

## CARDIOLOGY WORKFORCE ANALYSIS



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### Do we have too many? Or will we see a shortage?

There’s been a debate brewing in cardiology circles on whether we’ll see a future glut or shortage of cardiologists in the next five to 10 years. At each of the past three MedAxiom meetings this topic has come up with reasonable data to support both sides. So who is right? Are we staring down a cardiologist surplus, or will we see a scarcity that will lead to a very competitive recruitment environment and drive continued compensation increases? Only time will tell for certain, but below I’ll explore several major trends that will certainly have an impact on the ultimate outcome. At the end, you can decide for yourself!

#### Megatrends Impacting Cardiology Supply & Demand

Healthcare is perhaps the most complicated industry in the United States and, as such, is difficult to predict, particularly when looking out beyond 2 – 3 years. Myriad factors influence the supply and demand curves, from population trends to federal and state legislation. Additionally, geographic differences make it impossible to simply answer yes or no to the cardiology supply question. For instance, look at Table 1, which shows physician coverage per 100,000 population in the US. As is demonstrated here, geography will play a significant role in whether a market is over or under staffed with physicians.

TABLE 1

TOP 10	PHYSICIANS	BOTTOM 10	PHYSICIANS
Massachusetts	421.5	Mississippi	180.8
Maryland	364.6	Idaho	184.1
New York	348.9	Arkansas	190.9
Rhode Island	337.8	Wyoming	191.2
Vermont	332.9	Nevada	194.3
Connecticut	332.8	Oklahoma	198
Maine	307.3	Alabama	200.8
Pennsylvania	302.1	Utah	203.2
New Hampshire	298.5	Texas	207.9
Hawaii	289.9	Iowa	208.6

ASSOC OF AMERICAN MEDICAL COLLEGES, 2013; PHYSICIANS PER 100,000 POPULATION

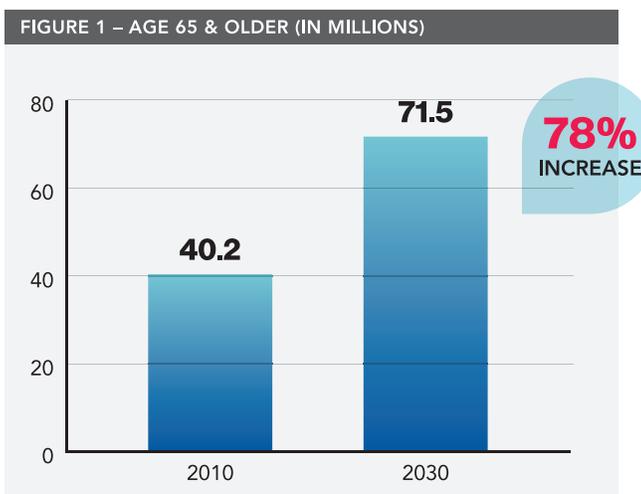
Likewise, cardiology is a complicated field and is influenced by many internal and external factors. This said, there are five megatrends that will have the greatest impact on cardiology supply and demand over the next decade. They are:

- Aging and growing population
- Prevalence of chronic diseases
- Changes in cardiology testing & procedure utilization
- Aging cardiology workforce
- Projected primary care shortages

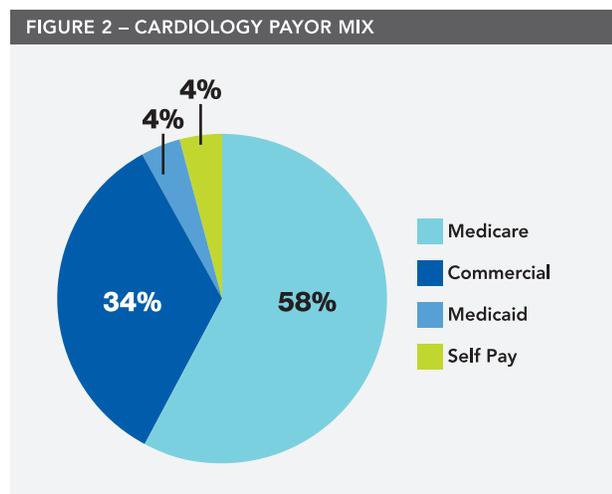
## Ageing & Growing Population

We’ve all heard for years the coming age wave caused by the Baby Boomer generation. According to the U.S. Census Bureau, 77 million people were born between the years of 1946 (just after World War II) through 1964 – the years most commonly used to define Baby Boomers. This cohort of our population is so large that currently just over 1:3 adults fit into its definition.

Using simple math, members of this generation started turning 65 years old in 2011 with 12,500 more each day currently hitting this milestone<sup>1</sup>. At this rate, the US Census data predicts that by 2030 there will be 71.5 million Americans over the age of 65 (see Figure 1). Given that cardiology patient populations tend to be skewed to the Medicare segment (see Figure 2 below), this growth will have an inevitable impact on cardiology demand. As an example, even if utilization of cardiology services dropped by nearly half for those aged 65 and older – a very tall order and not predicted (see “Prevalence of Chronic Diseases” below), the sheer increase in total population of this segment would almost entirely offset this drop.



Source: US Census Bureau 2013



Source: 2014 MedAxiom Annual Survey

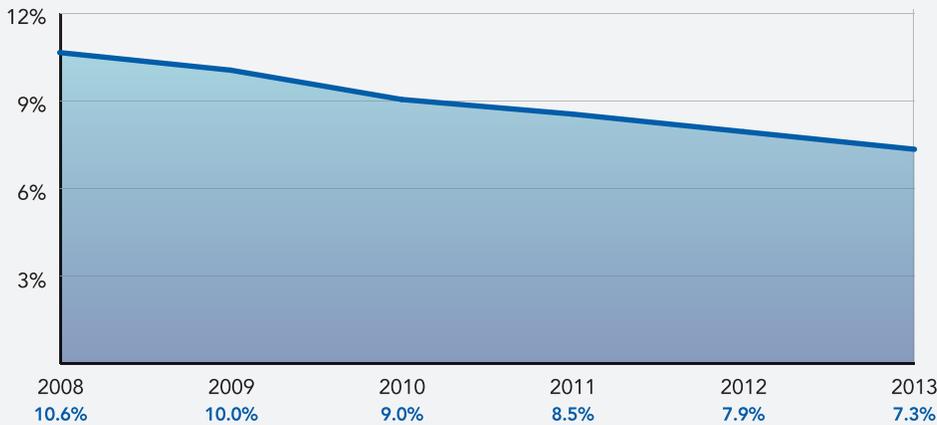
Of lesser consequence than the Baby Boomer explosion, but certainly significant enough to impact cardiology is overall US population growth. Between now and the year 2030, the US population between the ages of 18 to 65 is expected to increase by over 6 million, exceeding 205 million in total<sup>1</sup>. In the past, a large segment of this population may have been without health insurance, which would tend to pull utilization downward. However, with an estimated 21 million newly or additionally insured through the Affordable Care Act<sup>3</sup> this expanded population could bring increased demand on specialty services like cardiology. Even with no growth in the under 65 age demographic, it’s certainly likely the Affordable Care Act will impact utilization.

## Prevalence of Chronic Diseases

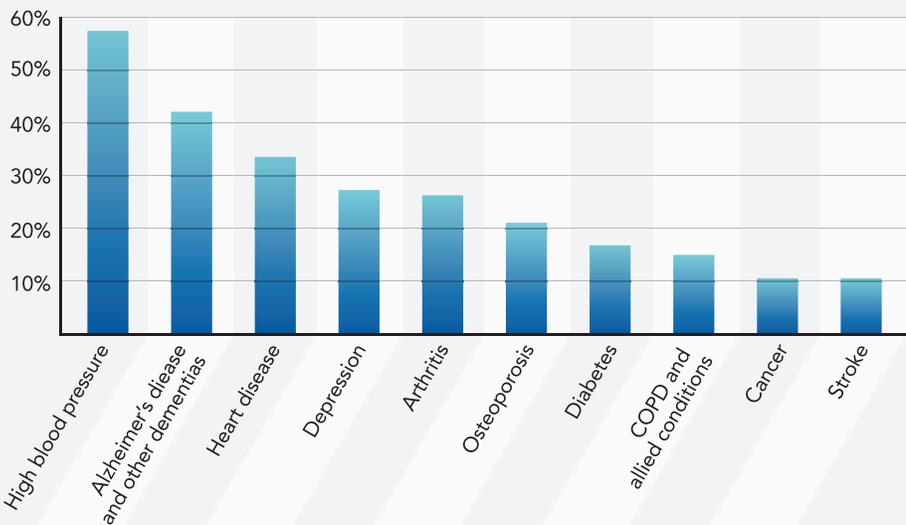
In recent years we’ve seen a reduction in the utilization of certain staple cardiology diagnostics and procedures (see “Changes in Cardiology Testing & Procedure Utilization” below), with some like nuclear cardiology experiencing a marked decline (see Figure 3). Given this, it may come as somewhat of a surprise that the incidence of chronic diseases in the population is actually increasing.

From 2001 through 2010, the percentage of US adults with multiple chronic conditions rose from 22% up to 25%. Because the US adult population is around 70 million, this seemingly small increase represents over 2 million additional adults with multiple chronic conditions. Considering that four of the top 10 chronic diseases are heart related (see Figure 4), this upward trend will undoubtedly impact cardiology demand at some point in our near future.

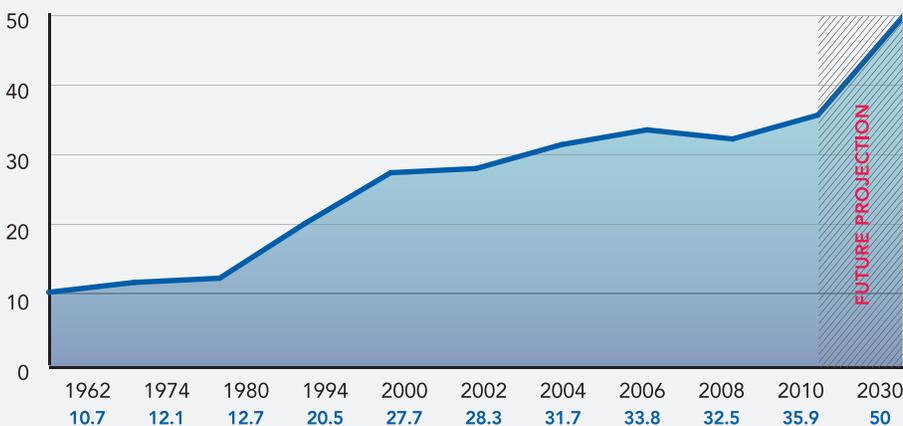
**FIGURE 3 – RATIO OF NUCLEAR STUDIES TO TOTAL COGNITIVE ENCOUNTERS**



**FIGURE 4 – TOP 10 CHRONIC DISEASES BY PERCENTAGE OF POPULATION**



**FIGURE 5 – OBESITY RATE**



One of the most significant drivers and, therefore, predictors of chronic disease prevalence is obesity. According to the Center for Disease Control (CDC), obesity increases the risk of many health conditions, but specific to cardiology expands the likelihood of coronary artery disease, stroke, high blood pressure, hyperlipidemia, elevated triglycerides and diabetes. As can be seen in Figure 5, the increase in the percentage of US population considered obese slowed during the period 2000 to 2010, but is still projected to reach 50 percent by 2030.

In a 2012 study, the Trust for America's Health found that at the present trajectory of obesity expansion in the US, the number of new cases of type 2 diabetes, coronary heart disease and stroke could increase tenfold between 2010 – 2020, and then double again by 2030<sup>4</sup>. When you consider this type of exponential growth of cardiovascular related diseases – even if predictions turn out significantly overstated – coupled with the bolus of the over 65 years demographic, the impact on demand will almost certainly be upward and dramatic.

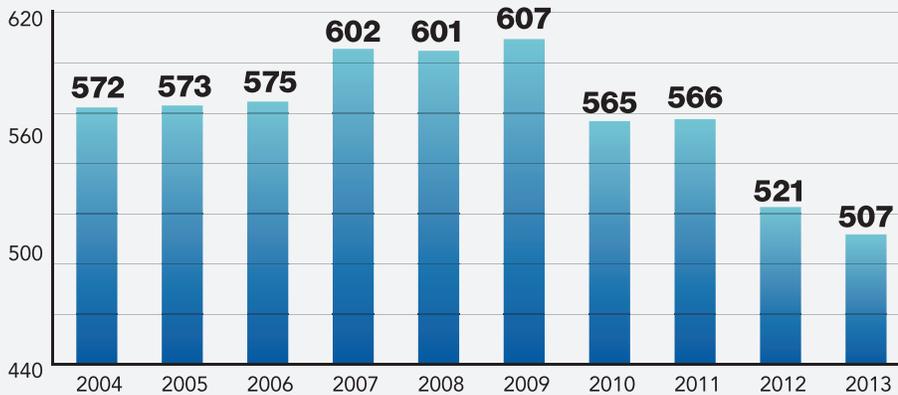
One of the bright spots for the US population – and one that lessens cardiac demand – is the reduction in cigarette smoking, a major contributor to chronic diseases in general and to cardiac problems specifically. According to the CDC, the

percentage of American adults smoking has dropped from around 44 percent in 1965 to around 19 percent in 2011. This is mostly likely one of the drivers of the changes in cardiac utilization described below.

## Changes in Cardiology Testing & Procedure Utilization

On the flipside of the demand increases predicted by the above data is the reality of the past several years. Cardiology groups across the country have seen a significant decrease in utilization patterns for many of the historically high-volume diagnostic tests and cardiac procedures. In fact, Figure 6 shows that the number of new patients entering into a cardiology practice on a per-cardiologist basis – perhaps the strongest indicator of future testing and procedures volumes – is at a 10-year low.

**FIGURE 6 – TOTAL NEW PATIENTS PER FTE CARDIOLOGIST**



Source: 2014 MedAxiom Annual Survey

Back in 2010, the New England Journal of Medicine published a study that found the incidence of myocardial infarction (MI) dropping in the United States<sup>6</sup>. The incidence of MI hit its peak in the year 2000 at 287 cases per 100,000 population and then dropped 24 percent to 208 cases per 100,000 in 2008.

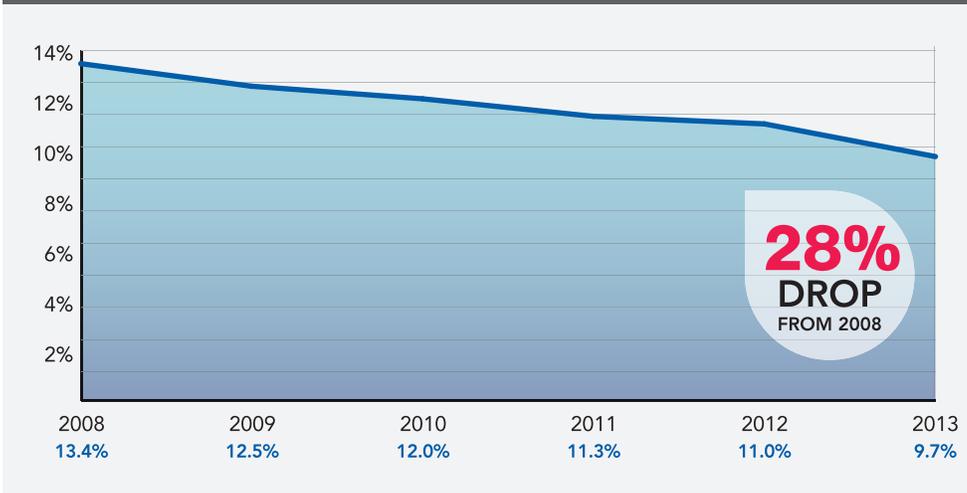
In concert with this study's findings, the 2014 MedAxiom Annual Survey shows that total catheterizations peaked in 2001 at a median level of 181 cases per FTE cardiologist and have now dropped back to 125 cases per FTE cardiologist in 2013. Expressed another way, the ratio of catheterizations to cognitive encounters (all new patients and cardiologist office visits) has dropped 17 percent in just the last six years (Figure 7). This latter statistic is a better indicator of the drop in utilization because it considers the population seen, expressed in cognitive encounters, as opposed to the population of cardiologists.

**FIGURE 7 – RATIO OF CATHETERIZATIONS TO COGNITIVE ENCOUNTERS**

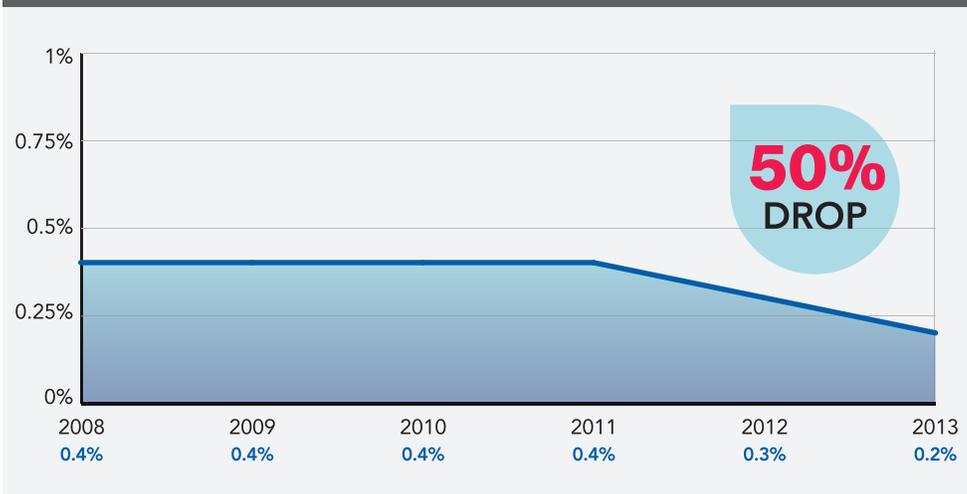


Several additional key cardiology tests and procedure trends can be found in Figures 8 - 10, all expressed as ratios of the population of patients seen (cognitive encounters).

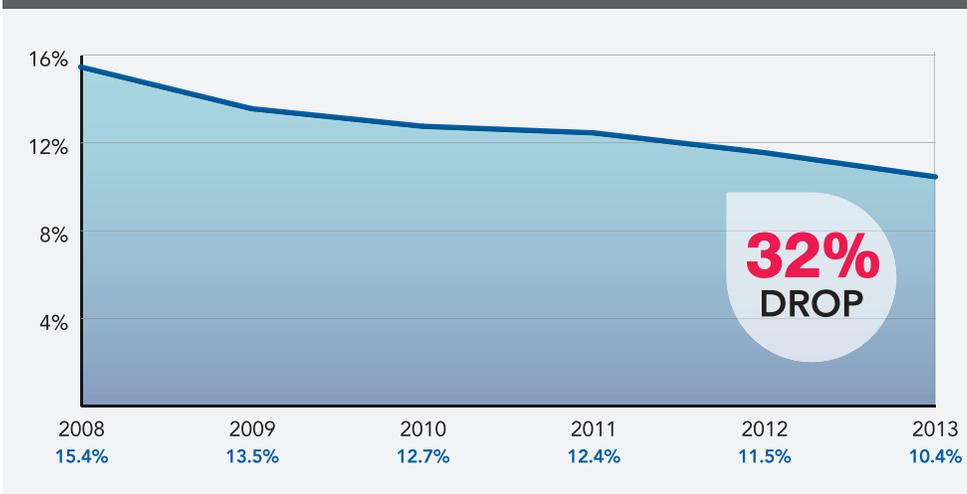
**FIGURE 8 – RATIO OF IMAGED STRESS STUDIES TO TOTAL COGNITIVE ENCOUNTERS**



**FIGURE 9 – RATIO OF ICD IMPLANTS TO TOTAL COGNITIVE ENCOUNTERS**



**FIGURE 10 – RATIO OF TREADMILLS TO TOTAL COGNITIVE ENCOUNTERS**

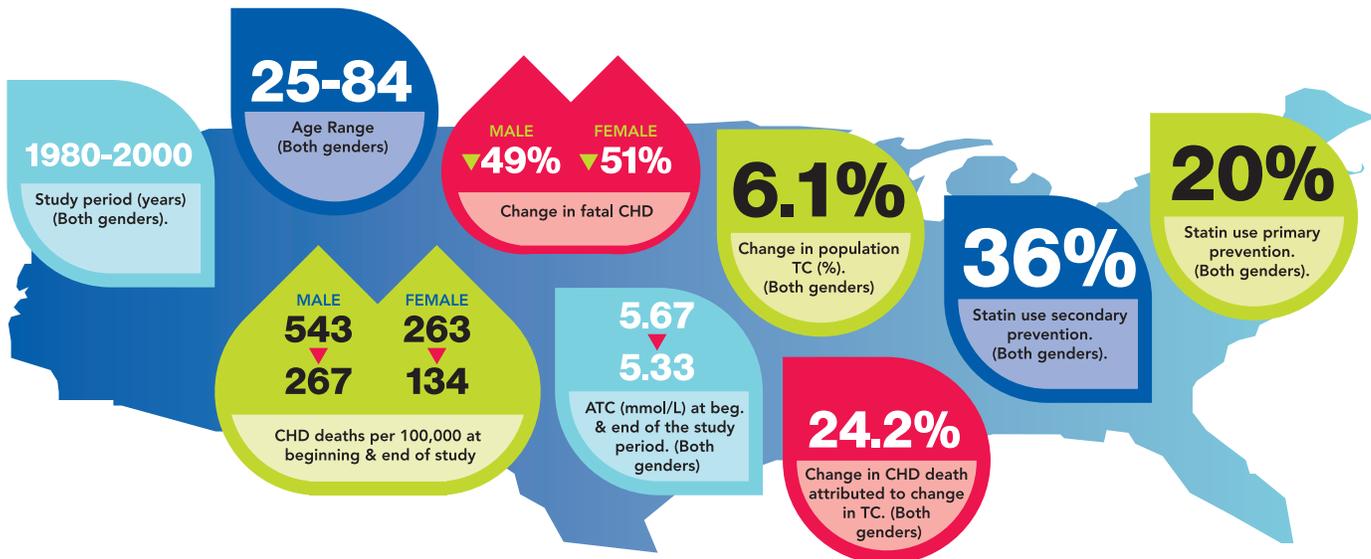


The drop in cardiology utilization for certain diagnostic and therapeutic procedures has been so dramatic and sudden, it has many believing the new normal will simply require less cardiologists. So what's driving these decreases and will such declines continue? It would be ideal if our industry were hit with just one change at a time. This would allow us the luxury of pinpointing the cause of such important changes and help predict with more clarity the future impact. Unfortunately, our real world doesn't act that way and, as is the case here, more often introduces multiple culprits.

It's impossible to discuss the overall drop in cardiology procedures without mentioning the impact of statins on this segment of medicine. While there is some debate as to the role that statins played versus other contributing factors like diet changes, there is no question that we have seen a marked decline in overall cholesterol and coronary heart disease (CHD). A 2012 article published in the European Heart Journal<sup>7</sup> created a table showing the worldwide effect of reduced cholesterol on coronary heart disease. This study finds that between 1981 – 2000 coronary heart disease (CHD) in the United States dropped by 62 percent among males and by 51 percent among females (see Figure 11). Clearly such dramatic changes have impacted utilization rates. The question

unanswered is whether the impact has already been realized, or if continued downward trends are possible.

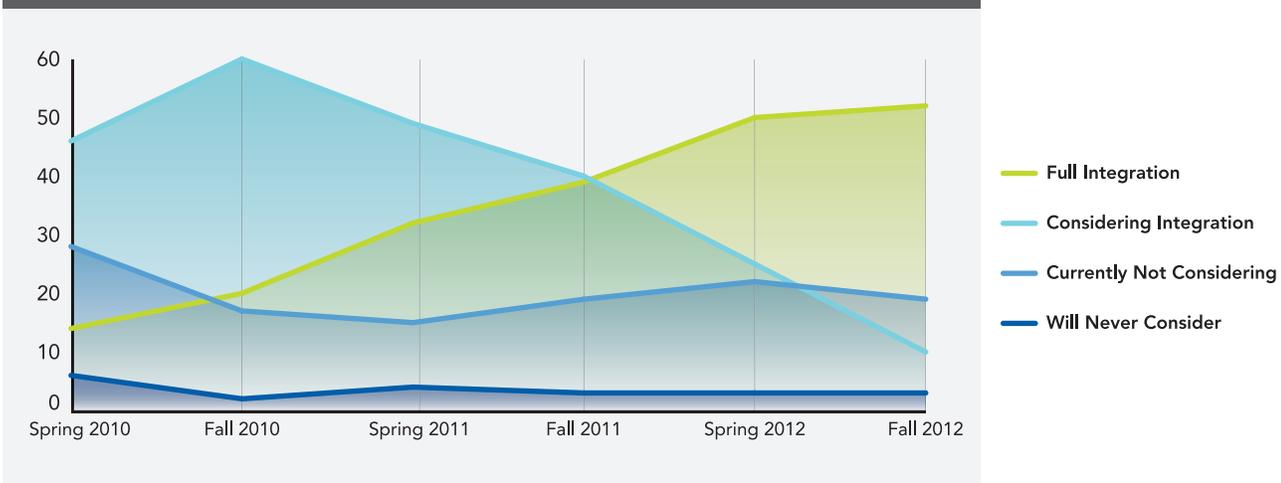
FIGURE 11 – OVERVIEW OF THE IMPACT OF POPULATION TOTAL CHOLESTOROL CHANGES IN THE USA



Beyond statins, there are multiple other changes in our industry driving cardiology utilization, particularly over the past five years. Research based guidelines on when testing and treatment should and, most likely should not, be employed have had a significant muting impact on cardiac volumes. These Appropriate Use Criteria (AUC), published by national bodies like the American College of Cardiology, have narrowed the need for diagnostic imaging, particularly routine annual testing which was formerly considered the best medicine. These same AUC, based on the latest clinical research findings for efficacy, have tended to lower the number of cardiac interventions performed.

Overall economic conditions have also certainly played a role in depressed volumes. The Great Recession that began in 2008 put millions of Americans out of work and in many cases without health insurance. Related is a trend that began much earlier than the recession, but accelerated during it: the shifting of health costs to patients via out of pocket expenses. According to a 2013 report by the AARP Public Policy Institute<sup>9</sup> national healthcare spending in the US jumped 72 percent from 2000 – 2010. The same report found that during the past decade the average amount a middle-income household spends on healthcare has increased 51 percent – nearly double the growth in their incomes. At the same time, we have seen the rapid integration of private cardiology practices to hospital employment (see Figure 12).

FIGURE 12 – STAGE OF INTEGRATION



Source: 2013 MedAxiom Integration Survey

In the majority of cases, this transition causes a shift of physician office testing to hospital services, which makes these services significantly more expensive. All of these factors have contributed to the downward trend in cardiac volumes.

## Aging Cardiology Workforce

Like the US in general, the cardiology physician workforce is aging – with the oldest segment growing faster than the younger population entering the profession. Table 2, which is based on the 2014 MedAxiom Annual Survey, shows cardiology ages by subspecialty and overall. General/Non-Invasive cardiologists are the oldest segment with a median age of 56 years, followed by interventional cardiologists at 54 years and invasive physicians at 52. Electrophysiologists are the youngest cohort with a median age of 50 years.

TABLE 2

	MEDIAN AGE	% >60	%>64
Electrophysiology	50	12%	3%
Invasive	52	18%	7%
General/Non-Invasive	56	34%	23%
Interventional	54	29%	13%
All Cardiologists	53	28%	15%

Of particular note on Table 3 is that more than a third (37 percent) of the General/Non-Invasive pool is 59 years and older. This ratio is 16 percent, 21 percent and 34 percent for Electrophysiology, Invasive and Interventional physicians respectively. Based on these same data 15 percent of the overall cardiology physician workforce is age 64 years or older.

TABLE 3

CARDIOLOGY AGE QUARTILES	OVERALL		2013 BY SUBSPECIALTY			
	2012	2013	EP	INVASIVE	GENERAL	INT
Age 46 and below	31%	28%	42%	32%	28%	26%
Age 47 - 58	41%	40%	42%	47%	35%	40%
Age 59 - 70	25%	28%	16%	20%	30%	32%
Age 71 and over	3%	4%	0%	1%	7%	2%

Source: 2014 MedAxiom Annual Survey

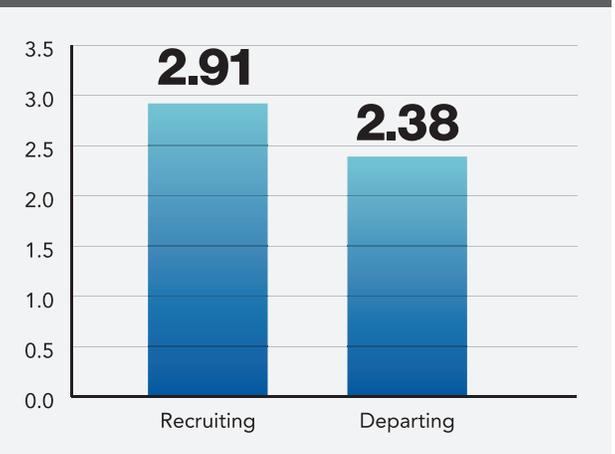
utilization being equal, you would have a static supply of cardiologists. However, as Table 3 demonstrates, this is not the case, with the younger segment shrinking and the older segments expanding (2012 compared to 2013). Further supporting this position is how quickly the pool of physicians drops once over the age 70 (bottom row of Table 3), representing just 4 percent of the total cardiology workforce a short 10 years past that 60th birthday.

In the spring of 2014 MedAxiom conducted a survey of its membership around recruitment efforts during the next 24 months. Groups that were not recruiting at all during this time were encouraged to respond with a “no” so the results did not include only programs that were recruiting. In all 62 programs responded, which represents just under 20 percent of the total MedAxiom membership. The results are quite startling.

Overall 87 percent are recruiting cardiology during the next 24 months. Of these programs, the average number of physicians each is seeking is 2.9 – nearly three new physicians in the two-year period (Figure 13). When asked what is driving recruiting, half responded it is primarily due to physician retirements or other departures (see Figure 14). The second most popular response was growth at just under a third of respondents. On the flip side of adding the physicians the survey asked how many

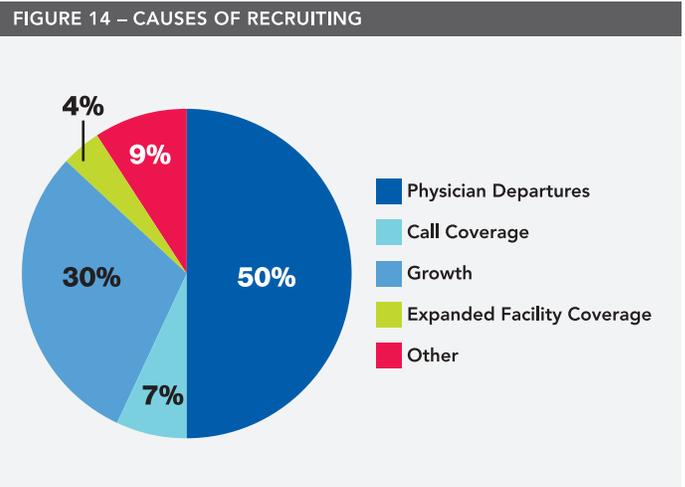
While it's true there is no consistent retirement age for physicians, it is logical to assume that a physician over the age of 60 is closer to the end of his/her career than the beginning. If the number of younger physicians coming into the pipeline were equal to this more senior element,

FIGURE 13 – COMING/GOWING NEXT 24 MONTHS



cardiologists the program expected to lose in the next 24-month period due to physicians leaving medicine (retirement, taking administrative roles, etc.). Here the average group expected attrition was 2.38 cardiologists.

According to the American College of Cardiology<sup>9</sup>, the total cardiologist population is estimated at approximately 23,000, with the annual number of cardiology fellows coming into the US workforce at around 700, or 3 percent of the total. If the age statistics and workforce data cited above are representative of this broader cardiology population the distribution would suggest a mathematical deficit in the annual number coming into the profession compared to those who will leave – by about half! Only dramatic changes to the size of cardiology training programs in the US and/or a substantial change in the issuance of foreign medical graduate visas – both quite unlikely with today’s stagnant Congress - will be able to overcome this shortfall.



### Primary Care Shortages

In a study by the US Department of Health and Human Services Health Resources and Services Administration (HRSA), published in November 2013, absent a major change in how primary care is delivered in this country the projected shortfall of primary care physicians by the year 2020 is estimated at 20,400. Given that the average primary care patient panel size is around 2,300 patients<sup>10</sup> this suggests that approximately 47 million Americans will have great difficulty getting access to these primary services.

One of the cornerstone elements embraced by the Affordable Care Act, more commonly referred to as Obama Care, is the Patient Centered Medical Home (PCMH), where a team of primary care professionals expand the panel capacity of each primary care physician. Further this model is intended to take on an expanded role in managing chronic diseases such as hyperlipidemia, hypertension and coronary artery disease. Should this model proliferate and take over primary management of these chronic cardiac conditions there would be an obvious pressure release on the cardiology infrastructure.

However, a 2014 report by the National Committee for Quality Assurance, with the largest PCMH program in the US, shows that just 10 percent of the current primary care physician population falls within this definition. Adoption of this model has been slow to develop in large part because physician reimbursement is still nearly entirely based on a fee-for-service model, where many of the activities critical for the PCMH model are simply not paid for. Even if this model blossoms, the HRSA report suggested the projected shortage could be “somewhat alleviated,” suggesting that it is quite likely the US will see a primary care shortage over the next 5 – 10 years. This will result in the current cardiology-based chronic disease utilization continuing for the foreseeable future.

### Summary

Myriad forces will determine the supply and demand equation with respect to the cardiology workforce; with so many at play predicting the future with any precision is a challenge. Compounding this are potential changes to the industry that would have profound effect on utilization, such as the widespread adoption of the PCMH as mentioned above, or the move away from fee-for-service physician reimbursement to something more global or value-based. Both of these are real possibilities and are even in motion, albeit with modest adoption so far.

Further clouding this prediction is changing technology. By most accounts electronic medical records (EMR) and other electronic reporting systems have a long way to go in improving physician efficiency – although certainly progress is

being made on this front. As these tools evolve they may allow for expanded patient population at each physician level. There may also be technology advancements not even contemplated that will change this paradigm.

Topping it all off are conflicting reports on utilization. As recently as November, 2013, a study published in Health Affairs<sup>11</sup> predicts a 19 percent increase in inpatient hospitalization days by the year 2025. The computer model it used factored in the same changes detailed above like the aging population and the Affordable Care Act. Not even six months before this study was released Sg2, a healthcare analytics firm, in its 2013 outlook report concluded that inpatient demand would likely drop by 3 percent over the next five years.

All this said, the data quite certainly point to a shortage of cardiologists during the next 10 years. Given the robust pace of recruitment noted above, this will make for a competitive environment and a “seller’s market”. Whether or not this translates into continued compensation increases remains to be seen – as the data in this survey indicate, compensation ticked downward in 2013. However, this may be more a result of a market correction after 5 years of significant increases or may simply be a statistical blip. What seems certain is that programs will need to compete vigorously for top candidates and would be wise to protect the workforce they have!

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<sup>1</sup>US Census Bureau 2013

<sup>2</sup>Prevalence of Multiple Chronic Conditions Among US Adults: Estimates From the National Health Interview Survey, 2010. Brian W. Ward, PhD; Jeannine S. Schiller, MPH

<sup>3</sup>Health Exchange Enrollment Remains at 75% of Target - NY Times, March 11 2014

<sup>4</sup>“F as in Fat: How obesity threatens America’s future”; Trust for America’s Health Issue Report, Sept 2012; Robert Wood Johnson Foundation

<sup>5</sup>2014 MedAxiom Annual Survey

<sup>6</sup>Population Trends in the Incidence and Outcomes of Acute Myocardial Infarction Robert W. Yeh, M.D., Stephen Sidney, M.D., M.P.H., Malini Chandra, M.B.A., Michael Sorel, M.P.H., Joseph V. Selby, M.D., M.P.H., and Alan S. Go, M.D.; N Engl J Med 2010; 362:2155-2165, June 10, 2010

<sup>7</sup>“Changes in total cholesterol levels in Western societies are not related to statin, but rather dietary factors: the example of the Icelandic population”; Bolli Thorsson, Laufey Steingrimsdottir, Sigrun Halldorsdottir, Karl Andersen, Gunnar Sigurdsson, Thor Aspelund, & Vilundur Gudnason; Oct 2012

<sup>8</sup>AARP Public Policy Institute: The Effects of Rising Health Care Costs on Middle-Class Economic Security; Harriet Komisar, Georgetown University; Jan 2013

<sup>9</sup>“ACC 2009 Survey Results and Recommendations: Addressing the Cardiology Workforce Crisis”

George P. Rodgers, MD, FACC; Jamie B. Conti, MD, FACC; Jeffrey A. Feinstein, MD, FACC; Brian P. Griffin, MD, FACC; Jerry D. Kennett, MD, FACC; Svati Shah, MD, MHS, FACC; Mary Norine Walsh, MD, FACC; Eric S. Williams, MD, FACC; Jeffrey L. Williams, MD, MS, FACC; Sept 2009

<sup>10</sup>Annals of Family Medicine; “Estimating a Reasonable Patient Panel Size for Primary Care Physicians With Team-Based Task Delegation”, September , 2012.

<sup>11</sup>THE CARE SPAN: An Aging Population And Growing Disease Burden Will Require A Large And Specialized Health Care Workforce By 2025; Health Affairs; November 2013