

Body Mass Index Measurement and Obesity Prevalence in Ten U.S. Health Plans

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Objective: The objective of this study was to examine the frequency of body mass index (BMI) measurement before the implementation of two new Healthcare Effectiveness Data and Information Set (HEDIS) performance measures for obesity that require U.S. health plans to annually report the frequency of BMI and BMI percentile measurement among all adults and children who had at least one outpatient visit during the past two years.

Design: Cross-sectional study.

Setting: A consortium of ten U.S. health plans and care delivery systems from the Health Maintenance Organization Research Network, which together provide care to more than 6.5 million adults and children.

Participants: Children and adults, age 2 years and older, who were continuously enrolled in one of ten U.S. health plans for at least one full year from 2005 to 2006.

Methods: We extracted available anthropometric data for 3.7 million adults and 1.2 million children with at least one visit captured from ten electronic medical record databases from 2005 to 2006.

Results: We found that the availability of BMI measurements for adults ranged widely across health plans from 28% to 88%, and availability of BMI percentiles for children ranged from 21% to 81%. Among adults and children with BMI measures in these ten health plans, the overall prevalence of overweight and obesity were very similar to those reported in the 2005 to 2006 U.S. national surveys that used measured heights and weights.

Conclusion: The newly approved HEDIS performance measures likely represent an important step in addressing the quality of obesity care in the United States. The current study demonstrates that these HEDIS measures are achievable, especially among health plans that have implemented electronic medical records. Future research should assess the relationship between BMI assessment, provider counseling and treatment practices, and long-term changes in obesity rates among different population groups.

Keywords: Body Mass Index; Health Care Research; Health Services

Dramatic increases in the prevalence of obesity among children and adults over the last few decades have heightened the national awareness of this serious threat to public health.¹ Despite these trends, U.S. healthcare delivery systems remain a largely untapped resource for obesity prevention and treatment interventions. For example, national surveys in 2001 and 2002 showed that patients made an estimated 1.1 billion outpatient visits per year in the United States, a rate of 3.8 visits per person annually, providing considerable opportunity for physicians to address weight issues.² However, fewer than half of the obese adults reported that their physician discussed their body weight with them. Notably, obese adults who received weight counseling from their physicians were substantially more likely to report attempting to lose weight.³

The National Committee for Quality Assurance Healthcare Effectiveness Data and Information Set (HEDIS) measures are used by more than 90% of America's managed healthcare plans and a growing number of preferred provider organizations to measure performance on important dimensions of care and service.⁴ Two new performance measures for obesity were enacted in 2009.⁵ The new measures require health plans to annually report the frequency of body mass index (BMI) measurement among adults and BMI percentile among children who had at least one outpatient visit during the past two years. The objective of this study was to examine the frequency of BMI measurement before the implementation of the HEDIS guidelines in a consortium of ten U.S. health plans and care delivery systems, which together provide care to more than 6.5 million adults and children.

Methods

This study was approved by the Institutional Review Boards of Group Health Research Institute (Seattle, WA), Geisinger Health System (Danville, PA), Harvard Pilgrim Health Care Institute (Boston, MA), HealthPartners (Minneapolis, MN), Henry Ford Health System (Detroit, MI), Marshfield Clinic (Marshfield, WI), Kaiser Permanente-Georgia (Atlanta, GA), Kaiser Permanente-Hawaii (Honolulu, HI), Kaiser Permanente-Northwest (Portland, OR), and Kaiser Permanente-Southern California (Pasadena, CA). This study was designed to assess the percentage of adult and child health plan members with a BMI or BMI percentile documented in their electronic medical record database over the two-year period from January 1, 2005 through December 31, 2006 among ten U.S. health plans and care delivery systems in the Health Maintenance Organization Research Network (HMORN). The HMORN (www.hmoresearchnetwork.org) is a consortium of geographically dispersed non-profit health plans and care delivery systems with integrated research divisions comprised of scientists with expertise in epidemiology, health services, behavioral medicine, and biostatistics.

Study Population

Eligible subjects were enrolled in commercial (private payer), Medicaid or Medicare products in the ten health systems. Researchers in each health system were asked to identify all members who met the following eligibility criteria: 18 years of age or older (adult sample), and 2 to 17 years (child sample) as of December 31, 2006 and continuously enrolled in the health plan for at least one full year during the 2005 to 2006 period. Consistent with the HEDIS BMI performance measures, all adults and children who had at least one outpatient clinical visit during the 2005 or 2006 period were considered to be eligible for BMI measurement.

Data Elements

The HMORN sites have extensive computerized data systems, and each site implemented electronic medical records at different time points (Table 1). Data elements were extracted from administrative and electronic medical record databases at each site using a common set of analytic codes and macros. Administrative data sources (eg, claims, demographic files) were used to determine the total number of eligible subjects cared for in each health plan or system from calendar years 2005 and 2006 as well as each subject's insurance type, age, gender and number of outpatient visits. Electronic medical record databases were then used to determine the total number of adults and children with at least one height, weight and BMI (or BMI percentile) measurement recorded during the 2005 to 2006 period.

Analyses

Each health plan performed all calculations on de-identified data, and results were submitted to researchers at Group Health Research Institute (DA), who developed aggregated reports with each health plans' data summarizing means and/or proportions for all data elements. The final analyses were reviewed and approved by all health plan sites. The primary outcome of interest was the percentage of adults and children with documentation of BMI or BMI percentile in the electronic medical record database. The denominator was comprised of subjects that had at least one outpatient visit during 2005 or 2006. The numerator was the number of subjects having one or more BMI measurement available from the electronic medical record during that time frame. Additionally, we examined the prevalence of overweight and obesity among adults and children. The prevalence of overweight and obesity was defined using the World Health Organization (WHO) obesity classification for adults and Center for Disease Control (CDC) recommendations for children.^{6, 7} The WHO defines overweight as a BMI between 25.0 kg/m² and 29.9 kg/m², and it defines obesity as a BMI of 30 kg/m² or greater. The CDC defines overweight among children as having a BMI value that is between the 85th percentile and the 94th percentile for one's age and sex, and it defines obesity as having a BMI value that is at or above the 95th percentile for one's age and sex. Among adults, the prevalence of overweight and obesity was calculated using any adult height and the most recent 2005 to 2006 weight

Table 1. Characteristics of the ten health plans from the Health Maintenance Organization Research Network (HMORN).

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Total enrollment, x1000	540	210	805	620	295	175	286	487	3,190	225
Structure, %										
Staff/Group	80	90	20	64	65	85	90	100	100	100
Independent Phys. Assn.	20	10	80	0	30	15	10	0	0	0
Preferred provider	0	0	0	36	5	0	0	0	0	1
Clinic sites	30	41	14	34	70	41	10	27	103	17
Hospitals	2	84	21	84	10	4	3	1	11	1
Year electronic medical record implemented	2003-2005	1995	2000	2004	1988	1994	2006	1997	2004	2004-2005
Demographics										
Age, years, %										
≤24	30	27	33	36	30	31	32	31	34	33
25-44	24	26	31	29	26	23	34	27	27	29
45-64	33	30	29	27	31	26	27	30	27	27
65-74	7	8	4	4	7	9	4	7	7	6
≥75	6	9	3	4	6	10	3	5	5	5
Female, %	53	51	52	52	55	53	52	52	53	51
Race, %										
White	82	96	75	85	67	97	63	84	38	27
African-American	3	<1	16	6	28	<1	33	3	8	2
Asian-American	6	0	5	5	2	<1	<1	5	10	39
Am Indian	1	<1	<1	<1	<1	<1	<1	1	<1	2
Hispanic	4	1.4	4	4	1	<1	<1	6	41	7
Hawaiian/Pacific Islander	0	0	0	0	0	0	0	<1	0	31
Other	3	<1	0	0	2	<1	4	1	<1	17

measurement; however, among children, these rates were calculated using the most recent height and weight measures that occurred on the same day in the 2005 to 2006 measurement period.

Results

The characteristics of the ten health plans/systems and their defined populations are presented in table 1. Total enrollment ranged from 175,000 to 3.2 million members. Consistent with the geographic diversity of their coverage areas, the racial/ethnic makeup of the health plan populations varied widely, with the proportions of white members ranging from 27% to 96%. Most enrollees received care in a staff or group model delivery system setting, and all of the health plans had at least partially implemented electronic medical records by the year 2005.

The 2005 to 2006 BMI measurement results for each of the health plans are presented in table 2. The proportions of enrolled adults with one or more outpatient visits during the two-year period ranged from 81% to 100%. The proportion of adults with available height and weight measures varied widely across the ten health plans. The proportions of adults with one or more BMI measure also varied widely across

plans from 28% to 88%. Finally, the prevalence of adult overweight (range, 63% to 72%) and obesity (range, 29% to 41%) varied considerably. Across the ten health plans, the mean prevalence of overweight (BMI ≥25) was 69% and obesity (BMI ≥30) was 36%.

A majority of children age 2 years to 17 years had one or more outpatient visit during the two-year period; ranging from 79% to 100% (table 3). The proportion of children with a BMI percentile also varied widely across health plans from 21% to 81%. Similar to adults, the prevalence of child overweight (range, 32% to 40%) and obesity (range, 15% to 23%) varied considerably across health plans. Overall, the mean prevalence of child overweight (BMI ≥85th percentile) was 34% and child obesity (BMI ≥95th percentile) was 18%.

Discussion

Although several decades of epidemiological research has shown that obesity is among the most common and costly chronic diseases in the United States, no studies have explored whether U.S. health plans and care delivery systems routinely measure BMI and BMI percentiles among their enrolled populations. In this study, we report on rates of BMI capture prior to two newly approved HEDIS performance measures

Table 2. Proportion of adults with a BMI, weight, and height measurement in electronic medical record, by health plan.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Number of adults with one or more outpatient visit in 2005-06, x1,000	246	293	98	323	124	95	191	338	2047	150
Proportion of adults with one or more outpatient visit in 2005-06, %	93	89	95	100	81	89	90	92	89	92
Proportion of adults with BMI recorded in 2005-06, %*	83	74	75	58	30	74	69	88	28	61
Proportion of adults with weight recorded in 2005-06, %*	91	95	80	75	53	92	87	91	30	82
Proportion of adults with height recorded in 2005-06, %*	83	75	84	60	71	75	86	93	48	64
Prevalence of adult overweight and obesity (BMI \geq 25), %	68	70	64	67	72	72	71	71	71	63
Prevalence of adult obesity (BMI \geq 30), %	34	39	29	34	41	40	38	38	37	31

* As stated in the methods, the rates of height, weight, BMI, and BMI percentile capture are based on the proportion of adults who had one or more outpatient visit during 2005-06.

among a diverse consortium of ten U.S. health plans and care delivery systems. We found that there were wide variations in BMI and BMI percentile capture, ranging from 28% to 88% among adults and 21% to 81% among children. At any given site, a higher proportion of adults have weight recorded compared to height, which underscores the need to emphasize routine height documentations for adults in all systems of care. Among adults and children with an available BMI measurement, the prevalence of overweight and obesity in these ten health plans was very similar to the rates reported in the 2005 to 2006 U.S. national surveys that measured heights and weights.⁸

Health services research on the quality and costs of obesity prevention and treatment is an emerging field. Recent clinical guidelines and HEDIS performance standards are likely important steps towards improving obesity care in the United States; however, it remains to be seen whether these modest policy efforts will lead to changes in counseling and treatment practices and, ultimately, to reductions in overweight and obesity among adults and children. Further research is needed to define how to optimally deliver obesity-related counseling and treatment in primary- and specialty-care settings and to establish the clinical and cost-effectiveness of such efforts on the health plan level. We believe that integrated health plans and care delivery systems, such as those found in the HMORN, are uniquely positioned to implement and evaluate quality improvement initiatives in obesity care.⁹

Key strengths of this study are its inclusion of ten health plans with wide geographic and demographic diversity and its use of standardized data elements and coding methods. This study also has several limitations, including the lack of generalizability to settings that have not implemented electronic medical records. Since we did not conduct individual chart reviews, we may have underestimated BMI capture in

some of the health plans with less extensive penetration of electronic medical records (sites 4 and 8). Our study could not assess the accuracy of height and weight measurements; however, other studies have addressed this question in detail.¹⁰

As with all “real world” outpatient practices, measurement of weight and height are often done when adults and children are fully clothed with shoes on, so the weight might be several pounds and height in inches might be higher than true research quality measurements. These types of errors, if common, could systematically affect the rates of overweight and obesity; however, the impact is likely to be small. Also, the proportion of adults without a height measurement could be due to the fact that providers might not measure height to calculate BMI in healthy individuals with normal weights, which would also inflate the rate of individuals in the top two BMI categories. In spite of limitations, these data are within the range of rates reported in the 2005 to 2006 U.S. national surveys where measurement practices were standardized to capture heights and weights.⁸ Finally, our study also does not address whether providers documented a discussion of the BMI measures, obesity risk, nutrition, or physical activity counseling with patients in the medical record.

Conclusion

In conclusion, this study examines the frequency of BMI assessment in electronic medical records of ten health plans before the implementation of HEDIS performance measures for obesity. Overall, our study demonstrates that the HEDIS measures are achievable among health plans that have implemented electronic medical records; however, given the variability observed among these health plans, there remains significant room for improvement.

Table 3. Proportion of children with a BMI percentile, weight, and height measurement in electronic medical record, by health plan.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
Number of children with one or more outpatient visit in 2005-06, x1,000	50	102	22	132	29	30	64	89	636	43
Proportion of children with one or more outpatient visit in 2005-06, %	92	89	98	100	79	93	89	91	89	93
Proportion of children with BMI percentile recorded in 2005-06, %*	70	71	81	62	76	55	66	71	21	73
Prevalence of child overweight and obesity (BMI $\geq 85^{\text{th}}$), %	32	35	32	32	35	34	33	32	40	34
Prevalence of child obesity (BMI $\geq 95^{\text{th}}$ percentile), %	16	19	15	16	18	17	17	16	23	19

* As stated in the methods, the rates of BMI percentile capture are based on the proportion of children who had one or more outpatient visit during 2005-06.

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