

Combining Clinical and Population-Level Data to Understand the Health of Neighborhoods

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From February through December 2012, we examined responses to health behavior questions integrated into the electronic medical record of primary care centers in the Bronx, New York in the context of New York City Community Health Survey data. We saw a higher proportion of unhealthy behaviors among patients than among the neighborhood population. Analyzing clinical data in the neighborhood context can better target at-risk populations. (*Am J Public Health*. 2015;105:510–512. doi:10.2105/AJPH.2014.302326)

Primary clinical care and population health have complementary goals of improving the health of patients and neighborhoods, respectively.^{1,2} However, clinical care centers and public health agencies rarely operate in concert to increase wellness at both the patient and population levels. The systems for collecting and analyzing patient- and population-level data are often not coordinated or connected,^{3,4} making the examination of changes in patient outcomes difficult to interpret within the context of larger population trends. Using a set of common metrics allows the assessment of intervention effectiveness in both the clinical and neighborhood settings.

As part of a common interest and shared vision to improve clinical outcomes for patients as well as the health of the broader community, Montefiore Medical Center (MMC), the Bronx District Public Health Office of the New York

City Department of Health and Mental Hygiene (DOHMH), and the Bronx Community Health Network, Inc. established a partnership in 2010—formally known as Bronx CATCH (Collective Action to Transform Community Health) to pursue a geographic approach to promoting health in specified neighborhoods in the Bronx, New York. This collaboration of hospital, department of health, and community partners in the Bronx was designed to integrate a set of population health metrics into MMC's clinical electronic medical record. We created the data infrastructure whereby comparable metrics at the clinic and population levels are collected. We have presented the results of the first year of behavioral health data collected through the electronic medical record for patients receiving routine primary care at 3 neighborhood health centers in 3 Bronx communities.

METHODS

Through a collaborative effort by Bronx-based MMC, the New York City DOHMH, and the Bronx Community Health Network, Inc. we identified data elements for collection and analysis. MMC is a large academic medical center with a wide network of community-based affiliated primary care sites, many of which are also federally qualified health centers. In February 2012, we integrated 5 Behavioral Risk Factor Surveillance Survey questions used in the New York City Community Health Survey (CHS)⁵ to assess physical activity and dietary intake into MMC's electronic medical record system. We piloted these CHS questions in 3 participating primary care centers. The health centers are located within distinct United Hospital Fund (UHF) neighborhoods in the Bronx. UHF neighborhoods are aggregations of zip codes reflecting neighborhoods used by the New York City DOHMH to report the results of CHS.

We included only adult patients (aged 18 years or older) attending 1 of 3 health centers between February and December 2012 in our analysis. We programmed the CHS questions to pop up automatically on the electronic medical record screen as part of the intake vital signs assessment during an outpatient visit.

The form may be bypassed at the discretion of the clinician, but the pop-up prompt will continue until the form is completely filled out. Once the form is completed, the survey prompt will not reappear for another 365 days. The ratio of eligible patients interviewed to total clinic visits ranged from 39% to 66%.

We calculated descriptive statistics using direct age adjustment to the 2000 US standard population to enable comparison with CHS population-based responses. We obtained neighborhood-level (i.e., UHF-level) physical activity and dietary intake data from the 2012 CHS, using the New York City DOHMH's publicly available online EpiQuery system.⁶ We obtained the demographic characteristics of neighborhoods from the 2010 US Census.⁷ We conducted all analyses in SAS version 9.3 (SAS Institute, Cary, NC).

RESULTS

The majority of patients visiting the 3 MMC health centers were women (Table 1). In the UHF neighborhoods surrounding the health centers, the distribution of men and women was closer to 50%. The age distribution at the health centers was similar to that observed in the neighborhoods. Hispanics made up the majority of the patient population at the health centers and the UHF neighborhoods with the exception of the northeast Bronx neighborhood, which was predominantly Black non-Hispanic.

Across the 3 health centers, between 35% and 43% of patients reported no physical activity in the past 30 days (Table 2). In the neighborhood surrounding the health centers, residents reporting no physical activity in the past 30 days ranged from 18% through 29%. Approximately half of patients reported walking or biking for transportation in the past 30 days, whereas the proportion was closer to 80% among neighborhood residents. Most patients and neighborhood residents reported consuming 1–4 fruit or vegetable servings the day before. The patients at West Farms Family Practice had a higher proportion of patients eating no fruits or vegetables the day before and reported a higher consumption of sugary drinks per day (≥ 1 drink) than did the surrounding neighborhood.

TABLE 1—Demographic Characteristics of Bronx CATCH Health Centers and Surrounding United Hospital Fund Neighborhoods: The Bronx, New York, February–December 2012

Variable	Fordham-Bronx Park Neighborhood		South Bronx Neighborhood		Northeast Bronx Neighborhood	
	Family Health Center Patients, % (No.)	UHF Neighborhood Population, % (No.)	West Farms Family Practice Patients, % (No.)	UHF Neighborhood Population, % (No.)	Williamsbridge Family Practice Patients, % (No.)	UHF Neighborhood Population, % (No.)
Total	5 740	183 842	1 917	383 908	2 236	146 048
Gender						
Women	72.9 (4 186)	54.0 (99 190)	75.3 (1 444)	55.0 (211 225)	71.1 (1 589)	57.2 (83 520)
Men	27.1 (1 554)	46.0 (84 652)	24.7 (473)	45.0 (172 683)	28.9 (647)	42.8 (62 528)
Age, y						
18–24	10.7 (614)	17.6 (32 422)	14.8 (285)	17.6 (67 653)	10.5 (235)	12.8 (18 727)
25–44	34.5 (1 982)	40.6 (74 695)	36.7 (704)	40.2 (154 432)	35.8 (800)	33.6 (49 052)
45–64	37.7 (2 161)	30.1 (55 370)	31.3 (599)	30.6 (117 600)	36.5 (817)	34.5 (50 425)
≥ 65	17.1 (983)	11.6 (21 355)	17.2 (329)	11.5 (44 223)	17.2 (384)	19.1 (27 844)
Race						
White, non-Hispanic	0.6 (22)	10.3 (18 865)	0.5 (6)	1.7 (6 622)	1.8 (15)	12.8 (18 712)
Black, non-Hispanic	6.9 (265)	25.4 (46 612)	6.3 (78)	30.6 (117 572)	46.7 (386)	58.8 (85 889)
Hispanic	89.6 (3 445)	57.2 (105 092)	91.6 (1 129)	65.1 (249 815)	49.0 (405)	22.8 (33 302)
Asian	1.2 (45)	5.3 (9 768)	0.1 (1)	1.2 (4 673)	0.8 (7)	2.8 (4 126)
Other	1.8 (69)	1.9 (3 505)	1.5 (18)	1.4 (5 226)	1.7 (14)	2.8 (4 019)

Note. CATCH = Collective Action to Transform Community Health; UHF = United Hospital Fund. We obtained the UHF-level data from the 2010 US Census.⁷ All percentages were rounded up to nearest tenth and therefore column total percents may not equal 100%. Health center patients with missing data for race were not included in the denominator for calculating race percentages.

DISCUSSION

The overall observed trend shows that a higher proportion of clinic patients than neighborhood residents reported unhealthy lifestyle behaviors. Although not exhaustive, a couple of scenarios are possible and warrant further investigation. First, response variation may reflect differences between patients who seek out health care and residents who live in the neighborhood. Second, the health behaviors of patients may reflect exposures relative to other important geographic locations, such as their residence, workplace, or school. It should also be noted that as not all patients seen during the study period were asked the study questions, response variation could reflect some combination of selection bias and clinician discretion.

Primary care is an important component of overall public health. Having access to physical activity and dietary data at the patient level similar to data at the population level can better inform tailored quality improvement initiatives in primary care settings. Using health care delivery partnerships such as Bronx CATCH enables the health behavior patterns observed in our clinical population to be shared within the context of community population trends with public health partners.

Through these partnerships, community resources—for example, community-based diabetes prevention programs⁸ and Shop Healthy-affiliated grocers⁹—can be identified to address the specific needs of our clinical population. ■

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Contributors

E. C. Chambers was responsible for the conceptualization and the writing of the article. B. C. Wong was responsible for article writing and analysis of New York City Community Health Survey (CHS) data. R. W. Riley was responsible for the analysis of patient-level data collected through the Montefiore Medical Center sites. N. Hollingsworth was responsible for clinical training and data collection at the clinic sites and contributed to the writing of the methods section. A. E. Blank contributed to the

writing of this article and worked with information technology to develop the electronic medical record data collection and ensure data integrity. C. Myers was responsible for integrity of the New York City CHS data and collaborated in the writing of the methods section. J. Bedell contributed to the conceptualization of the study and oversight of data from the Department of Health. P. A. Selwyn contributed to the conceptualization of the study and writing of the article.

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Human Participant Protection

The institutional review board of Montefiore Medical Center approved the study protocol.

References

- Centers for Disease Control and Prevention. The guide to community preventive services. Available at: <http://www.thecommunityguide.org/healthequity/housing/housing.html>. Accessed November 6, 2013.

TABLE 2—Age-Adjusted Proportions for Physical Activity and Dietary Questions by Bronx CATCH Health Center and United Hospital Fund Neighborhood: The Bronx, New York, February–December 2012

Health Behavior	Fordham–Bronx Park Neighborhood		South Bronx Neighborhood		Northeast Bronx Neighborhood	
	Family Health Center Patients, % (95% CI)	UHF Neighborhood Population, % (95% CI)	West Farms Family Practice Patients, % (95% CI)	UHF Neighborhood Population, % (95% CI)	Williamsbridge Family Practice Patients, % (95% CI)	UHF Neighborhood Population, % (95% CI)
Participated in physical activity or exercise during past 30 d						
No	39.9 (38.6, 41.1)	18.0 (12.0, 26.2)	42.9 (40.7, 45.1)	28.8 (24.4, 33.7)	34.6 (23.7, 36.6)	19.5 (13.3, 27.5)
Yes	60.1 (58.9, 61.4)	82.0 (73.8, 88.0)	57.1 (54.9, 59.3)	71.2 (66.3, 75.6)	65.4 (63.4, 67.3)	80.5 (72.5, 86.7)
Walked or biked as part of active transportation ^a during past 30 d						
No	47.7 (46.4, 49.0)	21.8 (15.0, 30.6)	47.5 (45.3, 49.8)	19.7 (16.2, 23.9)	44.6 (42.5, 46.7)	21.2 (14.4, 30.1)
Yes	52.3 (51.0, 53.6)	78.2 (69.4, 85.0)	52.5 (50.2, 54.7)	80.3 (76.1, 83.8)	55.4 (53.3, 57.5)	78.8 (69.9, 85.6)
Total fruit and vegetable servings eaten yesterday						
0	31.1 (29.9, 32.4)	23.0 (14.9, 33.9)	38.0 (35.9, 40.2)	18.0 (14.3, 22.4)	16.7 (15.1, 18.3)	20.8 (13.1, 31.5)
1–4	66.8 (65.5, 68.0)	68.2 (57.5, 77.3)	58.8 (56.6, 61.0)	77.7 (73.0, 81.8)	75.6 (73.7, 77.5)	71.2 (60.7, 79.9)
≥ 5	2.1 (1.7, 2.5)	8.7 (4.7, 15.6)	3.2 (2.4, 4.0)	4.3 (2.6, 7.1)	7.7 (6.6, 8.9)	7.9 ^b (4.2, 14.7)
Number of sugary drinks consumed on average per d						
0	32.5 (31.2, 33.7)	31.5 (23.8, 40.5)	25.0 (23.0, 27.0)	27.8 (23.6, 32.4)	29.5 (27.5, 31.6)	29.5 (21.6, 38.9)
< 1	21.5 (20.4, 22.6)	31.4 (22.9, 41.3)	20.4 (18.5, 22.2)	30.7 (26.1, 35.9)	37.4 (35.3, 39.6)	30.7 (22.0, 41.0)
≥ 1	46.0 (44.7, 47.3)	37.1 (28.8, 46.2)	54.6 (52.3, 56.9)	41.4 (36.2, 46.9)	33.0 (31.0, 35.1)	39.8 (30.3, 50.2)

Note. CATCH = Collective Action to Transform Community Health; CI = confidence interval; UHF = United Hospital Fund. UHF neighborhood estimates data are from the 2012 Community Health Survey, New York City Department of Health and Mental Hygiene.⁵ We calculated the number of sugary drinks consumed on average per d from 2 Community Health Survey questions (soda consumption and other sweetened drink consumption). All percentages are age-adjusted to the 2000 US standard population. All percentages were rounded up to the nearest tenth and therefore column total percents may not equal 100%.

^aMore than 10 blocks, as part of getting to and from work, school, or public transportation, or to do errands.

^bThe estimate should be interpreted with caution. The estimate relative SE (an estimate of precision measure) is > 30% or the sample size is < 50, or the 95% CI half width is > 10, making the estimate potentially unreliable.

2. US Preventive Services Task Force. The guide to clinical preventive services. 2012. Available at: <http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/guide/guide-clinical-preventive-services.pdf>. Accessed November 6, 2013.

3. Ockene JK, Edgerton EA, Teutsch SM, et al. Integrating evidence-based clinical and community strategies to improve health. *Am J Prev Med*. 2007;32(3):244–252.

4. Lebrun LA, Shi L, Chowdhury J, et al. Primary care and public health activities in select US health centers: documenting successes, barriers, and lessons learned. *Am J Prev Med*. 2012;42(6, suppl 2):S191–S202.

5. City of New York. Survey data on the health of New Yorkers. Available at: <http://www.nyc.gov/html/doh/html/data/survey.shtml>. Accessed November 6, 2013.

6. New York City Department of Health and Mental Hygiene. Epiquery: NYC Interactive Health Data System: Community Health Survey 2007. Available at: <http://nyc.gov/health/epiquery>. Accessed December 11, 2013.

7. New York City Department of Health and Mental Hygiene. Epiquery: NYC Interactive Health Data System—

Census 2010. 2013. Available at: <http://nyc.gov/health/epiquery>. Accessed November 3, 2014.

8. YMCA. YMCA'S diabetes prevention program. Available at: <http://www.ymca.net/diabetes-prevention>. Accessed November 3, 2014.

9. City of New York. Shop healthy. Available at: <http://www.nyc.gov/html/nycfood/html/shop/shop.shtml>. Accessed November 3, 2014.