responsibility for coordination of inpatient and outpatient care within a health care system and the challenges related to attribution when states apply this measure to Medicaid-funded child mental health services.

Data on publicly reported state adherence rates for the remaining three national quality measures are limited. The mean percentage of children and youth receiving concurrent antipsychotic medication in FFY 2016 was 4.6%, ranging from 0 in Iowa to 39.0% in West Virginia. Mean adherence rates for the two quality measures added to the Child Core Set since 2017 are pending.

Overall, these publicly reported adherence rates should be interpreted cautiously because the methods for data collection and reporting varied widely by state [19]. States differed in the types of public insurance included (Medicaid: fee-for-service, managed care; primary care case management, CHIP), data capture approach, operational definitions of some of the specifications, and whether or not they reported data from the state's External Quality Review Organization (EQRO). Estimates of change in mean adherence rates over the past 5 years are limited because only two measures were in the initial Child Core Set and the number of states reporting varied across fiscal years. To support public reporting, CMS has offered technical support since the release of the initial Child Core Set in 2011, ranging from implementation and data analysis of a subset of the Child Core Set to assistance applicable to most quality measures within the Core Set [23].

Nevertheless, based on these data, CMS identified six high-performing states as defined as meeting the following minimum criteria: (1) report data for at least Medicaid enrollees, (2) report on at least 10 of the 15 measures, and (3) adherence rates in the 75% quartile for at least half ($n = 8$) measures [24]. Success was attributed to three activities: (1) state-wide enforcement of health plan accreditation (e.g., URAC (formerly named the Utilization Review Accreditation Commission), National Committee on Quality Assurance (NCQA)), which involves measure reporting and alignment between the accreditor and Child Core Set measures; (2) contracts with managed care organizations or administrative services organizations that administer measure reporting programs and include measures within the Child Core Set (and access to

technical assistance programs that supported accurate reporting); and (3) participation in public reporting and financial incentive programs that reward or penalize health plans based on their reporting participation.

Implications are that states may be more likely to report child mental health quality measures that are also an NCQA Healthcare Effectiveness Data and Information Set (HEDIS) measure, a widely used set of performance measures in the managed care industry used for accreditation. The most recently added measure on screening for depression and follow-up developed strictly for CMS, rather than URAC, NCQA, or other accreditation programs, may be at a disadvantage because public reporting may require additional resources. In addition, the four original HEDIS child mental health quality measures were tested and NQF-endorsed based on performance, scientific acceptability, feasibility, and utility developed using the health plan as the unit of analysis. However, CMS and other program administrators include measures in quality programs, like the Child Core Set, programs that assess care at the facility-level but implemented at the provider—or health plan—level. This variation threatens the quality of the programs' data integrity, data used for public reporting, and data used to award financial incentives (or penalties). Further, though guidance for states to fully comply with mandatory reporting by 2024 has yet to be released, it is anticipated that variations in reporting (i.e., number of measures implemented, quality of the data collected, methods available to report the data, or analyses of the aggregate data) among states will remain unless funding and technical assistance are earmarked to assist lesser performing states to develop the infrastructure to adequately analyze and report the measure data. Such variations will continue to make data comparisons between states challenging.

Literature Review

To enrich the context of the state-reported rates of adherence and to explore the extent measure adherence associated with improved clinical outcomes, we conducted a systematic review of empirical studies measuring adherence to each of the five national child mental health quality measures. The review methodology was defined a priori to data collection. Studies were selected using strict eligibility criteria and predefined constructs. The literature was screened for eligibility and selected for inclusion by the study's authors.

We conducted a systematic search of peer-reviewed empirical journal articles, published between January 1, 2013, to October 1, 2018, using PubMed and Google Scholar databases. The literature search was restricted to the past 5 years, to ensure that the measures adopted by the studies were relevant to the most recent five national child mental health quality measures. The reference lists of eligible studies were tracked and reviewed for further relevant studies. A two-component search term string was used, combined with Boolean operations to exclude studies of adults, animal studies, case studies, qualitative reviews, books and book chapters, abstracts, and non-English language journals. The thesaurus of each respective database was utilized to modify terms included in our search. The final list of included studies was reached by consensus by two authors (BZ and JE).

Studies required to fulfill the following inclusion criteria: (1) Peer-reviewed articles that were sample size N was reported; and (2) prevalence of adherence to one of the five national child mental health measures was reported. We applied the following exclusion criteria: (1) studies that did not report data separately for children or transition age youth; (2) studies that reported adherence to a measure that was not aligned with a child mental health measure; (3) qualitative reviews of the literature; (4) studies assessing adherence within a group of children with a comorbid medical illness; and (5) intervention studies that did not evaluate adherence to the measure naturalistically at baseline prior to an intervention (e.g., studies that administered depression screening to all study participants at baseline were excluded). Where reported, we extracted numeric data on prevalence of adherence to each measure. Findings are summarized by child mental health quality measure in Table 2.

Follow-Up Care for Children Prescribed Attention-Deficit/Hyperactivity Disorder (ADHD) Medication

Seven studies evaluated adherence to the ADHD follow-up care measure. Sample size of each study ranged widely from 84 to 172,322 participants. Six of the studies were multi-site, one analyzed data from multiple practices within a single health system [30]. Study design was variable: Two studies were intervention studies (i.e., interventions to increase clinical decision support for ADHD management) [27, 29]. Five studies were retrospective analyses, three of claims data [21••, 26, 28••], and two of electronic health record data [25, 29].

Adherence to the ADHD follow-up measure varied widely, similar to the variability in the state-reported data. IP follow-up adherence ranged from 28 to 60.5% (reported in six studies). C&M follow-up adherence ranged from 37.4 to 71.0% (reported in five studies). All studies evaluated at least one predictor of adherence, but no individual predictor was evaluated by more than three studies. Three studies investigated sociodemographic variables (age, gender, and race/ethnicity) as potential moderators of adherence [21••, 26, 28••]. IP adherence were lower among African-American children compared with white children in two studies: 55.6% vs 60.5% [28••] and 33.3% vs 39.3% [21••]. Rates of adherence by sex were comparable in two studies: 50.6% (female) vs 49.3% (male) [26] and 40.9% (female) vs 46.8% (male) [21••]. One study found greater adherence to IP measures in academic practices (shorter time to first contact) [29]. Similar

to the state-reported measure adherence data, variation in findings between service environments, mental health and non-mental health providers, and patient demographics suggests the need for standardization in assessment methodology and measurement of potential confounds.

Two studies measured outcomes associated with adherence to the ADHD follow-up measure [21••, 25], and one study attempted to increase adherence via implementation of a planned care system intervention [30]. Studies reported mixed results of adherence to the measure. Blackburn reported that compared with children for whom the measure was not met, children for whom the measure was met had increased emergency department visits, higher medical and pharmacy costs, and higher total costs [21••]. Brinkman reported that adherence to the measure was associated with an increase in days covered by medication [25]. Adherence to the IP and C&M was both separately associated with more days covered with medication over the first year of treatment [25]. Time to first contact following initial prescription was inversely proportional to the number of days covered. Geltman (2014) implemented a planned care system intervention and found that this intervention did not significantly alter IP follow-up but increased C&M follow-up from 35 to 45% [30]. Given the scarce and mixed evidence for clinical outcomes associated with measure adherence, further work is needed to standardize measurement of IP and C&M adherence and investigate associations with potential clinical outcomes.

Follow-Up After Hospitalization for Mental Illness: Ages 6–20

For the follow-up visit after hospitalization for mental illness measure, four studies evaluated adherence. Sample size of each study ranged from 929 to 5713 and ages studied ranged from 4 to 20 years. All studies were retrospective claims analyses of Medicaid claims data. All studies collected data prior to 2013. Although the measure specifies assessment of follow-up visits at 7 and 30 days, only two studies measured adherence at these intervals [31, 34]. These studies reported adherence rate of 48.9 to 80% at 7 days, and 69.2–95% at 30 days. One study measured adherence at 60 days (56% adherence) [33], and one study used record of a discharge follow-up appointment as a proxy (40% adherence) [32].

Three studies evaluated predictors of adherence. Younger age was associated with increased adherence in two studies [31, 33]. Urban zones [31] and counties with more child and adolescent psychiatrists [33] were associated with increased adherence. However, Williams found no differences in adherence by geographic residence or age [32]. One study found that black children were less likely to receive follow-up services [31], a finding which has been replicated in studies of young adults receiving follow-up after hospitalization [47]. However, another study found no differences by race [32]. Together, these findings support future research examining adherence by sociodemographic characteristics and clinical severity to identify target populations for quality improvement. Moreover, although timely clinical follow-up after hospitalization is intuitively a beneficial practice, no studies reported an association between measure adherence and improved outcomes.

Use of Multiple Concurrent Antipsychotics in Children and Adolescents

Six studies evaluated frequency of antipsychotic polypharmacy. Sample size of each study varied from 677 to 16,131,721. Five studies were retrospective analyses, one study evaluated effect of a quality improvement intervention [40]. All studies except one [38] were multi-site studies. The percentage of children and adolescents receiving concurrent antipsychotics were reported in four studies and ranged moderately from 6.5 to 13.8%. One study counted the number of visits including one or more antipsychotic prescription, and reported a rate of 1.92 out of 100 visits [38]. Of note, this range of reported adherence was narrower than that described in the state-reported data; this may represent more restricted denominator inclusion criteria.

Three studies reported predictors of adherence, and all differed from each other in the type of reported predictors. One study reported that children in foster care or who received supplemental security income (SSI) were twice as likely to receive multiple concurrent antipsychotics, compared with children eligible for low-income Medicaid [36]. One study reported that children were more likely to be prescribed multiple concurrent antipsychotics if they were placed outside of the home or in foster care, or had previous hospitalization, greater number of psychiatric admissions, longer hospitalizations, or admissions for violence, aggression, psychosis, intellectual disability, or disruptive behavior disorder [37]. The same study reported that admission for suicidality, depression, or mood disorder was associated with lower risk of antipsychotic polypharmacy. Another study corroborated that psychotic disorders may be associated with increased risk of polypharmacy, in addition to older age, black race, and having a history of being prescribed one or more psychotropic medications [39]. One study evaluated a quality improvement intervention to decrease rates of polypharmacy and improve adherence to best practice guidelines, and reported that this intervention decreased prevalence of antipsychotic polypharmacy (by 24–30%) [36].

As each individual study reported a different potential predictor of adherence, generalizable conclusions on predictors of use of antipsychotic polypharmacy in children are limited. None of the six studies reported outcomes of adherence to the polypharmacy measure; thus, implications for improving clinical practice and trade-offs in adoption of this measure are not known.

Table 2 Adherence rates and relationship to outcomes based on systematic literature review 2013–2018 by child mental health quality measure

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
ADHD follow-up care								
Blackburn [21••]	1999–2012	Retrospective claims analysis	Alabama Children's Health Insurance Program; Medicaid	10,822	6–12	-Initiation phase follow-up within 30 days: 38.3% adherence -Continuation phase follow-up: 37.4% adherence	Among black children eligible for measure calculation, 9.8% met the measure compared with 15.8% of white children. Otherwise, characteristics (age, gender, fee group, urban vs rural, measurement year) between children meeting and not meeting the measure did not differ significantly	When measure met ($N = 1083$), children had more emergency visits (26.1% vs 21.9%, $p = 0.002$), and higher medical and pharmacy costs ($1698 vs $1160; $1678 vs $916; $p < 0.001$) and higher total costs ($3376 vs $2076, $p < 0.001$)
Brinkman [25]	2010–2012	Retrospective medical record analysis	Random sample of medical records from 50 pediatric practices with 188 providers	1352	n/a	-Initiation phase follow-up within 30 days: 28% -No measure of continuation phase follow-up -Children averaged 4.5 visits in the first year of treatment	-Number of days covered with medication was positively associated with adherence	When initiation measure met, children had 22.2 (SE = 7.4) more days covered with medication over the first year of treatment. When continuation measure met, children had more days covered by medication (223 days vs 132 days). Time to first contact was inversely associated with number of days covered
Bussing [26]	2009–2010	Retrospective claims analysis	Eight large healthcare organizations participating in the Scalable Partnering Network (SPAN); Medicaid	6864	3–17	-Initiation phase follow-up within 30 days: 49.8% -Continuation phase follow-up: 45.8% -62.3% were not eligible for continuation phase analyses as they did not receive continuous ADHD medication treatment	-Positive predictors of adherence: age < 6 years (52.9% vs 45.1% of children > 12 years) in the initiation and continuation phase. Mental health provider (49.5% vs 42.1% of non-mental health providers) -Gender, comorbid disorders, and single ADHD drug treatment were not significant predictors	None reported
Carroll [27]	2010–2012	Intervention study to create a decision aid for ADHD diagnosis	Four primary care practices in Indiana University Medical Group-Primary Care Practice Network; 84.5% Medicaid	84 (42 Interventi-on, 42 Control)	n/a	-No measure of initiation phase follow-up -Continuation phase follow-up: intervention group (50% had documentation of symptom reassessment at 3-month follow-up); control group (33% had documentation at 3-months)	-Intervention group positively predicted adherence	None reported
Cummings [28••]	2008–2011	Retrospective claims analysis	Medicaid data from nine states	172,322	6–12	-Initiation phase follow-up within 30 days: 55.6–60.5% -Continuation phase follow-up: 63.3–71.0%	-Race/ethnicity: African-American children were less likely to receive a follow-up visit during the initiation phase or	None reported

Table 2 (continued)

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
							continuation phase, compared with white children. Hispanic children were more likely than white children to receive adequate follow-up care in the initiation and continuation phases	
Epstein [29]	2010–2012	Retrospective medical record analysis	Random sample of medical records from 50 pediatric practices with 188 providers	1594	n/a	-Initiation phase follow-up within 30 days: 47.4% had visit or phone contact. Of these, 53% had at least one office visit -Continuation phase follow-up: In the year following prescription, children averaged 4.5 visits	-Academic practice setting; Medicaid vs non-Medicaid. Academic practices had a shorter time to the first contact	None reported
Geltman [30]	2010–2012	Intervention study to create a planned care system for ADHD management	Pediatric practices within Cambridge Health Alliance	73	5–18	-Initiation phase follow-up: 49–53% -Continuation phase follow-up: 35–45%	-Intervention group positively predicted adherence	In intervention group, initiation phase follow-up remained static during study period. Continuation phase follow-up improved from 35% a baseline to 45% at the end of the project assessment year
Follow-up after hospitalization for mental illness								
Fontanella [31]	2009–2010	Retrospective claims analysis	Medicaid claim files from four states (CA, FL, MD, OH), the American Hospital Association annual survey, and the Area Resource File	7826	6–17	-Mental health visit within 7 days of hospital discharge: 48.9% -Mental health visit within 30 days of hospital discharge: 69.2%	-Positive predictors of follow-up at both 7 and 30 days included prior outpatient mental health care, foster care, psychiatric comorbidity, care in teaching hospitals and psychiatric hospitals, and residence in counties with more child and adolescent psychiatrists -Negative predictors included older age, black race, care in hospitals with higher levels of Medicaid penetration, and substance use disorders	None reported
Williams [32]	1995–2006	Retrospective claims and medical record analysis	Tennessee Medicaid-enrolled youth who filled prescriptions for antidepressants and who presented for evaluation of injuries	929	7–18	-40% of individuals discharged home had documentation of discharge instructions with a follow-up provider and date -% adherence to follow-up visits not reported	-There were no differences in receipt of discharge instructions by geographic residence, race, age, or gender	None reported

Table 2 (continued)

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
			determined to be self-harm					
Heflinger [33]	2003–2007	Retrospective claims analysis	Child and Adolescent Mental Health Division (CAMHD) of the Hawaii Department of Health	3178	4–20	-Mental health visit or receipt of in-home services or residential services within 60 days of hospital discharge: 56%	-Positive predictors of adherence: urban zone, younger children, service received in later years, and those placed in hospital-based residential care (vs community-based residential care) were more likely to receive follow-up service -Negative predictors of adherence: rural school district	None reported
Anderson [34]	2009–2013	Retrospective claims analysis	Children enrolled in MaineCare	5713	6–20	-Mental health visit within 7 days of hospital discharge: 49–80% -Mental health visit within 30 days of hospital discharge: 76–95%	None reported	None reported
Multiple concurrent antipsychotic medication								
Becker [35]	2007–2010	Retrospective claims analysis	Children enrolled in Medicaid in Florida	162,483	6–17	11.3% (18,396/162,483) of children received multiple concurrent antipsychotics	None reported	None reported
Leckman-W-estin [36]	2012–2014	Retrospective claims analysis	Ten states from the 2008 Medicaid Analytic Extract (MAX)	144,200	< 21	6.5% (6660/101,857) of children received multiple concurrent antipsychotics	-Children receiving SSI or in foster care were twice as likely to receive multiple concurrent antipsychotics (SSI 8.1% vs 3.5%; AOR 2.22; foster care 7.9% vs 3.5%) compared with children eligible for income-based Medicaid -The above relationship persistent when controlling for age, gender, race/ethnicity, and diagnosis	None reported
Rettew [37]	2012	Retrospective claims analysis	Children enrolled in Medicaid in Vermont	677	0–18	6.9% of children received multiple concurrent antipsychotics	-Did not report specifically for multiple concurrent antipsychotics. Reported that psychiatrists (95.6%) were more likely to follow antipsychotic best practice guidelines, compared with non-psychiatrists (84%)	None reported
Saldana [38]	2010–2011	Retrospective medical record analysis	One large, urban children's hospital	1427	8–18	13.8% (116/1427) of children received multiple concurrent antipsychotics following hospital discharge	-Positive predictors of polypharmacy: placement or custody outside of biological family, greater number of	None reported

Table 2 (continued)

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
							previous psychiatric admissions, longer hospitalizations, admission for violence, aggression or psychosis, intellectual disability, psychotic, disruptive behavior, or developmental disorder diagnoses -Negative predictors of polypharmacy: admission for suicidal ideation or attempt, depression, mood disorder diagnosis	
Sohn [39]	2007–2011	National survey database	National Ambulatory Medical Care Survey (NAMCS); National Hospital Ambulatory Medical Care Survey (NHAMCS)	16,131,721	6–24	1.92/100 visits included one or more antipsychotic prescriptions	-Positive predictors of polypharmacy: older age, black race, having one or more non-antipsychotic prescriptions, and dx of schizophrenia or ADHD	None reported
Thackeray [40]	2013–2015	Pharmacy reports	Children enrolled in Medicaid in Ohio	11,634	2–17	-Baseline rate of adherence to measure not reported	- Ohio Minds Matter Psychotropic Medication QI Collaborative was designed to decrease rates of antipsychotic polypharmacy. The prevalence of antipsychotic polypharmacy decreased significantly in both study populations (− 23.8 to − 29.8%, p. 001)	None reported
Use of first-line psychosocial care								
Barclay [41]	2006–2013	Child psychiatry consultation program primary data and Medicaid pharmacy division antipsychotic utilization secondary data	Children enrolled in Medicaid in Washington State	1008	0–18	86% of consults in which an new antipsychotic is recommended were recommended to have psychosocial treatment (871/1008)	None reported	None reported
Finnerty [42]	2008	Retrospective claims analysis	Eight state Medicaid programs focused on children and adolescents initiating antipsychotic treatment	24,372	0–20	Less than one half of youth received a psychosocial service before initiating antipsychotic treatment (48.8%)	-Young children (0–5) and older adolescents [18–20] were less likely to receive psychosocial treatment -Youth with ADHD (43.3%), developmental disorders (41.4%), depressive (46.5%), or anxiety disorders (35.6%) were less likely to receive	None reported

Table 2 (continued)

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
							psychosocial service prior to initiation of antipsychotic, compared with youth with a psychotic or bipolar disorder (52.7%). Youth with stress disorders were more likely to have received the service (61.2%)	
Leckman-Westin [36]	2012–2014	Retrospective claims analysis	Ten states from the 2008 Medicaid Analytic Extract (MAX)	144,200	< 21	45.6% (6653) of youth received first-line psychosocial care	-Children receiving SSI were more likely to have had a psychosocial visit before starting an antipsychotic, compared with children eligible for income-based Medicaid (48.8% vs 41.5%) -Children in foster care were more likely to have had a psychosocial service (56.8% vs 41.5%)	None reported
Rettew [37]	2012	Retrospective claims analysis	Children enrolled in Medicaid in Vermont	677	0–18	Total % of youth receiving first line psychosocial care not reported. 380/677 (58.8%) received parent guidance with therapist (most common). 48.8% received psychosocial modifications, 37.6% child psychotherapy	None reported	None reported
Depression screening and follow-up plan								
Bhatta [43]	2016	Intervention study to increase depression screening among adolescents accessing school-based primary care. Retrospective chart review.	Pediatric school-based primary care clinic in the southwestern United States	256	12–18	-Depression screening (PHQ-9) (at baseline) occurred in 56.3% ($n = 144$) of charts -Mental health referrals were made for 83.3% ($N = 15$) with PHQ-9 scores of 10 or higher. 16.7% ($n = 3$) refused referral	Visit purpose was a significant predictor of screening status ($\chi^2 = 3.997$, $p = 0.046$); 66% ($n = 50$) were screened during wellness visits, while 52.2% ($n = 94$) were screened during episodic illness visits -Children with no insurance were less likely to be screened compared with those with public or private insurance -Gender, age, and ethnicity were not significant predictors	None reported
Fallucco [44]	Not reported	Intervention study to increase depression screening in primary care. Survey of adolescents	Four group pediatric practices in Jacksonville, Florida. Mix of private and Medicaid insurance	1315	13–17	-Depression screening (at baseline) occurred for 49% of adolescents -No follow-up plan reported	-Females more likely to be screened (OR 1.65, CI 1.25–2.16) -Older adolescents more likely to be screened (OR 2.0, CI 1.3–3.8)	-Increased diagnosis of depression at long-term but not short-term follow-up (3.3% pre- vs 5% short-term vs 10% long-term, $p < 0.001$)

Table 2 (continued)

Citation	Year	Design	Study population	Number	Age (years)	Main findings	Predictors of adherence	Outcome measures
							-No differences found for race/ethnicity, or provider gender or degree	-Discussion of at least one evidence-based treatment increased at both follow-up times compared with baseline (54% baseline vs 93% short-term vs 86% long-term, $p = 0.01$)
Lewandowski [45]	2010–2012	Retrospective medical record analysis	Large Health Maintenance Organization (HMO)	44,342	12–21	-Depression screening (PHQ-9) was administered to adolescents in 5.4% of cases (2010), 7.2% of cases (2011), and 10.6% of cases (2012)	None reported	-The increase in PHQ-9 use led to an increase in depression diagnoses in primary care and a shift in the location of some diagnoses from specialty mental health care to primary care -The increase in PHQ-9 use was also linked to a decrease in the proportion of positive PHQ-9 results that led to formal depression diagnoses
Zenlea [46]	2005–2010	National survey database	National Ambulatory Medical Care Survey (NAMCS); National Hospital Ambulatory Medical Care Survey (NHAMCS)	46,347	12–18	-Depression screening was rare (0.2%, 95% CI 0.1–0.3)	-Screening 80% less likely to occur during visits for Hispanic compared to non-Hispanic, white adolescents (aOR 0.2, 95% CI 0.1–0.7) -Depression screening was 9.1 times more likely in the Northeast compared to the West (aOR 9.1, 95% CI 2.2–38.1), if there were no visits within past 12 months as compared to 6 or more visits (aOR 6.1; 95% CI 1.8–20.4), and if stress management (aOR 24.2, 95% CI 11.8–49.5) or other mental health counseling (aOR 5.2, 95% CI 1.2–23.6) were provided	None reported

Of note, one meta-analytic study was conducted in 2014, reporting data from 15 studies of antipsychotic polypharmacy (published between 1998 and 2013), and found the overall prevalence of antipsychotic polypharmacy among antipsychotic-treated youth was 9.6% (SD 7.2%) [41]. This rate was higher in adolescent studies (12%, SD 7.9%) compared with child studies (5.9%, SD 4.5%). However, comparisons by age could not be confirmed by our analysis, as included studies did not report separate adherence rates for child and adolescent groups [33].

Use of First-Line Psychosocial Care for Children and Adolescents on Antipsychotics

Four studies evaluated adherence to provision of first-line psychosocial care prior to prescription of an antipsychotic medication. Sample size of each study ranged from 677 to 144,200. All studies were retrospective analyses of Medicaid claims data with one supplemented by primary data from a consultation program [41]. Three studies reported adherence to psychosocial care and found an adherence rate of 45 to 58% [36, 37, 48]. One study measured the number of consultations in which psychosocial care was recommended, rather than the actual frequency of psychosocial care, and found that psychosocial care was recommended in 86% of cases [42].

Two studies evaluated predictors of adherence. Finnerty (2016) reported that younger children (0 to 5 years) and older adolescents (18 to 20 years) were less likely to receive psychosocial treatment as first-line treatment, compared with youth in middle childhood and early adolescence (6 to 17 years) [37]. The same study also found variation in rate of adherence by diagnostic category: Youth with ADHD, developmental disorders, and anxiety disorders were less likely to receive psychosocial services compared with youth with a psychotic or bipolar disorder. Another study found that service eligibility was a significant predictor, with youth receiving SSI more likely to receive psychosocial visits than their Medicaid-eligible peers [36]. This study also reported higher adherence among children in foster care. As with the previous three measures, none of the four studies reported outcomes of adherence to the psychosocial treatment measure.

Screening for Depression and Follow-Up Plan: Ages 12–17

Four studies evaluated adherence to the depression screening and follow-up care measure. The sample size of each study ranged from 256 to 46,347. Two studies were interventions to increase depression screening in primary care and reported baseline measures of adherence [43, 44]. Three studies evaluated a group of clinics or a health maintenance organization [43–45], and one was a large national survey [46].

Depression screening ranged from 0.2 to 56.3%. The two larger studies ($N > 40{,}000$) found that depression screening ranged from 0.2 to 10.6% [45, 46], whereas the two smaller studies ($N < 1500$) found higher rates of depression screening (49 to 56.3%) [43, 44]. Data on follow-up service utilization were scarce: Mental health referral rates following depression screening were reported in only one study with a reported rate of 83.3% but with a small sample size ($N = 15$) [43].

Studies reported mixed evidence for predictors of depression screening. Two studies reported no significant difference in depression screening by race or ethnicity [43, 44]. One study reported that screening was 80% less likely for visits for Hispanic adolescents compared to non-Hispanic white adolescents [46]. One study reported that females and older adolescents were more likely to be screened [44], whereas another study reported no significant differences by gender or age [43]. Individual predictors were posited by single studies: More children were screened during primary care visits (66%) compared with episodic illness visits (52.2%) [43], if treated in the Northeast compared with the West (aOR 0.2) [46], if receiving mental health counseling (aOR 5.2) [46], and if insured [43].

Two studies reported outcome measures. One found that increased screening was associated with increased diagnosis of depression at long-term but not short-term follow-up, and children screened were more likely to be exposed to a discussion of at least one evidence-based treatment [44]. Another study found that increase in Patient Health Questionnaire-9 (PHQ-9) use to screen for depression leads to an increase in diagnosis of depression, and specifically an increase in diagnosis in primary care compared with specialty mental health care [45]. Increased PHQ-9 use was associated with a decrease in the proportion of positive PHQ-9 results that lead to a formal diagnosis of depression [46]. Although these studies may imply that measure adoption may increase depression diagnosis and potentially alter service management for depression diagnosis (e.g., diagnosis by mental health vs non-mental health providers), no studies reported evidence for depression screening and follow-up as impactful in reducing disease burden, severe clinical outcomes (e.g., hospitalization or suicidality), or acute care utilization. Also, no studies evaluated the potential costs or trade-offs of implementing this measure.

Of note, one study evaluating adherence to depression screening in Type I diabetic children was excluded from this analysis [49]. Two previous systematic reviews have been conducted, both raising similar concerns regarding the systematic evaluation of depression screening, with regard to accuracy of tools used, small sample sizes, and lack of studies directly assessing the benefits or harms of screening youth for depression [50, 51].

Conclusion

Five national quality measures are related to child mental health and include process measures that span two target

disorders, different age ranges, two different types of medication treatment patterns, and follow-up care after hospitalization for a mental illness. On average, national adherence rates for the two child mental health quality measures related to timeliness of care were below 50% and varied widely by state. Performance on these measures was similar to those of dental and oral health care, developmental screening, medication management of children with asthma, and measures related to adolescent health care [52]. There was also little improvement in adherence rates during a 5-year monitoring period. In addition, the mean adherence rate for use of concurrent antipsychotic medication was not only less than 5% but also varied by state.

These findings should be interpreted cautiously given that approaches for data reporting are not standardized making across state comparisons challenging. States that use of existing data for accreditation may also be more likely to report higher adherence rates, but this potential bias may favor greater standardization for the four child mental health quality measures that are also NCQA HEDIS measures. Technical assistance to states should continue to strive for developing more standardized approaches for data collection, analysis, and reporting as well as case-mix adjustment to improve capacity to compare measure adherence across states. Research funding at the federal level should also be earmarked to develop innovative solutions using existing health information and communication technologies conducted in partnership with state mental health agencies to refine existing data capture and reporting approaches and pilot-test linking to clinical outcomes [53, 54].

In the scientific literature, rates of measure adherence and methodologies also varied across study populations, but aggregate findings suggest that there is substantial room for improvement. Across studies that included adherence rates for the ADHD follow-up care measure, most reported less than one half of the children who were newly prescribed stimulant medication treatment had at least one follow-up visit within the first 30 days. For follow-up care after hospitalization for mental illness, only one study using Medicaid claims data from four states between 2009 to 2010 reported qualitatively similar rates of 7-day and 30-day follow-up visits when compared to state-reported mean adherence rates in FFY 2016. These findings are consistent with state-reported 5-year trends of little change. Together, these findings raise the question of whether quality measurement is effective in driving improved care or whether there remains substantial room for improvement to justify continued measurement?

Scientific evidence supporting the clinical validity of the five national child mental health quality measures is also scarce. A systematic literature review during the past 5 years yielded very few studies supporting the association between adherence of at least one of the care process measures and improved clinical outcomes, even short-term; moreover, no assessment of the association between adherence and clinical outcomes has been reported for three of the five national child mental health measures. When clinical outcomes were reported, findings were variable, not consistently positive, and limited in interpretation by the methodological heterogeneity of the existing studies. The study designs also did not allow for examining a sequence of recommended care processes that may be more likely related to improved clinical outcomes. Policy makers and mental health agency leaders will continue to face the challenge of balancing the ideal of strong clinical validity with the feasibility of data access [55].

The paucity of research to standardize methods for publicly reporting quality measure adherence rates and validation of these measures calls out for re-examining national priorities for children's healthcare research. Without greater public investment in improving the quality of mental health care for children and youth, and the data infrastructure to inform and continuously improve, the vision of healthcare system transformation through measurement-driven quality care will likely not apply to all ages.

Compliance with Ethical Standards

Conflict of Interest Bonnie T. Zima and Juliet B. Edgcomb declare no conflict of interest. Samantha A. Shugarman has received Cooperative Agreement Measure Development Funding from the Centers for Medicare and Medicaid Services.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

Papers of particular interest, published recently, have been highlighted as:
- • Of importance
- •• Of major importance

1.• Conway PH, Clancy C. Transformation of health care at the front line. JAMA. 2009;301(7):763–5 **Landmark commentary supporting measurement-driven quality of care to transform the U.S. healthcare system.**
2. Institute of Medicine, Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington D.C.: The National Academies Press; 2001.
3. Institute of Medicine. Improving the quality of health care for mental and substance-use conditions. Washington D.C.: National Academy Press; 2006.
4. Zima BT, Murphy JM, Scholle SH, Hoagwood KE, Sachdeva RC, Mangione-Smith R, et al. National quality measures for child

mental health care: background, progress, and next steps. Pediatrics. 2013;131(Supplement 1):S38–49.

5.•• Glied SA, Stein BD, TG MG, Beale RR, Duffy FF, Shugarman S, et al. Measuring performance in psychiatry: a call to action. Psych Services. 2015;66:872–8 **Excellent summary of behavioral health measures endorsed by the National Quality Forum, assessment criteria, and rationale for need for more functional outcome measures.**

6. American Academy of Pediatrics. Policy statement—the future of pediatrics: mental health competency for pediatric primary care. Available from: http://pediatrics.aappublications.org/content/pediatrics/124/1/410.full.pdf. Accessed 10 Oct 2018.

7. Webster-Stratton C, Taylor T. Nipping early risk factors in the bud: preventing substance abuse, delinquency, and violence in adolescence through interventions targeted at young children (0–8 years). Prev Sci. 2001;2(3):165–92.

8.•• Kilbourne AM, Beck K, Spaeth-Rublee B, Ramanuj P, O'Brien RW, Tomoyasu N, et al. Measuring and improving the quality of mental health care: a global perspective. World Psychiatry. 2018;17(1):30–8 **Complete yet concise summary of the current state of measuring mental health quality, unique challenges to mental health care quality measurement, innovations, and recommendations for implementing quality measurement of mental health care.**

9. Kilbourne AM, Keyser D, Pincus HA. Challenges and opportunities in measuring the quality of mental health care. Can J Psychiatry. 2010;55(9):549–57.

10. Pincus HA, Spaeth-Rublee B, Watkins KE. The case for measuring quality in mental health and substance abuse care. Health Aff. 2011;30(4):730–6.

11. Wilensky G. The need to simplify measuring quality in health care. JAMA. 2018;319(23):2369–70.

12. Houtrow AJ, Zima BT. Framing childhood mental disorders within the context of disability. Disability and health journal. 2017;10(4):461–6.

13. Children's Health Insurance Program Reauthorization Act of 2009. Available from: https://www.congress.gov/bill/111th-congress/house-bill/2. Accessed 25 Sept 2018.

14. Medicaid.gov. Keeping America Healthy: July 2018 Medicaid & CHIP Enrollment Data Highlights. Available from: https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html. Accessed 25 Sept 2018.

15. Medicaid.gov. 2018 Core Set of Children's Health Care Quality Measures for Medicaid and CHIP. Available from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2018-child-core-set.pdf. Accessed 25 Sept 2018.

16. H.R. 1892 One Hundred Fifteenth Congress of the United States of America. Available from: https://www.congress.gov/115/bills/hr1892/BILLS-115hr1892enr.pdf. Accessed 25 Sept 2018.

17. National Quality Forum. Strengthening the core set of healthcare quality measures for children enrolled in Medicaid, 2017. Available from: http://www.qualityforum.org/Publications/2017/08/Strengthening_the_Core_Set_of_Healthcare_Quality_Measures_for_Children_Enrolled_in_Medicaid,_2017.aspx. Accessed 25 Sept 2018.

18. National Quality Forum. Measure applications partnership: strengthening the core set of healthcare quality measures for children enrolled in Medicaid and CHIP, 2015. August 2015.

19. Medicaid.gov. 2017 Annual Reporting on the Quality Care for Children in Medicaid and CHIP (FFY 2016): Performance on the Child Core Set Measures for FFY 2016, 2015, 2014, 2013 (zip file). Available from: https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/child-core-set/index.html. Accessed 25 Sept 2018.

20. Zima BT, Bussing R, Tang L, Zhang L, Ettner S, Belin TR, et al. Quality of care for childhood attention-deficit/hyperactivity disorder in a managed care Medicaid program. J Am Acad Child Adolesc Psychiatry. 2010;49(12):1225–37. e11.

21.•• Blackburn J, Becker DJ, Morrisey MA, Kilgore ML, Sen B, Caldwell C, et al. An assessment of the CHIP/Medicaid quality measure for ADHD. Am J Manag Care. 2017;23(1):e1–9 **Using a statewide Medicaid claims database, this study supports the primary reasons for failing the ADHD follow-up measure were lack of medication coverage and lack of follow-up visit within 30 days. Adherence to this measure was related to greater health service utilization and costs.**

22. Zima BT, Norquist GS, Altchuler SI, Behrens J, Iles-Shih MD, Ng YKW, et al. Office visits to monitor stimulant medication safety and efficacy: recommended care. J Am Academy Child & Adolesc Psychiatry. 2018;57(6):438–9.

23. Centers for Medicare and Medicaid Services. Medicaid/CHIP Health Care Quality Measures: About the Technical Assistance and Analytic Support Program 2018. Available from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/tafactsheet.pdf. Accessed 25 Sept 2018.

24. Centers for Medicare and Medicaid Services. Medicaid/CHIP Health Care Quality Measures. The State of Children's Health Care Quality in Medicaid and CHIP: State Strategies to Promote Reporting and Performance. Available from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/child-core-set-hps-strategies-brief.pdf. Accessed 25 Sept 2018.

25. Brinkman WB, Baum R, Kelleher KJ, Peugh J, Gardner W, Lichtenstein P, et al. Relationship between attention-deficit/hyperactivity disorder care and medication continuity. J Am Academy Child Adolesc Psychiatry. 2016;55(4):289–94.

26. Bussing R, Narwaney KJ, Winterstein AG, Newton DA, DeBar L, Boscarino JA, et al. Pharmacotherapy for incident attention-deficit/hyperactivity disorder: practice patterns and quality metrics. Curr Med Res Opin. 2014;30(8):1687–99.

27. Carroll AE, Bauer NS, Dugan TM, Anand V, Saha C, Downs SM. Use of a computerized decision aid for ADHD diagnosis: a randomized controlled trial. Pediatrics. 2013;132:e623–9.

28.•• Cummings JR, Ji X, Allen L, Lally C, Druss BG. Racial and ethnic differences in ADHD treatment quality among Medicaid-enrolled youth. Pediatrics. 2017;139(6):e20162444 **Using a large, nine-state Medicaid claims data base, this study supports quality of care for Medicaid-enrolled youth initiating ADHD medication is poor, and racial/ethnic differences for the ADHD follow-up care measure are mixed.**

29. Epstein JN, Kelleher KJ, Baum R, Brinkman WB, Peugh J, Gardner W, et al. Variability in ADHD care in community-based pediatrics. Pediatrics. 2014:peds-2014.

30. Geltman PL, Fried LE, Arsenault LN, Knowles AM, Link DA, Goldstein JN, et al. A planned care approach and patient registry to improve adherence to clinical guidelines for the diagnosis and management of attention-deficit/hyperactivity disorder. Acad Pediatr. 2015;15(3):289–96.

31. Fontanella CA, Hiance-Steelesmith DL, Bridge JA, Lester N, Sweeney HA, Hurst M, et al. Factors associated with timely follow-up care after psychiatric hospitalization for youths with mood disorders. Psychiatr Serv. 2015;67(3):324–31.

32. Williams CL, Cooper WO, Balmer LS, Dudley JA, Gideon PS, DeRanieri MM, et al. Evaluation and disposition of Medicaid-insured children and adolescents with suicide attempts. Acad Pediatr. 2015;15(1):36–40.

33. Heflinger CA, Shaw V, Higa-McMillan C, Lunn L, Brannan AM. Patterns of child mental health service delivery in a public system: rural children and the role of rural residence. J Behav Health Serv Res. 2015;42(3):292–309.

34. Anderson N MT. Improving health outcomes for children: summary of pediatric quality measures for children enrolled in MaineCare FFY 2009-FFY2012. Available from: https://www.maine.gov/dhhs/oms/pdfs_doc/ihoc/Summary_of_Pediatric_Quality_Measures_2012.pdf. Accessed 16 Oct 2018.
35. Becker ER, Constantine RJ, McPherson MA, Jones ME. Antipsychotic polypharmacy prescribing patterns and costs in the Florida adult and child Medicaid Populations. J Health Care Finance. 2013;40(1):40–67
36. Leckman-Westin E, Finnerty M, Scholle SH, Pritam R, Layman D, Kealey E, et al. Differences in Medicaid antipsychotic medication measures among children with SSI, foster care, and income-based aid. J Manag Care Spec Pharm. 2018;24(3):238–46.
37. Rettew DC, Greenblatt J, Kamon J, Neal D, Harder V, Wasserman R, et al. Antipsychotic medication prescribing in children enrolled in Medicaid. Pediatrics. 2015;135:658–65.
38. Saldaña SN, Keeshin BR, Wehry AM, Blom TJ, Sorter MT, DelBello MP, et al. Antipsychotic polypharmacy in children and adolescents at discharge from psychiatric hospitalization. Pharmacotherapy. 2014;34(8):836–44.
39. Sohn M, Burgess M, Bazzi M. Antipsychotic polypharmacy among children and young adults in office-based or hospital outpatient department settings. Pharmacy. 2017;5(4):64.
40. Thackeray J, Crane D, Fontanella C, Sorter M, Baum R, Applegate M. A Medicaid quality improvement collaborative on psychotropic medication prescribing for children. Psychiatr Serv. 2018;69(5):501–4.
41. Barclay RP, Penfold RB, Sullivan D, Boydston L, Wignall J, Hilt RJ. Decrease in statewide antipsychotic prescribing after implementation of child and adolescent psychiatry consultation services. Health Serv Res. 2017;52(2):561–78.
42. Finnerty M, Neese-Todd S, Pritam R, Leckman-Westin E, Bilder S, Byron SC, et al. Access to psychosocial services prior to starting antipsychotic treatment among Medicaid-insured youth. J Am Academy Child & Adolesc Psychiatry. 2016;55(1):69–76. e3.
43. Bhatta S, Champion JD, Young C, Loika E. Outcomes of depression screening among adolescents accessing school-based pediatric primary care clinic services. J Pediatr Nurs. 2018;38:8–14.
44. Fallucco EM, Seago RD, Cuffe SP, Kraemer DF, Wysocki T. Primary care provider training in screening, assessment, and treatment of adolescent depression. Acad Pediatr. 2015;15(3):326–32.
45. Lewandowski RE, O'Connor B, Bertagnolli A, Beck A, Tinoco A, Gardner WP, et al. Screening for and diagnosis of depression among adolescents in a large health maintenance organization. Psychiatr Serv. 2016;67(6):636–41.
46. Zenlea IS, Milliren CE, Mednick L, Rhodes ET. Depression screening in adolescents in the United States: a national study of ambulatory office-based practice. Acad Pediatr. 2014;14(2):186–91.
47. Marino L, Wissow LS, Davis M, Abrams MT, Dixon LB, Slade EP. Predictors of outpatient mental health clinic follow-up after hospitalization among Medicaid-enrolled young adults. Early Interv Psychiatry. 2016;10(6):468–75.
48. Toteja N, Gallego JA, Saito E, Gerhard T, Winterstein A, Olfson M, et al. Prevalence and correlates of antipsychotic polypharmacy in children and adolescents receiving antipsychotic treatment. Int J Neuropsychopharmacol. 2014;17(7):1095–105.
49. Corathers SD, Kichler J, Jones N-HY, Houchen A, Jolly M, Morwessel N, et al. Improving depression screening for adolescents with type 1 diabetes. Pediatrics. 2013;132:e1395–402.
50. Forman-Hoffman V, McClure E, McKeeman J, Wood CT, Middleton JC, Skinner AC, et al. Screening for major depressive disorder in children and adolescents: a systematic review for the US preventive services task force. Ann Intern Med. 2016;164(5):342–9.
51. Wissow LS, Brown J, Fothergill KE, Gadomski A, Hacker K, Salmon P, et al. Universal mental health screening in pediatric primary care: a systematic review. J Am Academy Child & Adolesc Psychiatry. 2013;52(11):1134–47. e23.
52. Centers for Medicare and Medicaid. Quality of care for children and adults in Medicaid and CHIP: overview of findings from the 2017 Child and Adult Core Sets. Available from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/ffy-2017-core-set-reporting.pdf. Accessed 25 Sept 2018.
53. Ranallo PA, Kilbourne AM, Whatley AS, Pincus HA. Behavioral health information technology: from chaos to clarity. Health Aff. 2016;35(6):1106–13.
54. Price M, Yuen EK, Goetter EM, Herbert JD, Forman EM, Acierno R, et al. mHealth: a mechanism to deliver more accessible, more effective mental health care. Clin Psychol Psychother. 2014;21(5):427–36.
55. Iyer SP, Spaeth-Rublee B, Pincus HA. Challenges in the operationalization of mental health quality measures: an assessment of alternatives. Psychiatr Serv. 2016;67:1057–9.