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"The 80/20 Rule"
Is it still true? And what can it tell us about
Population Health in 2018 and beyond?

What's at stake?

In both the public and private sectors, the movement to value-based payment models is continuing. The number of value-based models where providers are responsible for the costs and care of specific populations, such as Accountable Care Organizations (ACOs), is increasing and early results are positive.[1] By early 2017, 923 active public and private ACOs were operating in the United States, covering more than 32 million lives.[2] Health plans have long considered their members as "populations" for which the costs, clinical utilization, outcomes, and satisfaction are intensively measured and reported. In order to truly practice "population health" and use these models effectively, health care organizations require a thorough understanding of the costs, needs, and outcomes of care for their populations over time.

In working with health care clients across the spectrum, we have found this practical definition of population health to be useful:

"Population health refers to health care efforts that aim to use health care resources effectively and efficiently to improve the lifetime health and wellbeing of a specific population."[3]

In essence, organizations need to have good information about what, when, and where the population is using (or not using) health care services, and thus spending the available health care dollars.

Most of us working directly with large groups of patients or studying data related to health outcomes are well-acquainted with some version of "The 80/20 rule." As applied to health care populations, it underlies much of the common thinking about population health. Many presentations and papers about health care costs or utilization include this "rule" to describe the distribution of health care costs.

This 80/20 rule is shorthand for many *assumptions* including:

• Of all of the dollars spent on health care, 80% of these dollars are spent on 20% of the population; and conversely, the remaining 20% of the dollars are spent on 80% of the population.

• Most people in a measured population don't spend very much on health care in a given year;

• This 80/20 distribution applies to all populations (Medicare, commercially-insured, Medicaid);

• This 80/20 distribution is "true" year after year, even if the individuals in the 20% are different each year;

• It makes sense to design and implement health care interventions focused on the most expensive individuals comprising the top 20%;

• Targeting health care support or interventions to individuals spending the most will reduce cost and/or improve quality.

Bottom line, the 80/20 rule is given as the reason that health management should "focus on the top 20%" while "not forgetting the rest of the population," that is, the 80%.

Are the "80/20" rule assumptions accurate and correct? We decided to analyze more recent data to find out.

Our take

Why did we do it?

The health care ecosystem is in a period of increasingly rapid change and innovation. At Deloitte, we engage with health care clients designing new models of care delivery, new provider-payor collaborations, and life sciences firms producing new treatments and devices. We have seen the influx of newly insured populations under Medicaid expansion and Affordable Care Act insurance exchanges. In addition, expanding classes of biologics and specialty drugs have caused pharmacy spending to be a rapidly rising component of health care spending on an annual trend basis.[4] High-deductible health plans and other benefit design changes have shifted a greater proportion of annual health care cost for commercially insured individuals to the consumer.[5]

Could these factors be changing the distribution of health care spending and the concentration of costs? Do Medicare and commercially-insured populations have similar cost distributions? Are expanding indications for high-cost medications increasing the costs for the "middle" of the population? Does current data reinforce the 80/20 rule? And what would the implications be to population health strategies for various stakeholders across the health care landscape?

So given the importance of this widely-held assumption, we set out to:

a) find out where the 80/20 rule originated,

b) analyze our commercially insured datasets and traditional Medicare datasets to see what the distribution and concentration of health care spending actually is now, and

c) consider the potential implications of our findings for key stakeholders in health care in 2018 and beyond.

What are the earlier sources of the often-stated 80/20 US cost distribution?

One reference often cited to support the 80/20 rule in health care spending is an Agency for Healthcare Research and Quality (AHRQ) monograph published in 2006, which summarized health care spending reports from 2002–2003.[6] This analysis used Medical Expenditure Panel Survey (MEPS) data, a national longitudinal survey of personal health care expenses in the civilian population. Another research brief in 2012 also used MEPS data to describe the concentration of health care spending, this time with spending from 2009.[7,8,9]

What data did we analyze to look at the recent distribution of medical spending?

For the privately insured population we utilized data from the Truven Health MarketScan® Commercial Database for the years 2012, 2013, and 2014.[10]

This data includes health insurance claims across the continuum of care (e.g., inpatient, outpatient, outpatient pharmacy, carve-out behavioral health care) as well as enrollment data from large employers and health plans across the United States who provide private health care coverage for employees, their spouses, and dependents. This administrative claims database includes a variety of fee-for-service, preferred provider organizations, and capitated health plans. We selected cohorts that had both medical and pharmacy coverage for all twelve months of the year analyzed. Each year the Truven dataset is a different cohort of lives, so unlike in a

health plan longitudinal analysis, we could not analyze cost progression across time for the same individuals.

To analyze Medicare cost distribution, we used the Medicare Limited Data Set (LDS) — a random 5% of all Medicare beneficiaries in traditional Medicare (it does not include Medicare Advantage) that is made available by the Centers for Medicare and Medicaid Services (CMS).[11]

We selected a subset of the LDS where all individuals in the cohort had both Medical Parts A and B during all twelve months of the year. This data does not include Part D pharmacy spending, so we don't know if these members did or did not have pharmacy coverage, and if they did, for how many months of the period. Each year the LDS is a different random selection of individuals. We had data for 2012, 2014, and 2015 (note 2013 was not included). 2015 is the most recent year of LDS data publicly available.

The distribution of spending in the commercial claims dataset did not significantly change over the three years analyzed (2012, 2013 and 2014).

So did the 80/20 rule for medical spending still apply in the commercial population in the years 2012 to 2014?

In the commercially insured population, looking at medical spending only without pharmacy, we found that the distribution was 85/20:

· The top 20% spent 85% of the dollars

· The top 10% spent 72% of the dollars

· The top 5% spent 58–59% and

· The top 1% consumed 30–33% of the health care dollars (Table 1)

Table 1: Distribution of medical spending for commercial population

| Commercial	Year	Top 1% of population	Top 5% of population	Top 10% of population	Top 20% of population
		Spent what % of total dollars spent (medical claims only)			
Medical only	2013	32.0%	58.0%	72.0%	85.0%
Medical only	2014	32.6%	58.8%	77.7%	84.9%
Medical only	2015	30.0%	59.0%	72.5%	85.0%

Figures 1a–1c show this graphically for each year as cumulative spending curves:

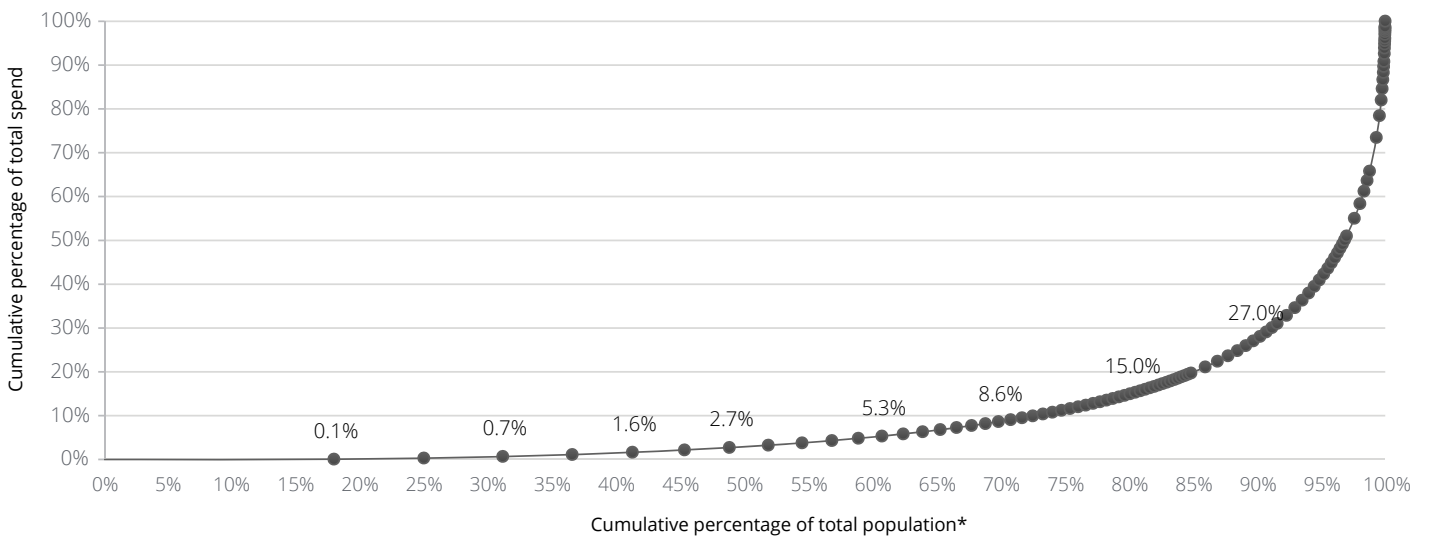**Figure 1a: 2013 commercial cumulative percentage of total allowed medical spend**
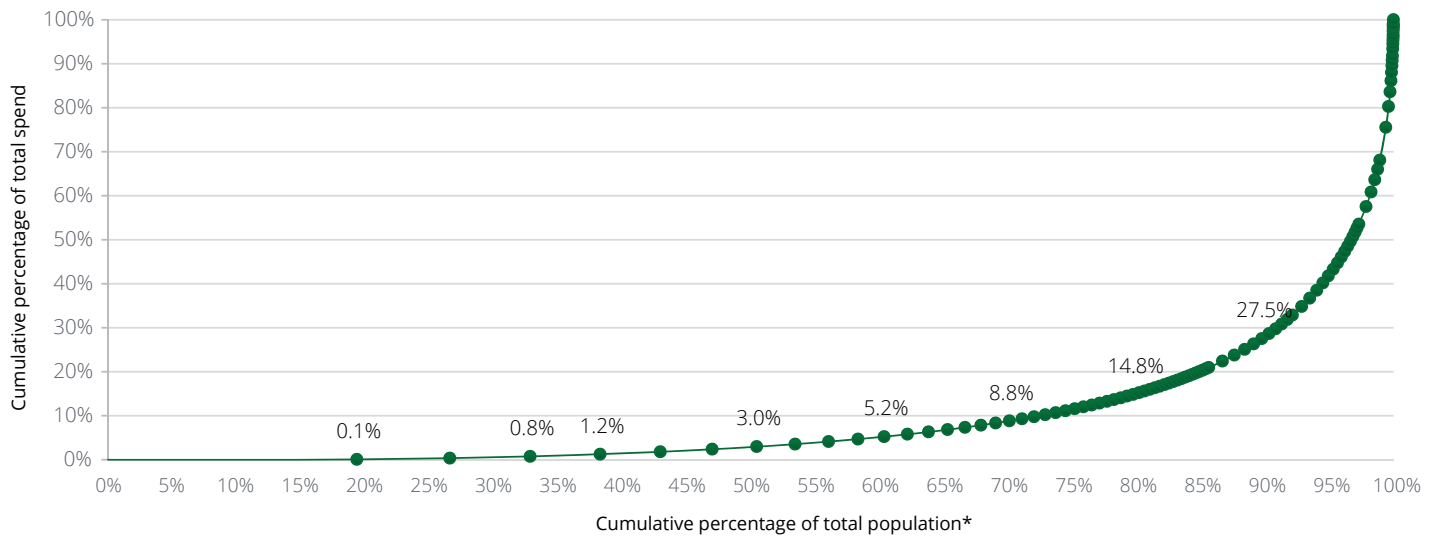
*Population includes only members that are eligible and enrolled for coverage for all 12 months.

Figure 1b: 2014 commercial cumulative percentage of total allowed medical spend
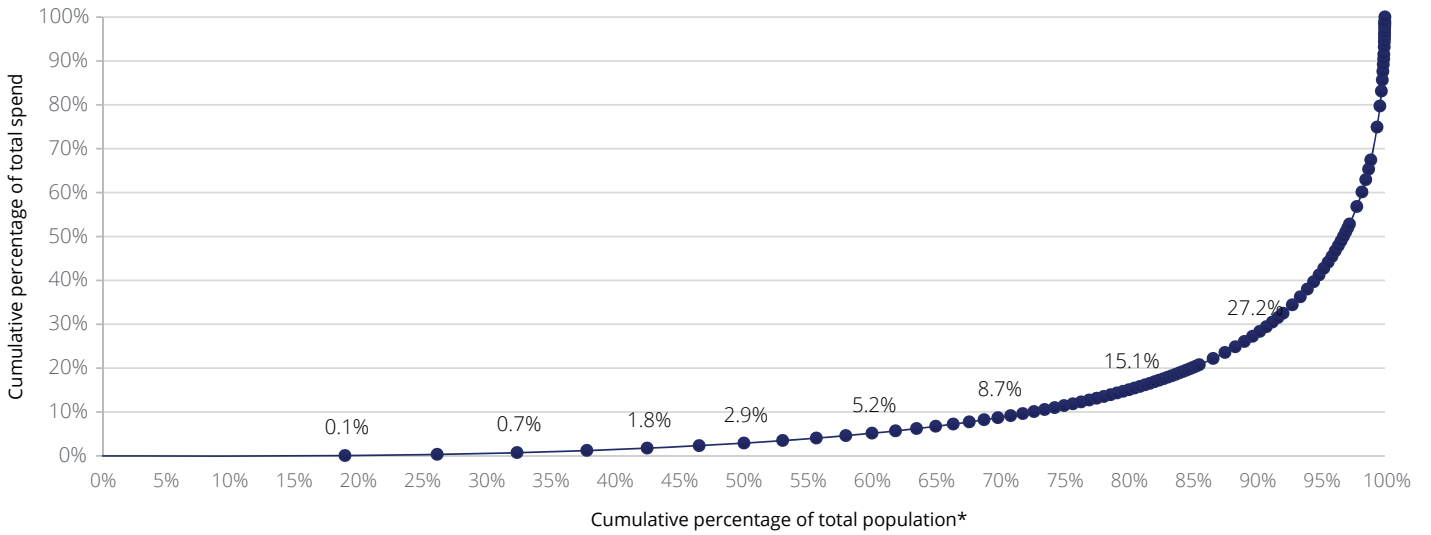
*Population includes only members that are eligible and enrolled for coverage for all 12 months.

Figure 1c: 2015 commercial cumulative percentage of total allowed medical spend

*Population includes only members that are eligible and enrolled for coverage for all 12 months.

What happens to the spending distribution when you combine medical and pharmacy spending in the commercial population?

In the commercially insured population, looking at medical and pharmacy spending, the distribution was actually 82/20:

- The top 20% spent 82% of the dollars

- The top 10% spent 68–69% of the dollars

- The top 5% spent 53–54%

- The top 1% consumed 27% of the health care dollars (Table 2)

Adding pharmacy spending to medical does shift the concentration curve somewhat to the left (slightly less steeply concentrated) in the commercial-insured population, but not dramatically. This could reflect a number of factors, including but not limited to the fact that drug spending tracks with medical spending and/or the fact that high-cost injectable medications are included in the "medical" claim category in many commercial health plans.

Table 2: Distribution of medical and pharmacy spending for commercial population

| Commercial	Year	Top 1% of population	Top 5% of population	Top 10% of population	Top 20% of Population
		Spent what % of total dollars spent (medical and pharmacy claims)			
Medical + RX	2013	27.0%	53.0%	68.0%	82.0%
Medical + RX	2014	25.0%	53.4%	68.0%	82.1%
Medical + RX	2015	27.0%	54.5%	69.0%	82.0%

Figures 2a–2c show this graphically for each year as cumulative spending curves:

Figure 2a: 2013 commercial cumulative percentage of total allowed medical and pharmacy spend
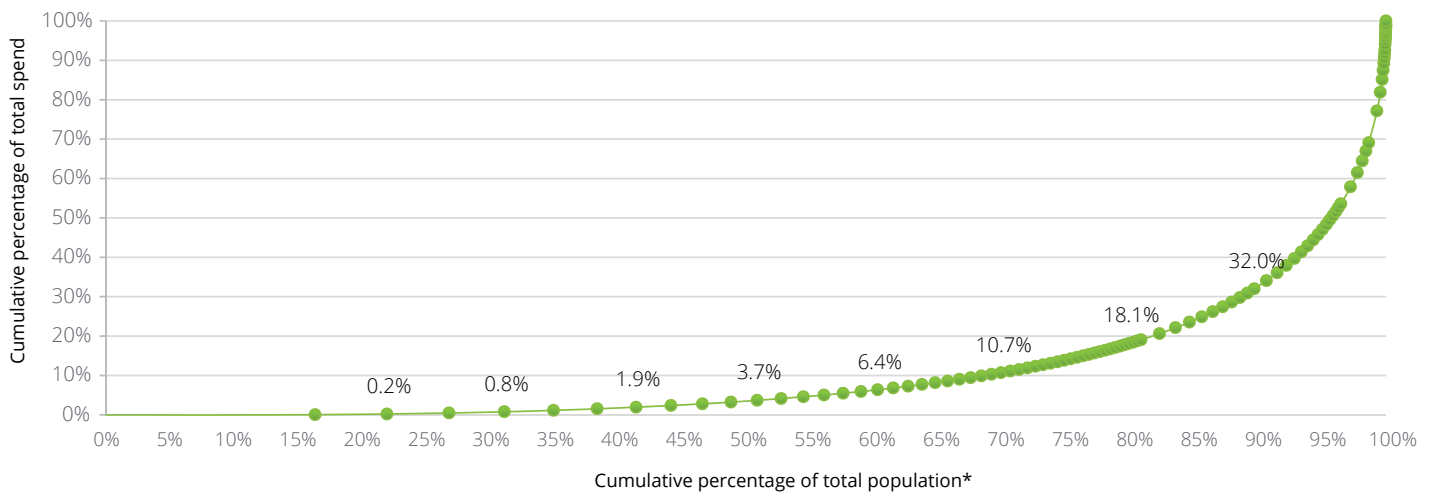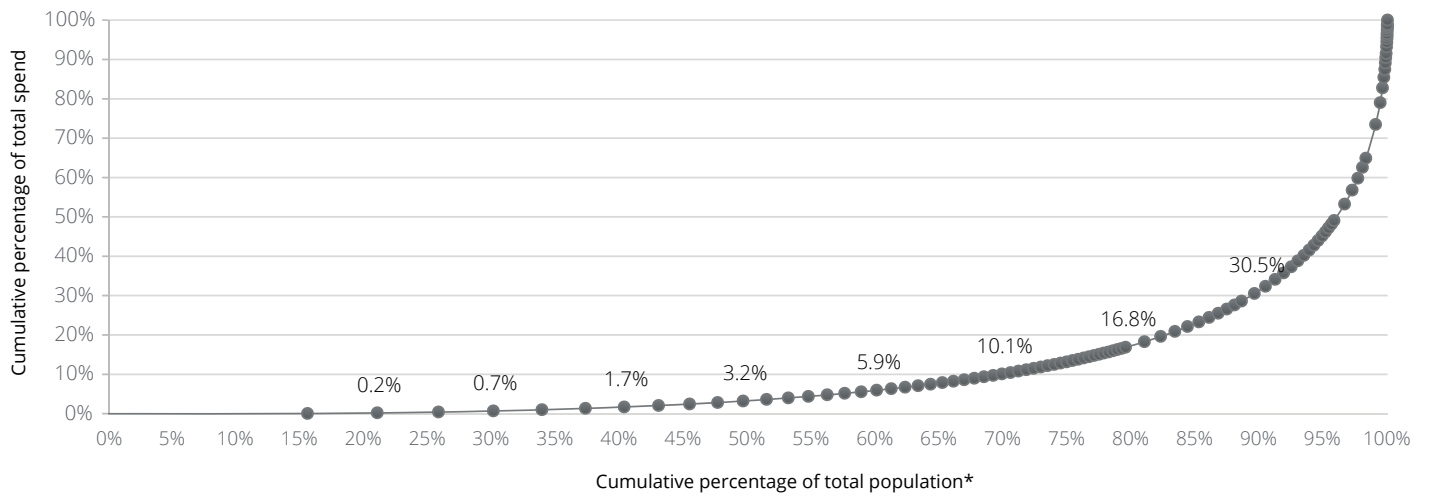

*Population includes only members that are eligible and enrolled for commercial medical and pharmacy coverage for all 12 months.

Figure 2b: 2014 commercial cumulative percentage of total allowed medical and pharmacy spend
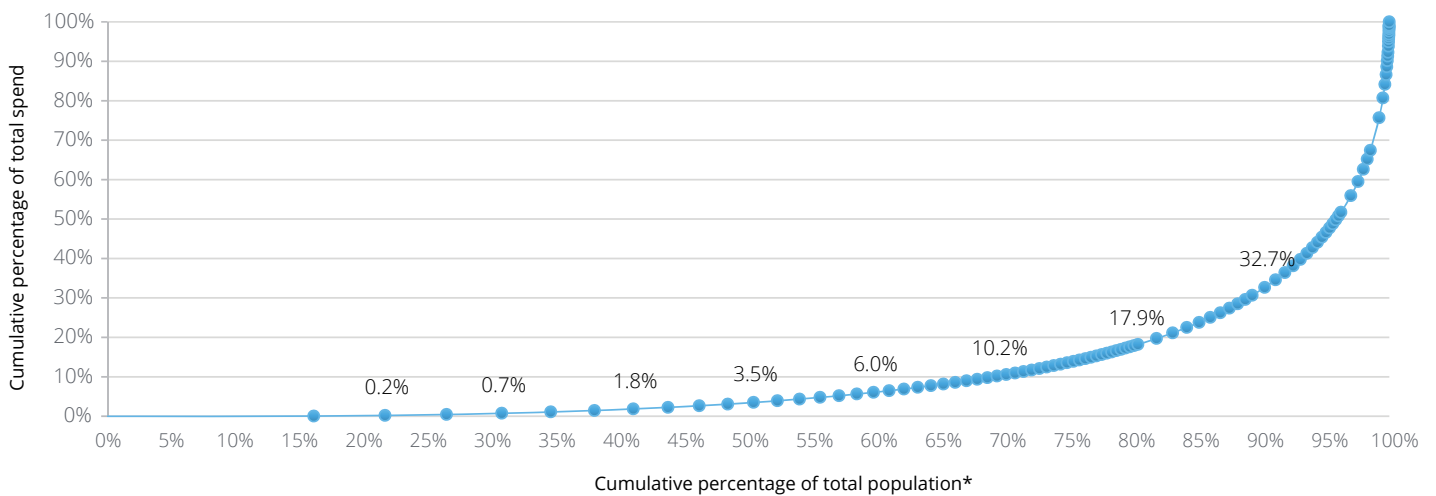
*Population includes only members that are eligible and enrolled for commercial medical and pharmacy coverage for all 12 months.

Figure 2c: 2015 commercial cumulative percentage of total allowed medical and pharmacy spend

*Population includes only members that are eligible and enrolled for commercial medical and pharmacy coverage for all 12 months.

What was the spending distribution in traditional Medicare 2012 to 2015?

Looking at Medicare Part A and B medical spending only (no Part D pharmacy), the distribution is 81/20, which is pretty close to 80/20 over all three years. Over this four-year period, the distribution of medical only spending in traditional Medicare beneficiaries across the population is consistent.

• The top 20% in traditional Medicare spent 81% of the dollars

• The top 10% in traditional Medicare spent 62–63% of the dollars

• The top 5% in traditional Medicare spent 44%, and the top 1% in traditional Medicare consumed 16–17% of health care dollars

As surprising as it may be that 1% of the Medicare individuals spent 17% of all the dollars, this concentration is half of what it is in the Commercial cohort where the top 1% spent 30–33% of the dollars.

Table 3: Distribution of medical spending for Medicare Part A and B

| Medicare	Year	Top 1% of population	Top 5% of population	Top 10% of population	Top 20% of population
		Spent what % of total dollars spent (medical claims only)			
Medical only	2012	16.0%	43.6%	63.0%	80.6%
Medical only	2014	16.5%	44.3%	63.0%	80.9%
Medical only	2015	16.5%	44.6%	61.6%	81.0%

Figures 3a–3c show this graphically for each year as cumulative spending curves:

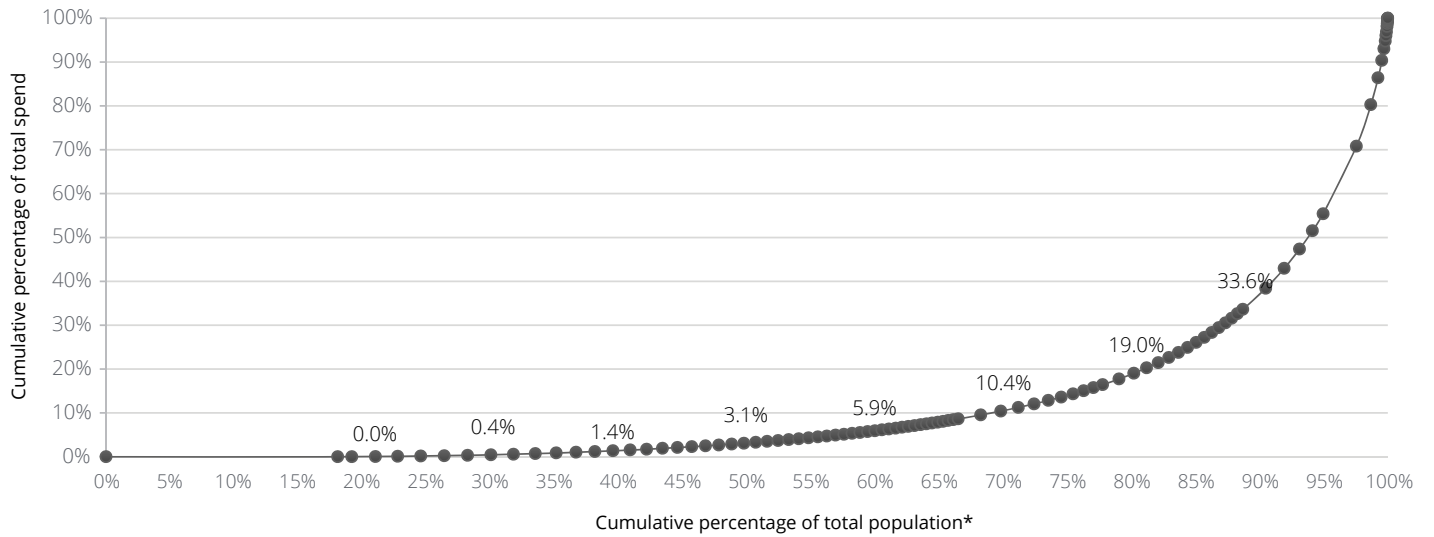### Figure 3a: 2012 Medicare cumulative percentage of total allowed medical spend
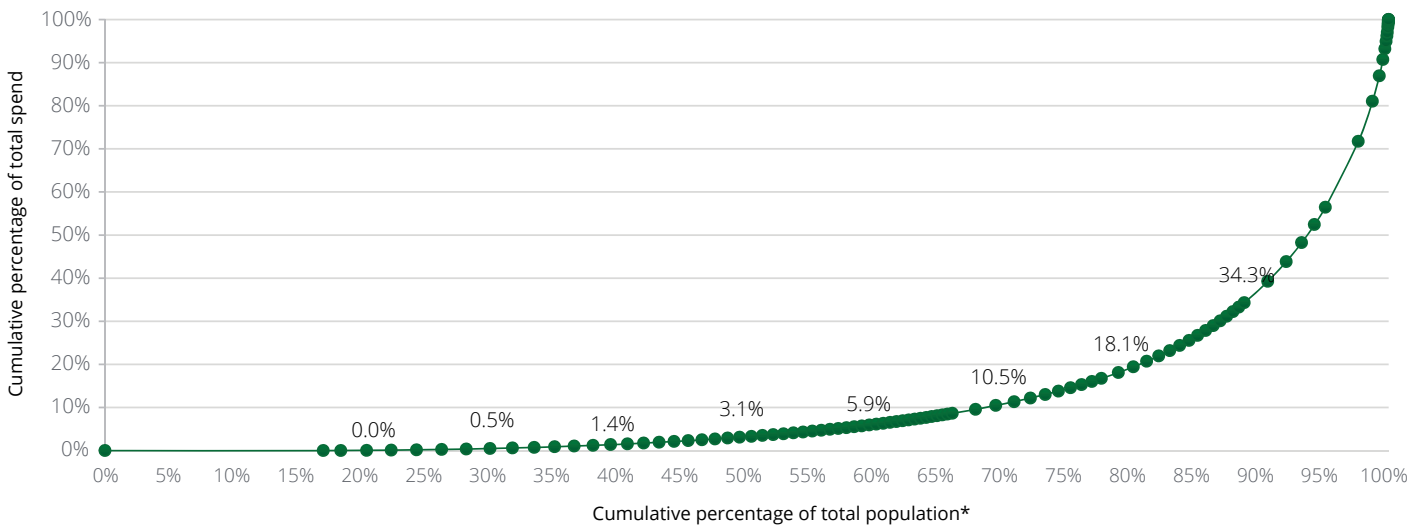
*Population includes only members that are eligible and enrolled for coverage for all 12 months.

Figure 3b: 2014 Medicare cumulative percentage of total medical allowed spend
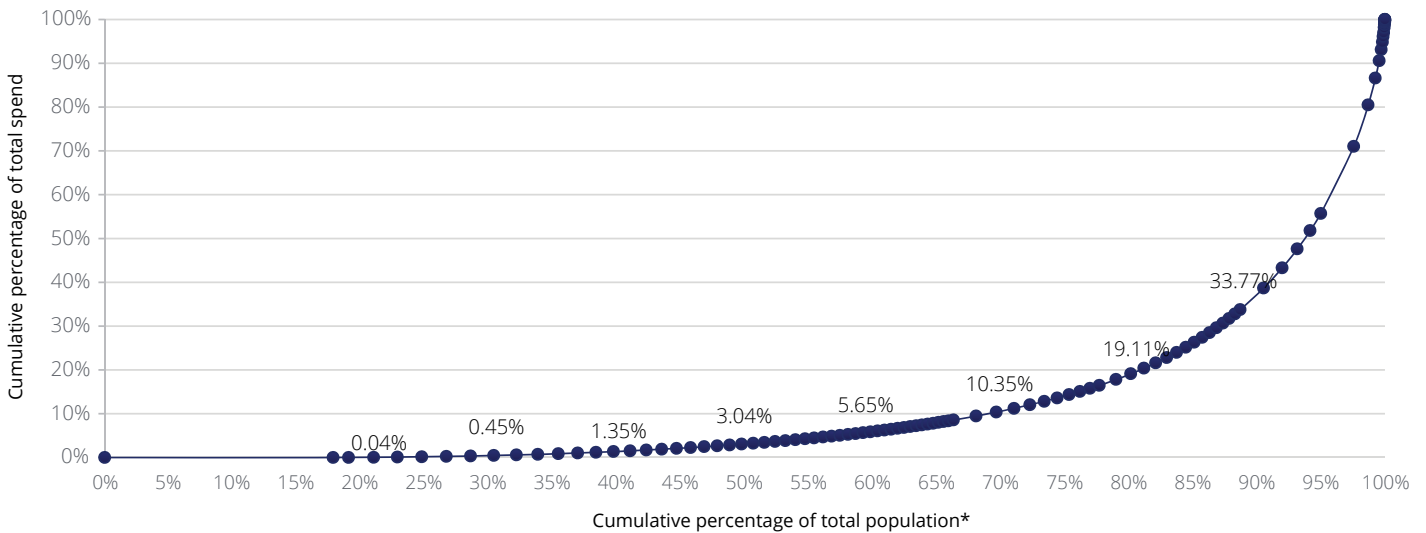
*Population includes only members that are eligible and enrolled for coverage for all 12 months.

Figure 3c: 2015 Medicare cumulative percentage of total allowed medical spend

*Population includes only members that are eligible and enrolled for coverage for all 12 months.

Looking at the numbers a different way shows us the number of individuals in the top spending bands — a practical necessity when designing health care support interventions.

Another way to visualize medical spending across these populations is to break the population into "deciles" of spend. The following bar charts illustrate the relative size of each 10% band of spending during 2015, the most recent year studied.

Table 4: What percentage of the population accounts for the top 1%, 5%, 10%, and 20% of spending?

Population	Top 1% of spending	Top 5% of spending	Top 10% of spending	Top 20% of spending
Commercial medical claims only	*Is expended by what percentage of the population?*			
2013	0.002%	0.032%	0.100%	0.400%
2014	0.003%	0.030%	0.100%	0.400%
2015	0.003%	0.030%	0.110%	0.400%
Medicare medical claims only				
2012	0.020%	0.200%	0.400%	1.300%
2014	0.030%	0.200%	0.500%	1.300%
2015	0.020%	0.200%	0.500%	1.300%

Figures 4a–4c show this graphically with the size of the bar showing relative number of individuals in each decile of spend in 2015:

Figure 4a: 2015 Number of commercial members per decile of spend (Medical claims only)
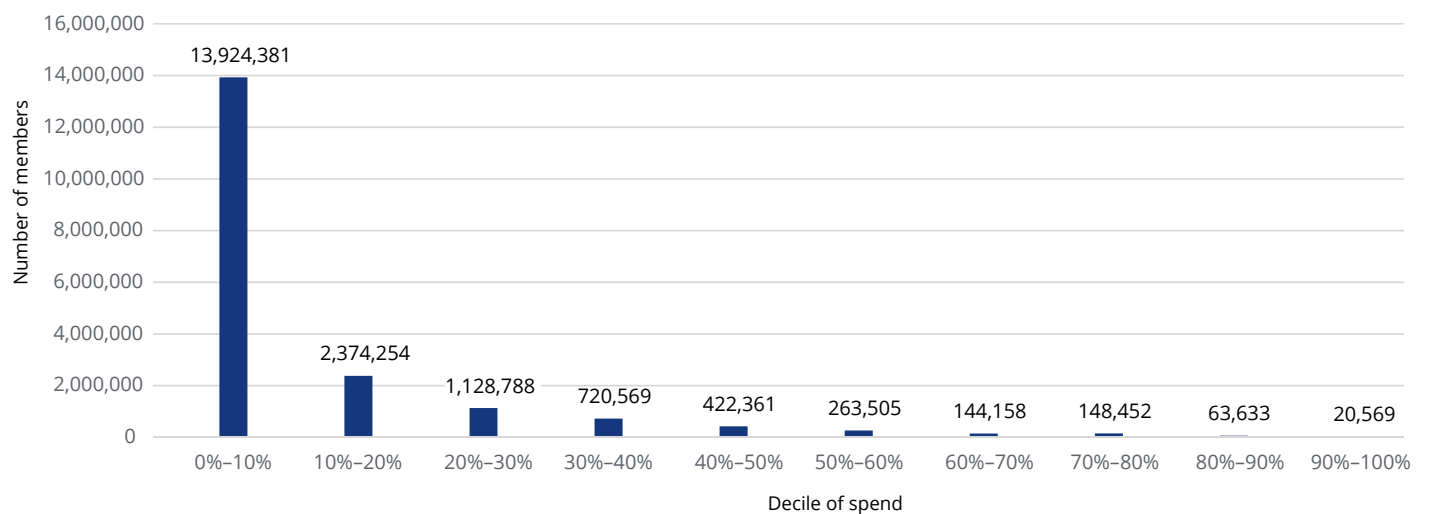
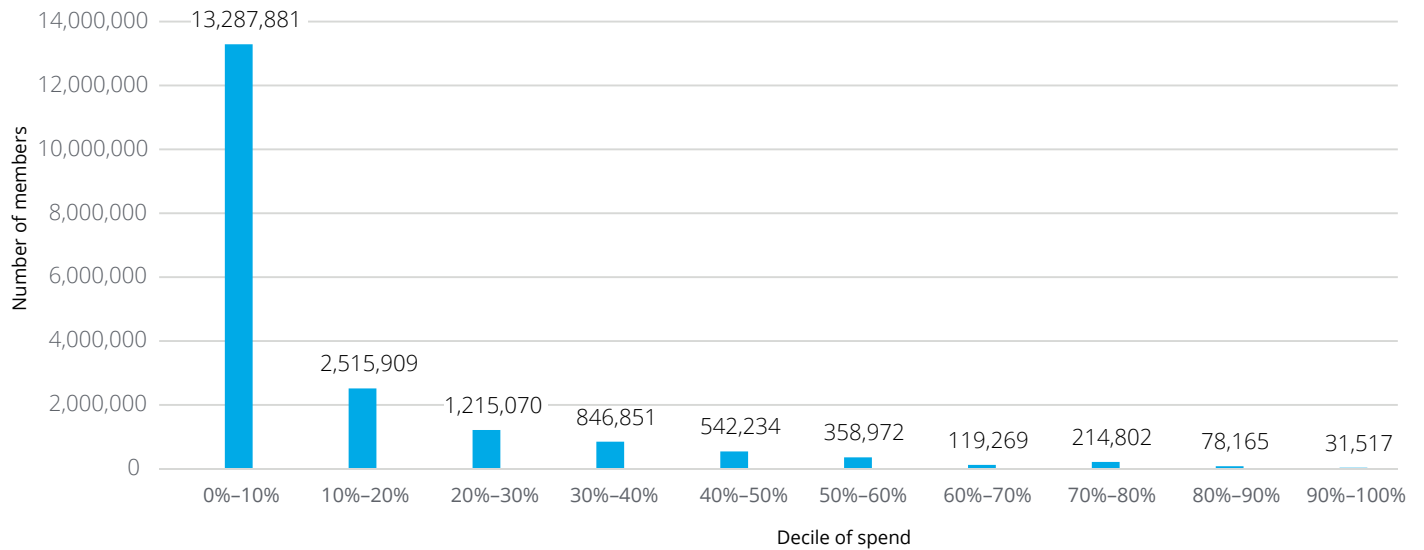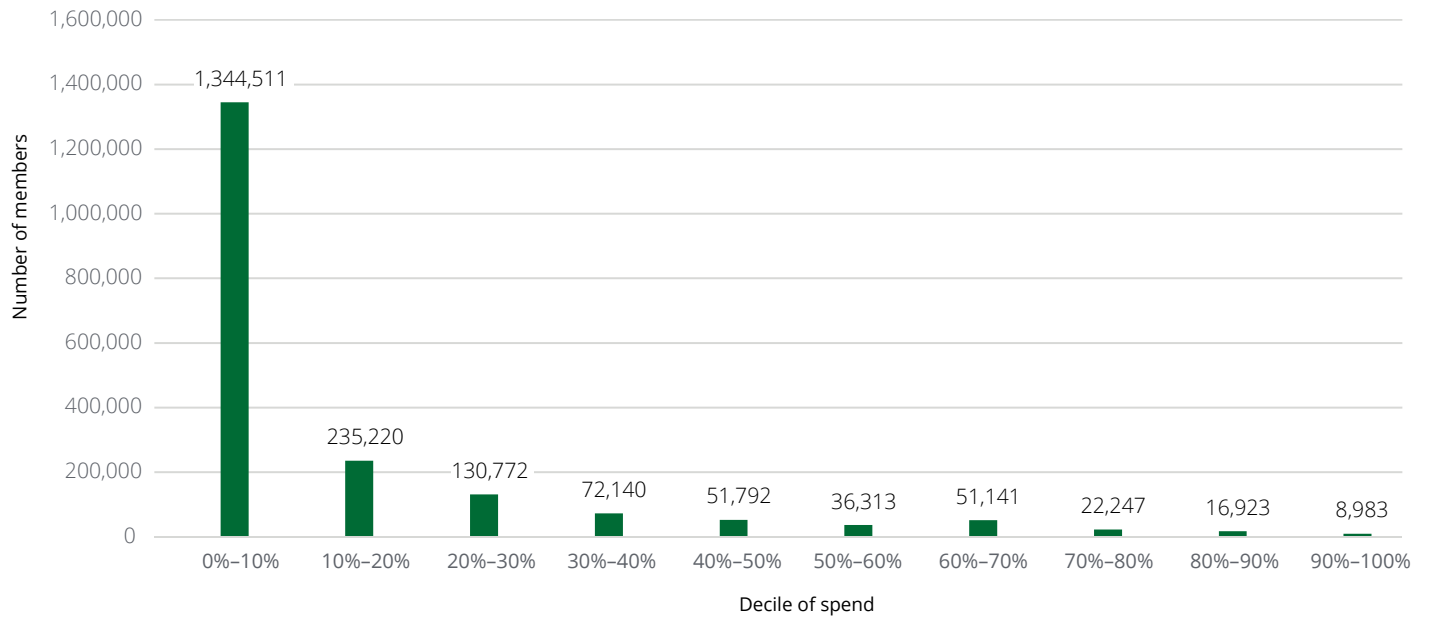**Figure 4b: 2015 Number of commercial members per decile of spend (Medical and Rx)**

Figure 4c: 2015 Number of Medicare members per decile of spend

A path forward

What do the commercial spending numbers tell us?

The concentration of health care spending appears to be extremely concentrated at the top in commercially-insured cohorts. A very few individuals consume a disproportionate amount of health care dollars. As can be seen in Table 4, less than 1 out of every 200 people account for 20% of all the medical claims paid.

Less than 0.5% of the population expends 10% of the dollars. This concentration is very consistent across the three periods studied.

In contrast, between 14% and 15% of commercially insured members have no medical claims in a given year. When pharmacy claims are included, the number of people with no spending drop to 11–12%. The numbers do not tell us if these are individuals who are very healthy and truly consume no medical care, or they obtain care through one or more other channels that do not generate an insurance claim in the Truven database (such as out-of-pocket spending, care at workplace clinics, government/VA clinics, or other sites that do not bill insurance.)

What do the Medicare spending numbers tell us?

If we look at the top 1% of the dollars, they are spent on 0.02–0.03% of members or 2–3 out of 10,000 traditional Medicare members. These high spenders are "rare" but ten times more common on a population basis than in commercial cohort (where it is 2–3 out of 100,000). Further drill-down analysis as to the responsible diagnoses and treatments would be needed to see if the spending in this top 1% is impactable.

Less than 0.5% of the population (or 1 in 200) expends 10% of the dollars. This concentration is very consistent across the three periods studied. A very few individuals consume a disproportionate amount of health care dollars. As can be seen in Table 4, only 1–2 people out of 100 accounted for 20% of all the medical claims paid.

Conversely, 18% of original Medicare beneficiaries do not generate a medical claim at all in a given twelve-month period. Remember, these are individuals with coverage for all twelve months, so they might be very healthy, or they might receive care through some other source outside of their Medicare coverage.

What are some of the key differences between commercial and traditional Medicare in our analysis?

Commercial distribution of spending is more concentrated than Medicare at all levels at the top, and especially striking for the top 1% which accounts for double the percent of spending in commercial than in Medicare. So it's "85/20" for commercial, and "81/20" for Medicare.

Is the spending distribution changing over time?

Schoeman noted in his analysis that a highly skewed distribution of spending has been observed for many years.[12,13] When the total civilian spending including commercial and Medicare is considered, spending has actually become slightly less concentrated over time, as high spending has spread to a broader swath of the population. For example, whereas 56% of spending was concentrated among the top 5% in 1987 this group accounted for just under half of spending in 2009. Similarly, the spending share for the top 1% fell from 28% in 1987 to about 22% in 2009.

Based only on retrospective claims spending information, we could "focus on the 20%" of spending by targeting 1.3% of the individuals in Medicare and just 0.4% of the individuals in commercial — if their past spending predicts current or future needs.

These observations were updated by AHRQ for 2014 combined commercial and Medicare civilian spending.[14] In 2014, the top 5% accounted for 50% of spending (slightly less than in 2009) and the top 1% spent approximately 23% (very slightly higher than 2009).

Our analysis separated commercial and Medicare spending, and used actual claims paid for cohorts with a full twelve months of insurance coverage, rather than the MEPS survey. If the commercial and Medicare distributions were taken together, the observations are broadly consistent, i.e., over time there is a slow trend towards less concentration of spending in the top 5 and 10%, but the commercial concentration at the top is very marked. And in the recent four-year span we studied, the distribution and concentration is staying fairly consistent.

What this analysis doesn't tell us

As mentioned above, the Medicare cohorts do not include pharmacy spending, and these Medicare cohorts could be a mixture of individuals with and without pharmacy coverage. The commercial cohorts have both medical and pharmacy coverage for the entire twelve months of each year analyzed.

Since the cohorts contain different samples, we were not able to analyze the "persistence" of spending or cost progression across time — that is, whether individuals in a particular spending band in one year continue to be in the same spending band in subsequent periods.

In this analysis, we did not delve into many attributes that population health analytics use to explore variation in spending, including but not limited to: the clinical causes of the spending, demographic attributes, provider practice patterns, site of service, unit costs, use of new technologies or treatments or social determinants of care.

Potential implications for health care stakeholders

As the roles of providers and payers converge, key health care stakeholders will have varying reactions to these findings but will likely share several key themes:

- Understanding the costs and utilization of the population as a whole
- Learning to predict which individuals can benefit from care support interventions
- Getting the most value from expensive technology investments and treatments.

Delivery system leaders: Today's delivery system leaders (CEOs, CFOs, CMOs, CIOs) may be expected to pay for the high fixed costs of hospitals and advanced technology under today's fee-for-service system, while transforming into accountable population health organizations at the same time. It's important to first understand who the "population" is, and how it utilizes care and incurs costs over time. More than ever, these leaders often want to understand the patients on the high end of the cost curve, and utilize care managers to serve them. They also are beginning to see the value of understanding the "low end" and the "middle" to help keep the population as healthy as possible.

Providers delivering care: Increasingly, providers are becoming accountable for specific populations as they move away from fee-for-service reimbursement to alternative payment models. Understanding the cost and utilization behavior of their "population", while much smaller than the large cohorts we analyzed, is key to informing providers where the "money is going." Provider organizations may not be used to studying summary trends, and comparing provider behavior and patient behavior to local averages or regional benchmarks. Once providers

become comfortable with the validity of data they "own", they can move from defense to offense, i.e., from challenging the findings to addressing the areas of opportunity.

Public health agencies and policy makers: From the perspective of public health professionals, "population health" is all of us. The spending distribution of insured individuals analyzed in this paper (Medicare and employer-based insurance) is only part of the picture. Policy makers tend to be concerned with those who are under-insured or uninsured. But even in the groups we studied that had coverage during the periods analyzed, we still see the concentration of spending in a fraction of the population, as well as a significant number not incurring any health care expense.

Health plans: More than ever, it's important for health plans to understand the drivers of high spending and ways to focus on members with predicted high cost. The interventions needed are those that effectively engage high cost members and help reduce the cost of care, or help improve the quality and experience of care, or both. At the same time, payers should explore those members that don't spend anything — or those that spend "enough" to indicate that their prevention and wellness needs are being met.

Employers: Employers realize that they bear both direct health care costs and significant indirect costs in the form of absenteeism, presenteeism, disability, and reduced employee engagement. Significant chronic condition costs impact working adults and their dependents. As sophisticated purchasers, they should challenge their health plans to show how

population health analytics are informing member outreach and interventions across the spending spectrum.

Pharma and life sciences companies: As pharmacy costs continue to increase, those paying high drug prices (payers, risk-bearing providers and consumers) should focus on alternative sourcing, utilization controls, and patient adherence to demonstrate value for the money spent. Pharma companies will likely be challenged to justify profits with good data on long-term disease outcomes and cost savings.

Analytics and EMR vendors: The large investments in technology by providers, particularly in electronic medical record systems and population health data warehouses, should produce value in terms of actionable insights at the point of care. Increasing attention to the social determinants of health may improve our ability to predict high spending/high need. Both individual patient care needs as well as population-level reporting and analytics are needed for providers and health plans to effectively target the right consumers at the right time: the under-user, the future spender, and the current high-spend/high-need patient.

Population health/ Care management vendors: Whether provider organizations expand their care teams to include care managers, community health workers, and "navigators," or these services are provided by health plans or specialized vendors — there are rarely enough skilled care support resources to serve every patient in a population. Understanding the distribution of needs and effectively engaging the patient are key skillsets needed to succeed in population health management.

Bottom line

Considering recent medical claims in commercially insured populations, 85% of these dollars were spent on 20% or 1/5 of the population; and conversely, the remaining 15% of the dollars were spent on 80% of the population.

In Medicare populations, 81% of these dollars were spent on 20% or 1/5 of the population; and conversely, the remaining 19% of the dollars were spent on 80% of the population.

• 15–18% of individuals had no medical claim paid in a given year

• This distribution has been very consistent year to year in the 3 years studied

• Adding pharmacy spending to the commercial analysis moved the cost distribution modestly to the left

More than ever, it's important for health care stakeholders to understand the predictors and drivers of high spending in order to focus valuable health support resources on engage-able patients with impactable health needs.[15]

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