

Data-driven Quality Improvement: The Case of Precise Blood Pressure Measurement

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About AMGA Analytics

- AMGA represents multispecialty medical groups and integrated healthcare delivery systems—450 member organizations, median size 150 FTE physicians
- In partnership with Optum, AMGA conducts a learning collaborative for members who use the Optum™ One population health analytics platform
- Optum extracts, maps, and normalizes clinical data from EHRs and outgoing claims data, to enable meaningful comparisons across medical groups, identifying groups with superior performance
- We focus on ambulatory care for patients with chronic conditions
- Data determines what to improve; shared learning focuses on how to improve

Why Investigate Precise BP Measurement?

- Hypertension (HTN) is a major risk factor for cardiovascular disease¹
- A reduction as little as 2 mm Hg can lead to a substantial reduction in the incidence of death, stroke, heart disease, or other vascular outcomes²
- Recording precise blood pressure (BP) measurements is fundamental to managing HTN and allows providers to make timely treatment adjustments
- Assuming BP values are measured accurately but rounded to the nearest 10 mm Hg:
 - Reduction of 2 mm Hg could be interpreted as a reduction of 10 mm Hg, e.g., 146 (rounded to 150) to 144 (rounded to 140)
 - Reduction of 8 mm Hg could be interpreted as no change, e.g., 164 (rounded to 160) to 156 (also rounded to 160)

Objective

- Establish the degree of precision to which blood pressure is measured in the ambulatory setting
- Determine if data sharing on precision of BP measurement leads to improvement
- Identify interventions associated with improvements in the precision of BP measurement

Methods

Study Population:

- 1,200,000 patients
- Aged 18–85
- Dx HTN (insurance claim or problem list)
- Received care at 22 AMGA member organizations

Blood Pressure:

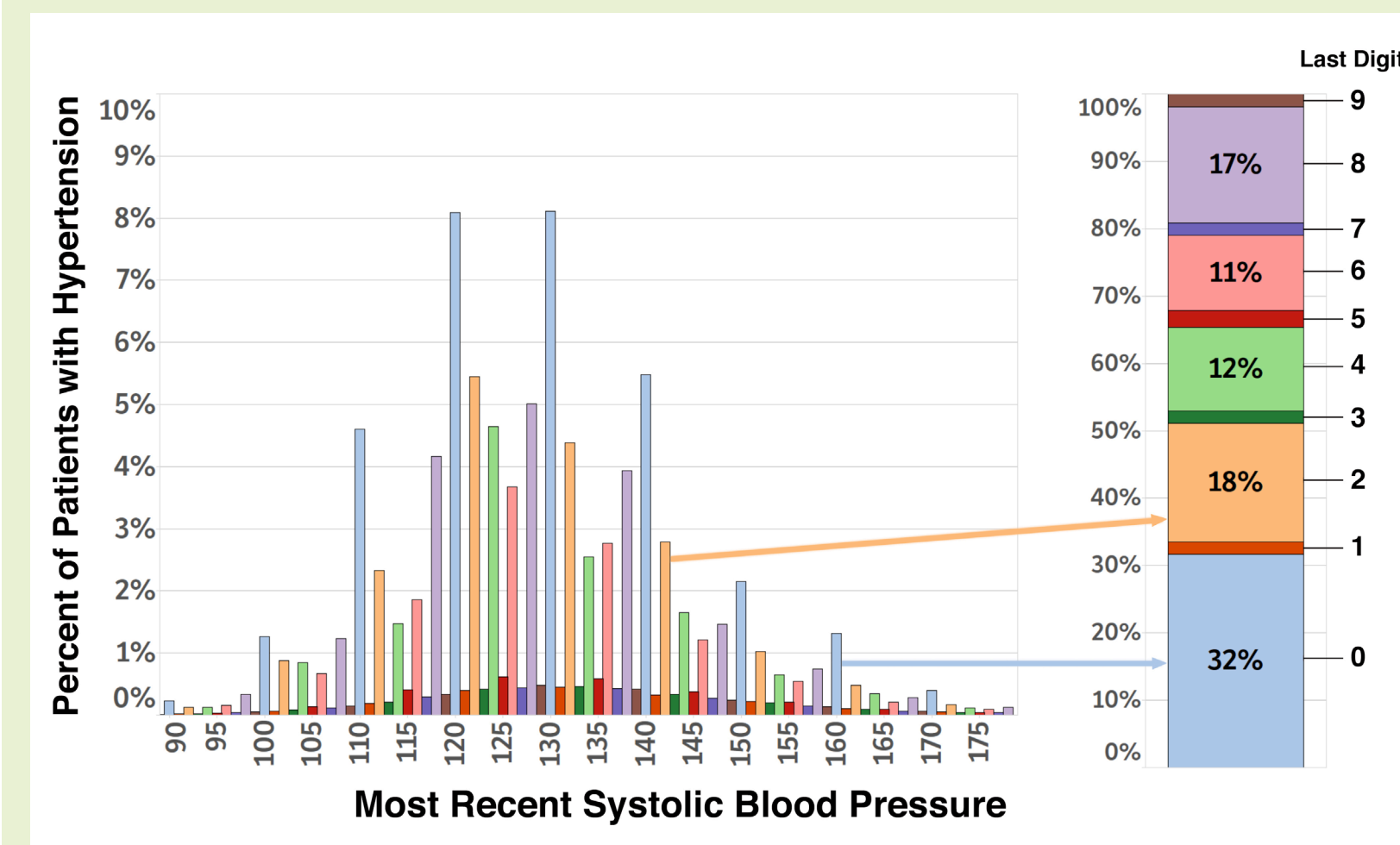
- Readings recorded during an ambulatory visit

Study Design

- Precision of BP measurement was quantified using the proportion of patients whose most recently recorded systolic or diastolic BP reading was a multiple of 10 mm Hg, e.g., 100, 110, 120, 130, identified by a last digit of zero
- Baseline reports were distributed to organizations in 2013 Q2 including:
 - Precision of systolic and diastolic BP measurement on all patients
 - Stratification by degree of HTN, i.e., patients with BP \geq 134/84, and by site of care
- Improvements were tracked quarterly for the duration of a 3-year HTN campaign
- Organizations with the largest improvements shared success stories

Figure 1: Quantifying Precise Blood Pressure Measurement

- On the left is a distribution of systolic BP, each color represents a different last digit
- The stacked bar chart on the right shows the proportion of patients grouped by their last digit of systolic BP, e.g., 17% had last digit 8, 11% last digit 6
- Lighter colors represent even numbers, darker colors odd numbers
- If BP were precisely measured and recorded to the nearest
 - 1 mm Hg, each digit would account for approximately 10% of patients
 - 2 mm Hg, even numbered digits would account for about 20% of patients
- Overall, 32% of patients had a 0 as the last digit of their most recent systolic BP (blue); suggesting a lack of precision in BP measurement and an opportunity for improvement

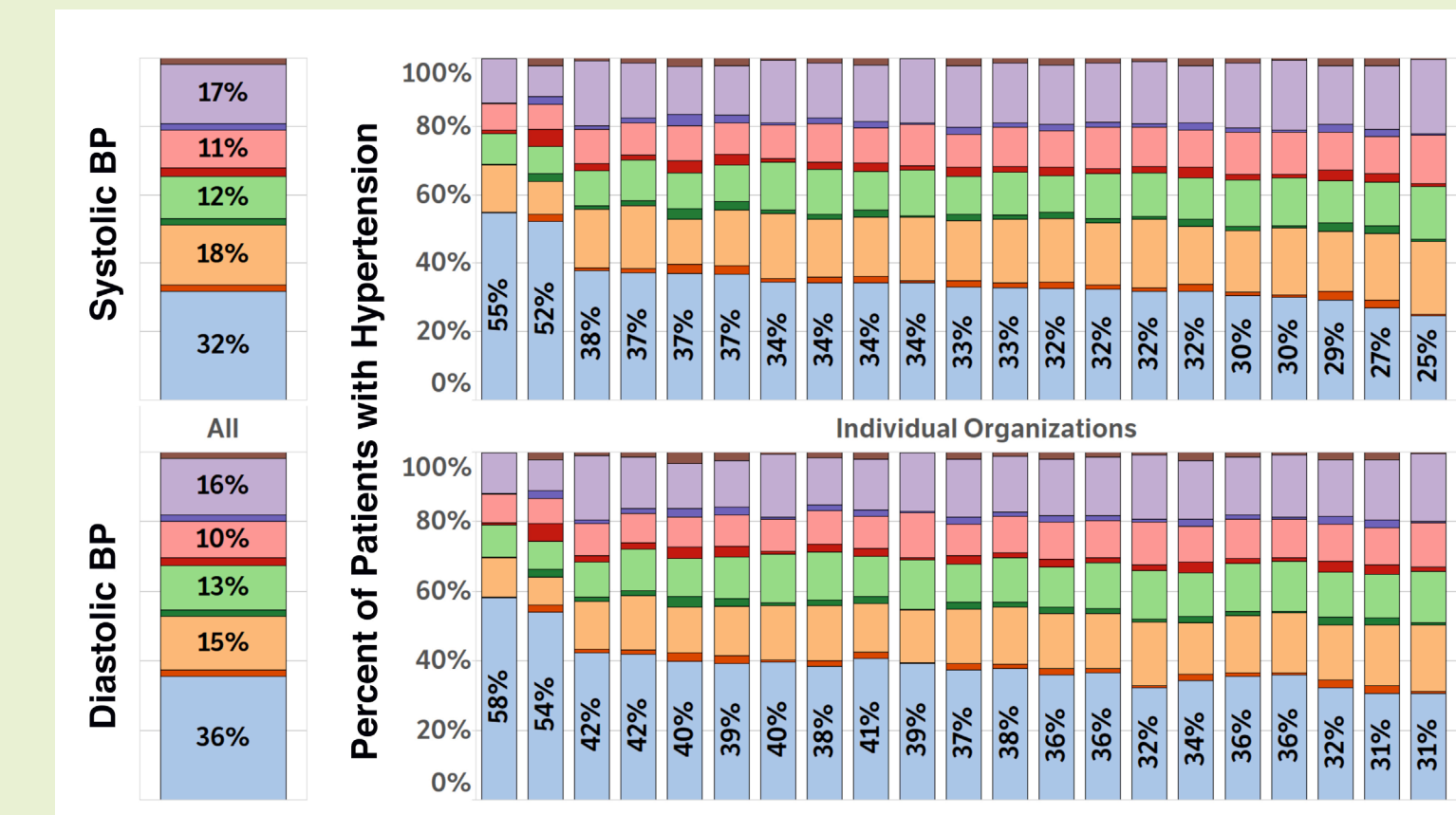


Results

- Overall, 32% of patients had a last digit of 0 for their most recent systolic BP
 - This varied across organizations from 22%–55%
- Slightly less precision was observed in diastolic BP readings (36% with 0)
- In patients with BP \geq 134/84, 28% had a last digit of 0 for systolic BP, 31% for diastolic
- Some practices or care teams had as many as 83% of patients with a last digit of zero

Figure 2: Last Digit of Systolic (top) and Diastolic (bottom) BP

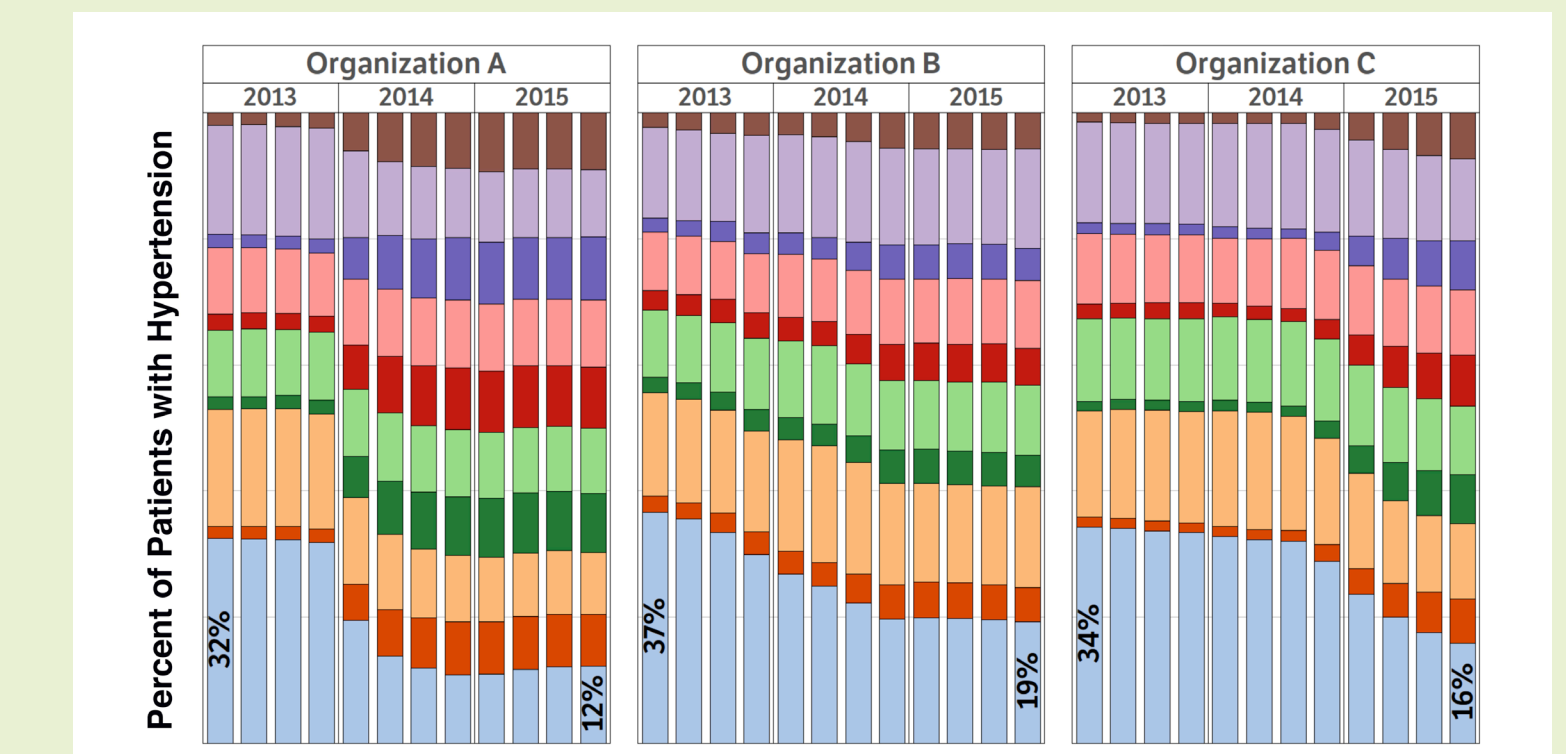
- Distribution of last digit of systolic and diastolic BP during the baseline period (2013 Q1):
 - This is shown both overall (left), and for individual organizations (right)
- Blue represents the proportion of patients with a zero as the last digit of BP



- By the end of the 3-year campaign, significant improvements were observed at 91% (20/22) of the participating organizations (p < .001)
- Relative reductions in the proportion of patients with a last digit of zero ranged from 3–62%
- Similar improvements were achieved for both systolic and diastolic BP
- A subset of organizations with the most significant improvements shared strategies with other AMGA members, such as:
 - Applying across-the-board changes at all practices
 - Targeting interventions with specific practices or individual care teams with the least precision
 - Implementing automated BP monitors
 - Providing educational sessions to staff

Figure 3: Improvements in Precise Systolic BP Measurement

- Improvements in the precise measurement of systolic BP readings at three organizations over the course of three years
- Each bar is a quarter ranging from 2013 Q1 to 2015 Q4
- A reduction in the blue segment represents improvements in precise BP measurement



Conclusions

- Most organizations have opportunities for improvement in precise BP measurement
- Sharing simple BP data with organizations can lead to improvements
- Stratifying analyses by practice or provider/care team can lead to more efficient quality improvement, by targeting areas with the least precision
- Interventions leading to improvements varied in breadth and resource utilization

Implications

- As healthcare organizations transition from volume to value, productive use of EHR and other data will become increasingly essential to business operations
- Precise BP measurement is important as it enables providers to make timely therapeutic adjustments, and patients to better manage their own disease with accurate information
- Data-driven interventions are critical for efficient use of limited resources, and the future of health care in the U.S.

Bibliography

¹ Mozaffarian, D., et al. (2016). "Heart Disease and Stroke Statistics—2016 Update: A Report From the American Heart Association." *Circulation* 133(4): e38-60.
² Lewington, S., et al. (2002). "Age-specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies." *Lancet* 360(9349): 1903-1913.