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ASSOCIATION**

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2019 Conference Proceedings

Pennsylvania Economic Association

Contents of Proceedings

1. CONNECTICUT MAGNET SCHOOLS, INTEGRATION, AND ACADEMIC ACHIEVEMENT	51
Caroline Accurso	
2. HOW DEMOGRAPHIC AND ECONOMIC VARIABLES AFFECT THE FEMALE LABOR FORCE PARTICIPATION RATE	66
Kaitlin M. Albright Jesalyn N. Fada	
3. THE IMPACT OF DOWRY PAYMENTS ON WOMEN’S EDUCATION IN NEPAL	81
Abhishek Anand Tony Maynard	
4. PENNSYLVANIA RESOURCE MANUFACTURING TAX CREDIT	87
Thomas O. Armstrong	
5. INCOME AND CLINICAL OUTCOMES: AN EMPIRICAL STUDY ON CARDIOVASCULAR INCIDENCE	
Georgia Barbayannis, I-Ming Chiu, Javier Cabrera, Nora M. Cosgrove, John B. Kostis, Davit Sargsyan, William J. Kostis	
6. THE GOOD, THE BAD, AND THE UGLY OF THE ACCOUNTING PROFESSION – SHOULD ALL ASPECTS BE SHARED WITH STUDENTS?	123
Robert P. Derstine James M. Emig James P. Borden	
7. EXPLOITATION, EXPLORATION, DEVELOPMENT AND DECAY OF RESOURCES: A SYSTEMIC VIEW	137
Jeffrey Yi-Lin Forrest Yong Liu Eric Swift Tooraj Karimi	
8. A GENERALIZED VALUE CHAIN FRAMEWORK SIMULTANEOUSLY USEFUL FOR COMPANIES THAT OFFER EITHER PRODUCTS, OR SERVICES, OR INFORMATIONAL GOODS	164
Jeffrey Yi-Lin Forrest Yong Liu Jesus Valencia Yaya Sissoko Qiaoxing Li	
9. THE POTENTIAL POWER OF INTERNSHIPS AND THE IMPACT ON CAREER PREPARATION	

	Diane Galbraith	
10.	OBESITY AND SOCIOECONOMIC STATUS AMONG PERUVIAN WOMEN: EVIDENCE OF PANEL DATA ANALYSIS	202
	Tahereh Alavi Hojjat	
	Juan Daniel Morocho Ruiz	
11.	ANALYSIS OF YIELD IN REAL ESTATE	242
	Malek Lashgari	
12.	THE EFFECT OF OFFICIAL DEVELOPMENT ASSISTANCE ON HEALTH IN SUB-SAHARAN AFRICA	248
	Sierra Loehrer	
13.	DIVIDEND HOUSING: A COMMUNITY-BASED AFFORDABLE HOUSING MODEL	259
	Eric Malm	
14.	DOES THE FRIEDMAN-HAYEK HYPOTHESIS APPLY TO THE INTERNET?	267
	William P. McAndrew	
	J. Zachary Klingensmith	
15.	FROM GOWN TO TOWN: THE ECONOMIC TRANSFORMATION OF THE UNIVERSITY OF PENNSYLVANIA	286
	Helen M. Midouhas	
16.	THE ECONOMIC BENEFITS OF TRADE DEFICITS	293
	David A. Nugent	
17.	ECONOMIC ISSUES PREVENTING GOOD HEALTHCARE	299
	CJ Rhoads	
	Roger Jahnke	
	Joe Baumgarden	
	Franz Porzsolt	
18.	PLAYING IT SAFE? AN ANALYSIS OF PROFIT VARIABILITY IN THE MODERN MOTION PICTURE INDUSTRY	337
	M. Garrett Roth	
19.	AL-UMRAN: IBN-KHALDUN’S THEORY OF DEVELOPMENT	348
	Ismail Ait Saadi	
20.	THE EXTERNAL DEBT AND ITS IMPACT ON ECONOMIC GROWTH AND INVESTMENT IN ECOWAS COUNTRIES	359
	Kalamogo Coulibaly	
	Yaya Sissoko	
	Brian W. Sloboda	
21.	IMPACT OF GREEN GROWTH ON THE SUSTAINABLE DEVELOPMENT OF INDIA	371
	Babita Srivastava	
22.	WHAT MOTIVATES STUDENTS TO TAKE THE CPA EXAM?	381

	Brian Trout	
	Eric Blazer	
23.	THE DEMOGRAPHICS OF INCOME INEQUALITY: THE ROLE OF GENDER, EDUCATION AND AGE IN PENNSYLVANIA	391
	Lisa A. Wilder	
24.	THE CONTINUED PROGRESSION OF SWEDEN'S SUSTAINABLE (GREEN) ECONOMY.....	408
	Timothy L. Wilson	
	Lars Lindbergh	

ECONOMIC ISSUES PREVENTING GOOD HEALTHCARE

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ABSTRACT

The purpose of this systematic review is to outline some of the challenges (and potential opportunities) inherent with the current economic evaluation of healthcare and how they are impacting the quality of healthcare. From the search of the literature, the following factors were identified as impacting good healthcare: **Ethical, Society, Research, Custom, Process, and Payment** issues. These are discussed.

Economic issues can be influential in *causing* health problems and in preventing good healthcare practices. In the United States, even the rich are being deprived of good healthcare because of the difficulty in assessing true healthcare costs.

INTRODUCTION: CHANGING DOMAIN OF HEALTHCARE ECONOMICS

The world of healthcare (especially the economics of healthcare, the healthcare potential of chronic disease prevention, workplace healthcare, wellness, and integrative healthcare) in the United States has changed drastically over the past few decades due to a variety of reasons. The rising costs of healthcare is most often cited as the main reason, but there are others. The Patient Protection and Affordable Care Act of 2010 and the repeated attempts to defang or eliminate it might be another reason. The increased use of Electronic Health Records which makes comparative economic health research much easier to accomplish very likely is another. The extremely high cost of some procedures and medications might be another. The focused attention on overtreatment and wasted costs might be another, and a growing body of evidence suggests that there is more to treatment than drugs and surgeries. This appears to be especially true with the increased incidence of chronic health problems that occur as the population grows older and lives longer. Certainly this is another reason.

The state of healthcare research has also changed drastically. The search terms and the numbers of articles found eight years ago, listed in Table 1, tell the story of vastly changing resources for research. In 2012, the search for articles from July 2005 to June 2012 found an at-the-time-impressive 14000 articles. The exact same search done in May of 2019 for an

Pennsylvania Economic Association 2019 Conference Proceedings

equivalent time frame (previous seven years, July 2012 to May 2019) found over four times as many articles: 61,561. The number of searchable journals and the number of databases has expanded since 2012. The quality of the articles has expanded. And the economic health data is much more available.

A key question is: what can we learn from a systematic review of the literature on the economics of healthcare, especially with the development of integrative health, for the seven years before 2012 and the seven years after 2012? What themes arise from the literature on the economics of a more integrative management of healthcare, and what are the logical next steps based on those themes?

METHODS

The original 2012 search was done for a project which proposed utilizing a binary logistical regression analysis to identify the factors influential in a predictive model known as the Thrive Index (Rhoads, 2012). The Thrive Index model was conceived to predict the chances that a person will survive a treatment with a high quality of life (i.e. Thrive after the treatment). The Thrive Index was categorically the opposite of the typical economic outcomes, and it would have been used to calculate the number of quality years based upon a comparison of treatments. The Thrive index was designed to take into account many factors such as lifestyle, heredity, and ability to fulfill their role in life, and represented a personalized and individualized "health risk number" for each person, similar to the way the Fair Isaac Corporation (FICO) score represents a personalized and individualize credit risk number. The original project for the Thrive Index was dropped for political reasons and the terminology (Thrive Index) was subsequently appropriated for a completely different purpose a few years later. But the concept of a health risk assessment number has been renewed as our healthcare costs have risen. Various Health Risk Assessments have been bandied about by many different academics and health-oriented economists in the intervening seven years.

In order to optimize the benefit from our 2012 project we changed the original study question of this project from a descriptive to a comparative description. As a result we can describe a development, comparing before and after, instead of only a single current state.

The search of the literature done for that project was a deep look at the exact same issues that influence whether economics interferes with good healthcare. In addition to building on already-acrued knowledge, the seven-year comparison may be educational and instructive in and of itself. Basically it was an original attempt at a comparison of the literature in the seven years before a major upheaval in the United States healthcare system, and the seven years after.

In both cases, the following academic databases were searched for articles on methods of economic analysis for healthcare:

- Academic Search Complete
- Alt HealthWatch
- Business Source Complete
- EconLit
- Health Source: Nursing/Academic Edition
- MEDLINE

**Pennsylvania Economic Association
2019 Conference Proceedings**

In the initial search in 2012, we found 15,567 articles using the search terms in Table 1. 14,434 articles had full text and were not duplicates, and these titles were scanned based on their fit of the original search terms.

The initial search resulted in 15,567 titles. Duplicates were first eliminated, and then articles for which full text was not available (total eliminated 1133). Of the 14,434 remaining articles, the titles that were obviously not appropriate for the study were eliminated (5333). The abstracts of the resulting list (9101 records) were manually reviewed. We included the article if it met one of these criteria:

- Provided a systematic review or meta-analysis on healthcare cost research.

- Described a randomly controlled study with specific financial analysis on a common ailment.

- Provided a theoretical framework or statistical model for cost benefit research.

- Discussed issues with cost benefit models and measurements.

- Estimated the impact on society costs of general ailments.

- Discussed various healthcare models and cost impacts

Additionally, 8675 were eliminated for one of the following objective reasons:

- Not involving a financial analysis- no society or cost impact.

- Only involving a pure financial analysis - no reference to quality of life or society cost.

- Different article utilizing data from study already published.

- Dealt only with single malady with no societal implications.

- Dealt only with a single treatment with no societal implications.

Additionally, articles could be eliminated for subjective reasons:

- Not sufficiently rigorous.

- Design not sufficiently documented.

- Too specific or population too narrowly defined.

After reviewing the abstracts, 426 articles were chosen to be included. This review resulted in 117 articles on the research frameworks and models of healthcare costs, 217 articles on the estimated impact on society of various models, 28 systematic reviews or meta-analysis, and 64 articles of randomly controlled comparisons of treatments and/or chronic health issues that are most likely to impact society's healthcare costs such as diabetes, hepatitis, stroke, obesity, etc. Note that there was no attempt made to create a mutually exclusive or comprehensive list of chronic health issues; a few articles of various health issues were chosen as representative in order to validate/verify the framework and model information discussed in the economically-oriented articles.

Our thinking was that a direct comparison on the topics could be made. However, we were unable to do that comparison due to the increased volume of research.

Using the same search terms, the revised search in 2019 resulting in 61,561 articles. This was too many articles even for a team of researchers to review. At that point we chose to simply utilize the earlier search instead of trying to do a direct comparison. So starting with the original 2012 search criteria, we added a set of criteria for the 2019 search; Integrative Health.

We know from earlier work that Integrative Health (also known as complementary or alternative or integrative medicine) is a good candidate for cost-effectiveness and cost savings (Charness & Jahnke, 2012). Many researchers feel that economic evaluation is necessary in order determine if healthcare costs can be avoided through the use of Integrative Health (Herman, 2018). Narrowing the search parameters by adding "Integrative Health" in

Pennsylvania Economic Association 2019 Conference Proceedings

the later search to the criteria resulted in only 96 articles being chosen for further review. After reviewing the abstracts of those 96 articles, 81 articles were eliminated using the same inclusion and exclusion criteria as the 2012 search. That left 15 additional articles to be included in this review from the 2019 search.

We also returned to the original list of 426 articles from the 2012 search with our new lens of Integrative Health. While we couldn't go back in time and add a new search term, we could manually review the articles again. After reviewing the 426 articles again, 302 were eliminated as not applicable to Integrative Health, and 50 were eliminated due to outdated data. 74 were selected to be included. The articles were reviewed in full and summarized. Both searches are graphically illustrated in Figure 1.



Figure 1. Graphic illustration of search.

RESULTS

The final results of our search were the 89 articles discussed within this paper. Each article was read and grouped on potential themes until summarizing categories became apparent. This entire process from title review and abstract scan to paper review took more than a year (2012 to 2014) for the initial search. The second process took about six months.

**Pennsylvania Economic Association
2019 Conference Proceedings**

Table 1. Comparison of Numbers for 2012 and 2019 Search

Search Terms	2012	2019	Change
Cost Impact and Healthcare	5907	39365	6.7 fold
Cost Impact and Quality of Life	4649	17415	3.7 fold
Cost Impact and Quantity of Life and QALY (Quality Adjusted Life Years)	3849	4233	1.1 fold
Cost Effectiveness and Cost Analysis and Health care reform and Health Insurance	29	548	18.9 fold
Total Number of Articles Reviewed:	14434	61561	4.3 fold

It is interesting to note that the largest change occurred in Cost Effectiveness and Cost Analysis and Health Care Reform and Health Insurance, as can be seen in Table 1. It might be posited that the explosion was due to the seemingly sudden change in healthcare due to the implementation of the Patient Protection and Affordable Care Act of 2010 in the United States, but further observation is needed as the numbers are too small for solid conclusions. It should also be noted that the number of articles with QALY (Quality of Life Years) stayed about the same.

As noted earlier, the search in 2019 was for an equivalent time-frame, seven years. The timing was not coincidental. The year 2012 was a monumental year for healthcare in the United States as that was the year the first sections of Patient Protection and Affordable Care Act (PPACA) of 2010 were implemented. By 2015 PPACA was fully implemented until the 2016 election when its future was again in doubt, as major sections were eliminated or not enforced by the new administration.

**Pennsylvania Economic Association
2019 Conference Proceedings**

Themes from Systematic Review on Healthcare Cost Issues

After reviewing all articles, it was apparent that the articles fell into several economic categories: **Society**, **Ethical**, **Research**, **Custom**, **Process**, and **Payment**. A graphical representation of the proportion of articles for each category can be found in Figure 2.

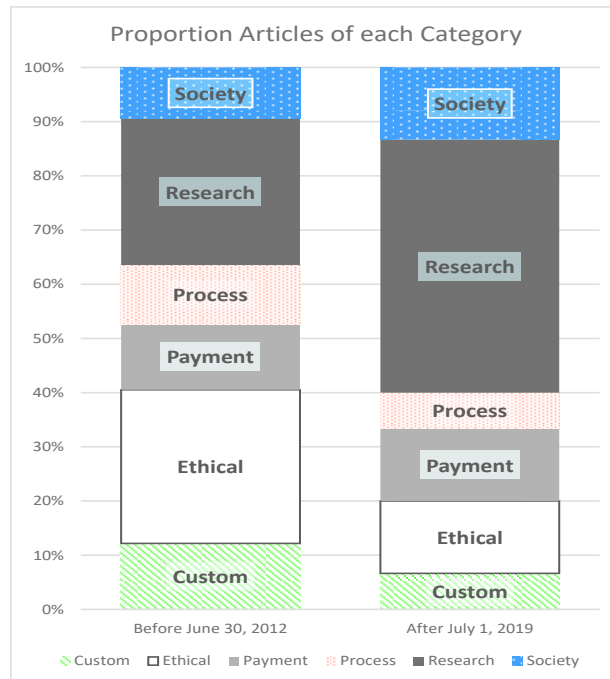


Figure 2. Proportion of Articles found in each Category, both Before and After June 30, 2012.

The total number of articles within each of the categories is summarized in Table 2.

**Pennsylvania Economic Association
2019 Conference Proceedings**

Table 2. Frequency of Articles by Category

Ethical	23
Society	9
Custom	10
Payment	11
Process	9
Research	27
Total	89

Additionally, for purposes of the discussion of each category, several government-sponsored reports and white papers were included in the reviews. When dealing with healthcare costs, it would be foolish to ignore the resources of think tanks and the United States Government and their ability to provide statistics, trends, and analysis of healthcare.

Society Issues

Society issues are healthcare quality factors that are impacted by the economic issues of our whole society: rising costs of healthcare, growing senior population, and increased prevalence of chronic conditions.

Rising Costs of Healthcare

Healthcare costs have increased compared to previous years, and are expected to continue to grow, as can be seen in the graph of healthcare costs compared to Gross Domestic Product (GDP) in Figure 3, which came from Centers for Medicare and Medicaid Services, National Health Expenditure Accounts. (The tables from 2017, published in January of 2019 are available from [http:// www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/ tables.pdf](http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/tables.pdf).) These rising costs were leveling between 2012 and 2016 when PPACA's implementation made an impact, but now are rising again as important mandates of PPACA designed to lower costs were removed.

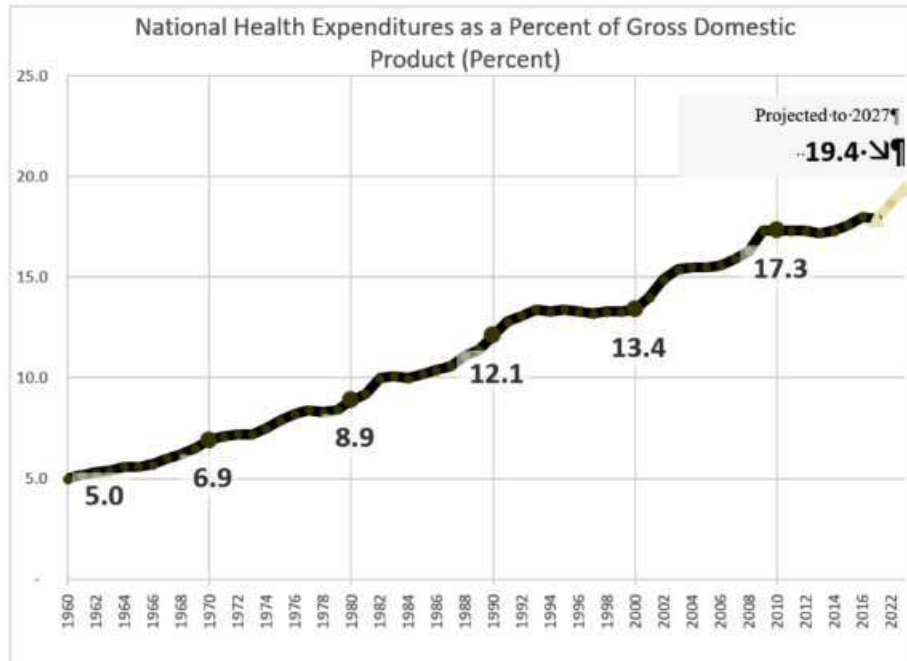


Figure 3. Healthcare Costs as Percent of GDP according to CMS.

In 2018, healthcare costs in the United States covering 327.2 million people were \$3.6 trillion dollars (\$11,002 per person). To put that in perspective, that is ten times the cost of all military spending of the government each year for the past 20 years (which was only about 300 billion dollars each year) (Crawford, 2018). If the healthcare system does not change, the health costs will increase to over \$17,200 per person by 2027, 19.4% of the GDP. There are many reasons for the rise in healthcare costs that are explored in depth in the literature, but for purposes of this article it is enough to note that healthcare beyond the ability of people to pay is not actually healthcare, but health non-care.

Growing Senior Population

Part of the problem is the growing percentage of baby boomers entering their senior years designated by the press the "Silver Tsunami" (Seals, Justice, & LaRocca, 2016). The number of people over 65 is expected to double, and the number over 80 will triple by 2050. Seventeen percent of GDP is spent on people over 65. The basic healthcare system developed to handle broken arms and traumatic accidents is not optimized for the chronic illnesses which impact 45 percent of the population, and are especially common among older people (Kumar & Nigmatullin, 2010; Kumar & Prevost, 2011). The healthcare costs of seniors are three to five times that of a younger person (as can be seen in Figure 4). If they have multiple chronic conditions, costs can be seven times more shown in Figure 5 (CDC et al., 2007). Society is facing much higher than expected costs and lower quality of healthcare as a result (Martini, Garrett, Lindquist, & Isham, 2007).

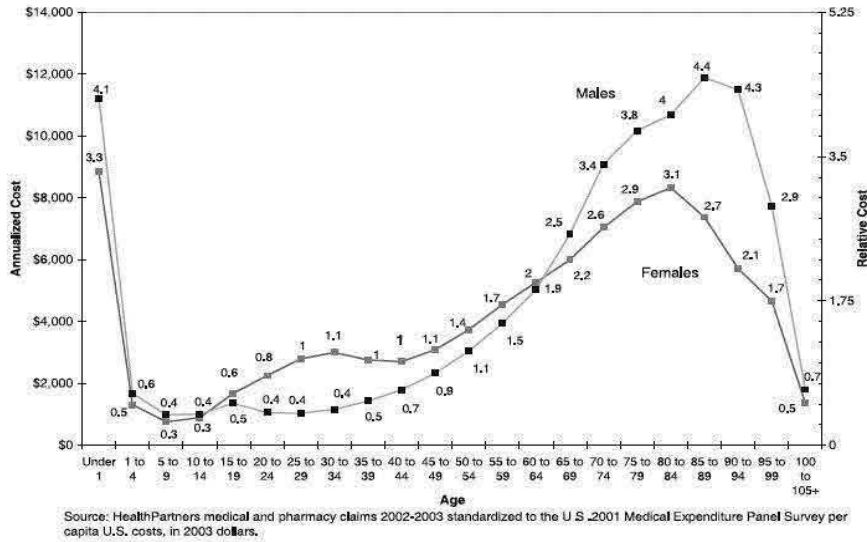


Figure 4. Typical Medical Costs by Age

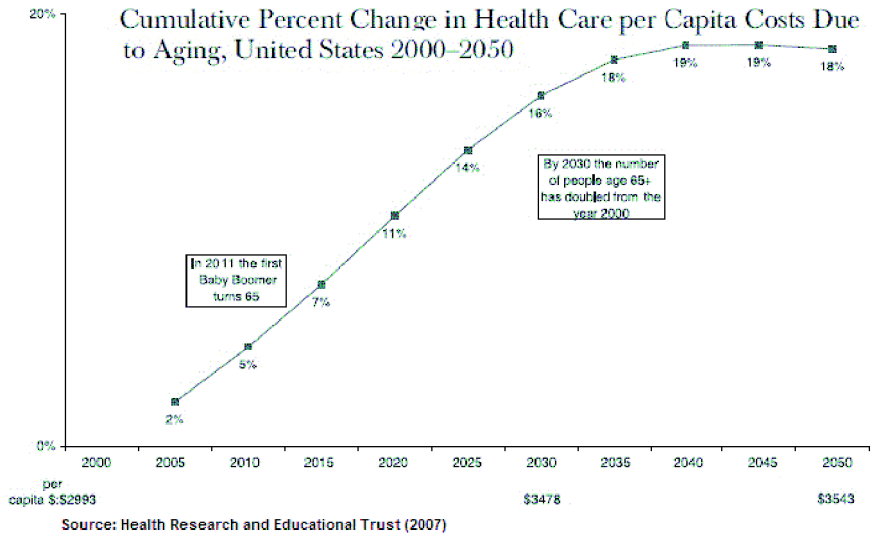


Figure 5. Change in Health Care Costs Per Capital Due to Aging

Growing Chronic Conditions and Diseases

Chronic conditions and diseases came up again and again throughout the literature as a major problem in today's healthcare. Seniors are not the only ones who are suffering more and more from chronic conditions (Seals et al., 2016).

Each year the United States population spends \$128 billion on patients with arthritis, \$148 billion on patients with Alzheimer's disease, \$174 billion on patients with preventable type II diabetes, and over \$432 billion on heart disease and stroke (Avila, 2011). Another \$120 billion is spent on chronic autoimmune disorders such as Graves disease, lupus,

**Pennsylvania Economic Association
2019 Conference Proceedings**

vasculitis, anemia, celiac disease, and a host of others (Nakazawa, 2008). Eighty-five percent of each person's Medicare dollars are spent on preventable chronic conditions. The current system rewards treatment, not prevention (Knauf & Aronson, 2009). Seventy-five percent of each healthcare dollar currently goes to chronic illnesses that are easily preventable (Freudenberg & Olden, 2011).

Centers for Medicare and Medicaid Services published a report that shows that there has been a steady increase in post-acute care services as the number of chronic conditions increase, with at least 41 percent of the Medicare beneficiaries needing post acute care. They also noted that beneficiaries with multiple chronic conditions were more likely to be hospitalized, had more hospitalizations during the year, and that more than two-thirds of Medicare beneficiaries had multiple chronic conditions. They indicated far reaching implications of chronic illnesses for the healthcare system built on a fee-for-service model, and noted that it was important to understand the impact (Lochner, 2012).

The current healthcare system is set up for diagnosis and treatment; it does not deal with the issue of prevention and healthy lifestyle (Hoffman, 1997; Kurzweil & Grossman, 2004; Weil, 2000). There is very little support for lifestyle change guidance such as nutrition counseling, exercise programs, weight maintenance help, vitamins and supplements, stress reducing activities, etc., though the research is overwhelming that lifestyle changes are essential for the abatement of rising healthcare costs. (Anderson et al., 2009; Artnak, McGraw, & Stanley, 2011; Gallelli, Wells, Peltonen, & Groden, 2011; Mattke et al., 2010). Even the word "prevention" in the current healthcare system often only means undergoing diagnostic tests such as colonoscopy, mammogram, and pap smears, all of which can only treat a disease once it has started rather than focusing on behaviors and practices that prevent them from starting (Alexa, Marian, Jae Hak, Diana, & Stephanie, 2010).

The World Health Organization identifies healthy lifestyle issues as a global health risk. Figure 6 shows the causal chain between lifestyle and just one of the major chronic illnesses that is growing (found on page 9 of the report) (Mathers, Stevens, & Mascarenhas, 2009). The main point of this graphic is to demonstrate the complexity of even a single disease; the cause-effect is not a simple relationship that can be shown with a linear string of boxes.

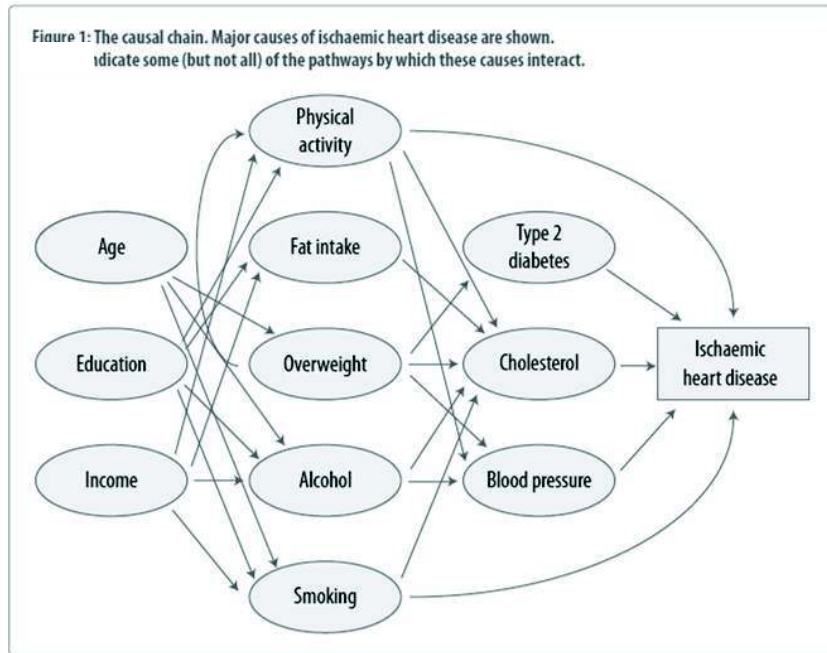


Figure 6. World Health Organization Causal Chain

Ethical

Ethical Issues are those which, while not economic issues themselves, do impact the economics in non-scientific ways. These include the non-economics principles of healthcare and end-of-life management issues.

Non-Economic Principles of Healthcare

Normal economics principles do not always apply to healthcare. One of the reasons economics prevents good healthcare is the ethical issues. With healthcare there is a desirable state of *access for everyone* regardless of ability to pay. Society at large does not wish to be responsible for the death of members of the community simply because they could not pay for the service (Coleman, 2011; El-Sayed, 2012; Fleck, 2011).

Additionally, many people resist the idea that financials should be part of the equation; people are often unwilling or unable to put a price on their life. Physicians ordering treatments are not expected to take financials into account. Scholars are recognizing a great concern in the community at the idea that the amount of resources available must be balanced against the outcome expected. These fears have sometimes led to an "outcry" in the media, especially while healthcare reform was under debate, accompanied with warnings of impending rationing of healthcare and so called "death panels" (Gruenewald, 2012; Kernick, 2005; Lauridsen, Norup, & Rossel, 2008; Nord, 2010; Ruger, 2008; Zunic et al., 2011).

But many people do see the value in looking at costs (Siebert, 2003). Petrou and Gray call for the use of an Incremental Cost Effectiveness Ratio (ICER) to determine if a treatment is worth the investment of public funds. The ratio would establish the maximum acceptable incremental cost ratio (Petrou & Gray, 2011). Beil reports on an interview with Dr. Thomas Smith from the Sidney Kimmel Comprehensive Cancer Center in Baltimore who noted that

Pennsylvania Economic Association 2019 Conference Proceedings

"We are the only industrialized country that doesn't look at the cost balanced somehow with effectiveness in making decisions about drugs." He concludes that asking hard questions about health care is not a bad idea (Beil, 2012).

Another reason ethics is involved in the fact that healthcare does not follow normal economic principals is that healthcare is one of the industries where the *providers* (i.e. the doctors) are more knowledgeable about the needs of the *customers* (i.e. the patients) than the patients themselves are. The physicians, hospitals, and healthcare networks are *trusted* by the patient to do *what is necessary and right* rather than what would make the most money. Patients don't feel empowered to "go against the doctor's orders", so if the doctor says to get a test or undergo a treatment, they do so. Even if it is inconvenient, difficult, and unlikely to produce qualitative or quantitative value. Currently, to "opt out" of a physician ordered test or treatment requires signatures on forms that warn the patients of dire consequences if they don't get a recommended test. Courts have been known to mandate a physicians order even if the patient clearly states they didn't want it (Gallelli et al., 2011).

One difficulty patients have in opting out of testing, (and that physicians have in curtailing testing), is related to another contributor to the high cost of overtreatment: malpractice suits (Mulvany, 2010). The possibility of an astronomical malpractice settlement has greatly impacted the field (Bovbjerg & Bartow, 2003). Physicians need to order tests even though they may not be necessary simply to avoid the possibility of a suit. The high price of malpractice insurance is a considerable issue that severely limits the amount of money a physician can make in private practice (Callens, Volbragt, & Nys, 2006; Hermer & Brody, 2010).

End of Life Care Management Issues

Often we consider extending lifespan without considering healthspan. The availability of treatments that keep the body alive without quality of life has changed the community's concept of death.

Financing high-cost low value treatments uses up scarce resources and prevent low-cost, high value methods from being used more often, benefitting more people. However, the fact that it feels unethical to put finances above extension of life (even when the quality of life is not improved and the cost is extremely high compared to the value) is one way that economics issues impacts quality of care.

Years ago people lived at home, taken care of by family members until they died at home surrounded by family. Most commonly these days people live in nursing homes and die in a hospital (Mattke et al., 2010). Up to 33 percent of Medicare dollars get spent on the last year of life, and 40 percent of those Medicare dollars are spent in the last month of life (El-Sayed, 2012). While some authorities dispute the importance of these percentages because it does not take into account the total amount spent by Medicaid and private insurance (Aldridge & Kelley, 2015), it cannot be ignored that end of life costs are high, and getting higher.

What has caused the shift to nursing homes instead of home care? One influence is the changing economic structure of the family, most notably the fact that women, previously unpaid long-term care laborers, have much higher mobility and employment, and therefore are less able to serve as unpaid caregivers.

Some people believe that another influence on this change in behavior occurred in 1951, when the Department Of Health And Human Services, Centers for Disease Control and Prevention, and the National Center for Health Statistics stopped allowing physicians to notate old age as cause of death (Sondik, 2003). Elderly people who's health is failing are

constantly taken to the hospital, again and again, in an effort to "fix" the problem, even when the cause is due to old age. Well-meaning family and friends will often take a person to a hospital even when they've clearly stated they prefer otherwise (Abel, Rich, Griffin, & Purdy, 2009; Riley & Lubitz, 2010). The fear is that family members are not "doing all that they can" if they don't take a person who may be dying to the hospital. There is a resistance to the idea that someone should be allowed to die without intervention (Artnak et al., 2011).

This is not necessarily because people want to die in a hospital. More than 75 percent of survey respondents want to convalesce and die at home (Donnelly, 2012). Brumley, Enguidanos, and Jamison found increased satisfaction with palliative home care rather than usual care (which usually indicated hospital or hospice). Additionally, costs were reduced by 33 percent ("Disease Management Update," 2007). Nonetheless, more than 80 percent of people die in a hospital, hooked up to various machines, unable to return home (Abel et al., 2009; Artnak et al., 2011; Grabowski, 2007).

Treating more people at end of life at home doesn't necessarily help with costs, however. Lupari, Coates, Adamson, Crealey identified studies that involved nurses providing care to elderly patients with multiple chronic conditions in their own homes. While the studies reported positive qualitative outcomes, there was not a significant improvement in the number of emergency admissions, bed days, nor costs (Lupari, Coates, Adamson, & Crealey, 2011). One study found that palliative care decreased costs for terminally ill children without cancer, but increased costs (along with hospitalizations and emergency room visits) for terminally ill children with cancer (Postier, Chrastek, Nugent, Osenga, & Friedrichsdorf, 2014).

Palliative care programs, however, are perceived as higher quality. Brumley, Enguidanos, and Jamison found increased satisfaction with palliative home care rather than usual care (which usually indicated hospital or hospice).

Often palliative care is not considered, but rather every attempt is made to extend life. Beil explored the issue of the cost and efficacy of commonly prescribed cancer drugs that have all entered the market in the last few years. Americans spent \$23 billion on cancer drugs, more than spent on any other type of prescription drug in any other category. These drugs provide weeks or months of additional life for cancer patients at an extremely high cost. Perjeta, a breast cancer drug, provides up to six additional months of life at a cost of \$188,000. Provenge can provide a prostate cancer patient with four additional months of life, at a cost of \$93,000. Yervoy, another prostate cancer drug, costs \$120,000 for four months of life. Tarceva helps pancreatic cancer patients get 14 to 16 additional days of life for about \$15,000 (Beil, 2012).

Baily researches the controversy of futility of care and the ethics of cost control. Baily argues that universal access to quality care cannot be affordable unless the decision makers accept the moral legitimacy of taking cost into account in health care decisions, even decisions at the end of life (Baily, 2011).

Banham, Lynch, Karnon developed an Equity-Effectiveness framework that, if utilized by a central healthcare decision making agency, would enable proper evaluations of health interventions in applied settings with an internally consistent approach. This would help physicians make better end-of-life decisions about treatment (Banham, Lynch, & Karnon, 2011).

The Framingham Heart Study resulted in an index that assesses the 10 year risk of cardiovascular disease (Kannel, 1976). This index is widely used, and has more than 50 years

Pennsylvania Economic Association 2019 Conference Proceedings

of additional research on it, allowing physicians to determine whether further interventions would be helpful (Brindle et al., 2003).

Process

Process issues are those where the quality of healthcare is impacted negatively because of the current process for healthcare. This includes the high administrative costs, overtreatment and waste, and lack of healthcare information technology data standards.

High Administrative Costs of Healthcare

Administrative costs for private health insurance plans has risen dramatically over the past ten years - by over 117 percent. Compared to the administrative costs, actual healthcare costs only rose 74 percent, so administration costs are a larger part of rising healthcare costs. Researchers estimate that administrative costs eats up more than 30 percent of the United States healthcare dollar in administration and procedures (Roth, 2010; *Thinking Outside the Pillbox: A system-wide approach to improving patient medication adherence for chronic disease*, 2009; Wikler, Basch, & Cutler, 2012).

According to the majority of healthcare researchers, the United States spends more on healthcare than any other country - and the quality of the basic healthcare is lower. Germany spends less than 6 percent of their healthcare dollar on administrative systems (M. Nelson, 2010; Roth, 2010).

Most researchers believe that the high administrative costs are caused by the disconnected, bureaucratic, and for-profit competitive nature of the current healthcare system (Wikler et al., 2012).

The literature on the reasons for the high administrative costs is also related to several other areas: the non-economic principles of healthcare, the multilayer payment structure of healthcare, the burden of overtreatment, the lack of healthcare information standards, the typical sedentary lifestyle of an American, the lack of prevention guidance, and end of life care management issues.

Overtreatment and Waste

Estimates range from 22 to 40 percent of the healthcare administration dollar being completely wasted, or going into a shareholder's pocket, but not influencing the quality or quantity of healthcare (Barthold, Nandi, Mendoza Rodríguez, & Heymann, 2014; Bernstein et al., 2004; Berwick, 2003; CDC et al., 2007; Daniel, Damon, Mark, Mark, & Richard, 2012; Roth, 2010).

Brownlee explains the causes and outcomes of overtreatment, making the claim that the current system encourages disconnects between healthcare providers, unnecessary testing, and an overwhelming number of unnecessary surgeries (Brownlee, 2008).

The Atlas Project studied hospital referral regions (HRRs) in different states and determined that local capacity determined the treatment rather than standards of care. In a play on "if you build it they will come", this study determined "if you buy the diagnostic equipment, they will be tested" whether they need it or not. They conclude that overtreatment of the chronically ill is a problem, and that better coordination of care at the preventative stage is needed to avoid it (Wennberg & Fisher, 2008).

Lack of Healthcare Information Technology Data Standards

Lack of healthcare data standards is a major waste of healthcare dollars. Research is clear that if hospitals, physicians, healthcare networks, providers, insurance companies, and government agencies were to all use the same process, the same fieldnames, and the same codes for diagnostic, treatment, and payment, the healthcare system could save billions of dollars each year (Bouhaddou et al., 2012).

The prevailing level of data interoperability in the healthcare industry can be characterized as *a mess*. Ghosh and Scott proposed developing catalysts and antecedents in order to aggregate data for better healthcare decision-making, but found that even with a single system, the data was not interoperable. Systematic and semantic differences caused by diversity of data entry standards, and conflicts between multiple systems made it a real challenge to develop a working model (Ghosh & Scott, 2011).

Roth noted that in the United States, even within a single government, there is a competing hodge-podge of poorly integrated and often conflicting programs each with its own standards, computer systems, database schema, rules and policies (M. Nelson, 2010; Roth, 2010).

Gruman makes the case that the lack of health information technology (HIT) standards also drastically decreases the quality of care. He notes that the current chaotic state of healthcare delivery is increasingly fragmented and increasingly relies upon the patient to keep track of all their own medical records. He notes that people with chronic illnesses generally see many physicians, and that doctors generally do not currently communicate, even when they are within the same system or have offices in the same building. He notes that personal EHR systems are time consuming to populate, and that doctors resist them in any case, wasting whatever resources were invested in populating them (Gruman, 2011; Karapinar-Çarkit et al., 2010).

Wikler, Basch, and Cutler note that because each health care payer has their own customized data requirements for transaction, the number of hours that physicians, nurses, and clerical staff spend per week in claims and authorization is staggering. Physicians spend 43 minutes each and every day, and nurses spend half of their time (21 hours per week), while clerical staff spend 53 hours per week per physician (necessitating multiple clerical staff per physician). The healthcare industry employs more billing staff than any other industry nationwide. A typical transaction consists of eight separate steps in the revenue cycle, compared with most industries which typically only have three or four (Wikler et al., 2012).

In 1996 Health Insurance Portability and Accountability Act (HIPAA) stated that it was setting standards for identified organizations to use; but then listed 13 different sets of standards maintained by 11 different organizations ("Coding Classification Standards," 2012). The relationship between these codes and the organizations that maintain them is so complex as to require eight different certifications to understand all of them. Employment in the healthcare industry had been largely immune to the 2008 recession, but it is not because the industry was hiring more doctors, it is because the industry was hiring more clerks to code medical records. A decade ago a staff to physician ratio of 3:1 was commonly acceptable. Now, staff ratio needs to be between 5 and 7 to 1 physician in order to keep up with the large amounts of coding necessary for all the different insurance companies and government organizations. Wikler, Basch, and Cutler point to poor policy design, weak implementation and enforcement, as well as a lack of leadership on the part of the federal government regarding data standards of HIPAA (Wikler et al., 2012).

The economics of paying for all this wasteful technology that cannot interoperate and must be replaced every few years lowers the amount available to be spent on actual health care. Though technology companies love all the extra income caused by disconnected Electronic Health Record systems, healthcare quality suffers.

Pennsylvania Economic Association 2019 Conference Proceedings

Payment Issues

Payment issues are economic factors that impact healthcare quality simply because of the payment methodology itself.

Multilayer Payment Structure of Healthcare

One of the reasons why economics impacts quality of healthcare is the multilayered payment system. Because of the multilayered payment system, the cost savings due to technology implementation that is typical in normal businesses do not apply because those who pay for the technology do not benefit from the savings of technology. As a result, healthcare is the last major industry to adopt technology to better serve its users (Taylor, 2012).

The way healthcare invoices get paid makes the economically-driven rules of supply and demand less applicable than normal industries. The payer is not the recipient of the service (Schimpff, 2012a, 2012b). The only group of people who pay directly for healthcare services are the uninsured, less than nine percent of the population in 2017 (though expected to rise with the elimination of the healthcare insurance mandate of PPACA). While some uninsured patients pay out of their own pocket, many are unable to pay the high prices of care, especially emergency care. Hospitals cover billions of dollars in costs each year for uninsured patients as they are mandated to treat everyone regardless of ability to pay (Baumgarten, 2012). So even in that situation, the receiver of the service is not the payer of the service.

For the remaining 89 percent of people, healthcare costs are covered by different organizations based upon whether or not the person is employed, was in the service, is older or younger. More than 50 percent are covered by private insurance (either paid by the person or by the person's employer). Twenty-two million people also choose to supplement with a Health Savings Account (HSA). Jordan and Nicholls suggests HSA is used by people who earn more and are healthier than most (Jordan & Nicholls, 2018).

For combat veterans, the Veterans Administration (VA) covers some or all of the healthcare costs. For seniors over 65, Medicare covers 80 percent of healthcare costs. For poor people in general, Medicaid (or Medical Assistance) covers the bills (2.18 million adults), and for children, CHIP (Children's Health Insurance Program) pays for healthcare (1.26 million children) (Claxton et al., 2012).

Sometimes who we think of as the payer is not actually the payer. When an employer pays the cost of health insurance, the recipient of the service, the patient, is not even indirectly involved in the payment and the payer of the service (the insurance company) is paid by someone other than the recipient. Even in the case of public healthcare insurance such as Medicare and Medicaid, the recipient is still not the payer, the taxpayer is the payer who pays the payer, the government. Only individual self-paid health insurance has a more direct connection between the payer and the service.

Overtreatment is also related to the multilayer payment system, because there is no direct link between the amount that employers or governments pay for insurance, and the cost that is borne by the patient (Forgione, Vermeer, Surysekar, Wrieden, & Plante, 2005; Larg & Moss, 2011). Furthermore, malpractice influences overtreatment by setting defensive standard of care that requires a great deal of unnecessary testing (Bovbjerg & Bartow, 2003; Hermer & Brody, 2010).

This odd non-economic method of payment means that there is a unique relationship between the consumer (patient), the payer (the insurance company or the government), the employer (who, at times, provides the conduit to the insurance and may pay part or all of the costs), and the providers (doctors, nurses, hospitals) and their suppliers (medical equipment, pharmacies, etc.).

Mattke and the RAND team point to this "payment silos" structure of healthcare as the reason why numerous beneficial health care innovations (from the systems perspective) are not adopted. The current payment structure rewards a group other than the payers for efficiencies. For example, they note that Electronic Health Records (EHR) generally would require investment and training on the part of the providers, but the beneficiaries are the private and public insurance companies (Mattke et al., 2010). Generally, until CMS mandated the use of EHR systems for Medicare, doctors and hospitals did not invest the money despite the eventual efficiencies they might bring. Additionally, as Miller points out, the government impacts the cost of healthcare insurance by issuing mandates for required coverage (Miller, 2014).

Forgione, Vermeer, Surysekar, Wrieden and Plante advocate looking at this unique relationship in the framework of Agency Theory, through the lens of "optimal agreements governing interactions between the involved parties". Reviewing their activities through this lens can give public policy and healthcare advocates insight into rising and lowering costs. In Agency Theory, each involved party can be expected to work in their own best economic interests, so the balance between the parties must be taken into account when considering public policy. A chart outlining the different agencies (payers) and the economic issues involved in healthcare decisions can be found in Figure 7 (Conrad, 2016; Larg & Moss, 2011).

Agency Theory demonstrates why, despite significant evidence that prevention costs less than treatment, it is difficult to get insurance companies to pay for health promotion, wellness, self-care, or behavioral prevention. The financial benefits of prevention occur "downstream", most likely when some other agency would be responsible for them. Childhood vaccines, for example, often don't prevent a disease for a decade or two - by which time the insurance company covering the cost of vaccines is no longer responsible for healthcare costs of the patient. Healthy lifestyle expenses such as gym membership, nutrition counseling, classes, coaching and support groups all impact costs of chronic illnesses in a major way; but often not until the person is in their sixties, by which time it is Medicare, and not the insurance company, which pays the costs. This is also why employers are often the only ones willing and able to pay for healthy lifestyle support; they are the ones who benefit the most from healthy productive employees (Baicker, Cutler, & Zirui, 2010; Berry & Mirabito, 2011; DeVries Iii, 2010).

Goetzel and Ozminkowski reviewed the research and encouraged work health programs to be funded at an optimal investment level so that program savings can be obtained. They stated that more research is needed on the optimal design and cost of interventions, and this research must reach employers for these programs to be applied more broadly (Goetzel & Ozminkowski, 2008).

Nelson, Cohen, Greenberg, and Kent reviewed 887 publications reporting 2128 cost effectiveness ratios for innovative health care. They were looking for lower cost treatments that were decrementally cost effective; giving up quality for price. The number of comparison studies that increased quality and improved health (increasing costs as well) was 1533, but they found very few (1.6 percent of the sample) that were decrementally cost effective (i.e. found equivalent alternatives to decrease costs). They concluded that because insurance tends to shield both physicians and patients from the true cost of care, there is no incentive to decrease the quality in order to save the costs. Even if the quality would only decrease slightly and the cost savings were large, there was no incentive to save the money (A. L. Nelson, Cohen, Greenberg, & Kent, 2009).

**Pennsylvania Economic Association
2019 Conference Proceedings**

	People with Health Condition	Family members of Person with Health Condition	Healthcare Insurance (public [gov] or private [employer or self])	Business or Industry
Healthcare Related Resource Use	Premiums paid to private insurance. Taxes paid to public insurance. Out of pocket health costs. Transportation costs. Home and/or car modifications due to health. Food for special diets. Loss of income for unpaid leave to attend treatment.	Premiums paid to private insurance. Taxes paid to public insurance. Out of pocket health costs. Transportation costs. Home and/or car modifications due to health. Food for special diets. Loss of income for unpaid leave to attend treatment.	Information Systems and Infrastructure. Administration. Prevention programs. Specialists Equipment. Infrastructure. Community Support Services. Residential Support Services. Prevention Programs. Research.	Premiums paid to private insurance. Taxes paid to public insurance. Out of pocket health costs. Transportation costs. Home and/or car modifications due to health. Food for special diets. Loss of income for unpaid leave to attend treatment.
Other Resource Use	Legal representation. Childcare.	Damage to property (i.e. for substance abuse, smoking, crime related activities)	Worker replacement costs (recruitment, training, retraining). Cost of implementing and adhering to regulations and legislation.	Regulations, inspection and monitoring, child welfare services, disability support services, court services, police services, prison services, emergency fire services, cost of administering taxes and benefits.
Production Losses	Loss of revenue due to unpaid sick leave, treatment related time off from work, reduced on-the-job productivity, premature retirement due to health issues, loss of opportunity for promotion, early mortality.	Loss of revenue and unpaid production while caring for sick family and friends.	Loss of revenue due to unpaid sick leave, treatment related time off from work, reduced on-the-job productivity, premature retirement due to health issues, loss of opportunity for promotion, early mortality.	N/A
Intangible Burdens	Lower Quality of Life, impaired functioning, psychosocial impact, loss of leisure time, loss of life.	Psychosocial costs of caring for sick family and friends.	Deadweight. Loss of additional taxation.	Employee morale

Figure 7. Components of Costs and economic issues. Simplification of a chart from Larg & Moss (2011).

Osilla, et al, investigated worksite wellness, which the majority (58 percent) of corporations take advantage of. There is an accelerating trend of employees taking part in worksite wellness programs. They reviewed 33 studies, and concluded that despite the mostly positive outcomes, the body of evidence did not support such widespread adoption of wellness programs – not because they did not work (they did) but because the employee, and not necessarily the company, benefitted (Chan Osilla et al., 2012).

Custom

Custom factors are those factors that impact healthcare quality negatively simply because "we've always done it that way". Needed changes could dramatically improve healthcare, but because it's not the typical way things get done, the changes are very slow in coming. These include lack of high quality guidelines, and problems with research methodologies.

Lack of High Quality Guidelines

It is difficult to find consistent high quality guidelines for treatment. Gabbay, et al reviewed 92 studies, over half of which purported to provide clear guidance to clinicians as to when to determine that further actions are unlikely to help a dying patient (futility), and half of which refuted that the point of futility was reached or could be determined and therefore further action was warranted. They determined that among the 47 studies that supported withholding of treatment, they did not demonstrate clear determinable guidelines for clinicians to follow. They conclude that trying to rely upon statistically driven data to make such determinations is fraught with problems, and that physicians need to rely upon their own expertise rather than relying upon published data determining futility guidelines (Gabbay et al., 2010).

Porzsolt, et al analysed guidelines for 330 treatment recommendations for three different types of cancer from 11 countries. The recommendations were categorized as congruent, incongruent, or undetermined. A congruent recommendation matched 66% of other country's recommendations, an incongruent matched less than 66%, and an undetermined recommendation did not clearly provide a recommendation in at least 66% of the modalities. Their results indicate that incongruent recommendations were 4-fold more common than congruent recommendations. Out of the 330 recommendations, only 50 were congruent (15%). One of the reasons proposed for the high level of incongruence was that some guidelines were based solely on random control studies, and some on the experience of the guideline authors – and they do not necessarily lead to the same conclusion for treatment (Porzsolt, Rhoads, Manzini, Lobmeyer, & Kaplan, 2019).

Decision Making Methods

Siebert considers economic evaluation as part of the essential decision making of healthcare (Siebert, 2003). Bong-Min researches the use of health technology assessment as a policy option in order to avoid unnecessary healthcare costs. Bong-Min found that health technology does not save money, but generally increases costs overall. Bong-Min did note that health technology assessment tools do help determine if new treatments are cost effective. He notes that some countries such as South Korea have already implemented health technology assessment policies requiring pharma-economic research (proof that a new drug will be more cost effective than what is already available) before reimbursing for prescriptions. He identifies culture, healthcare systems, and public trust in the government as factors that determine which countries will utilize health technology assessment (Bong-Min, 2009).

**Pennsylvania Economic Association
2019 Conference Proceedings**

Decisions are influenced by availability of services. The Atlas project studied hospital referral regions (HRRs) in different states regarding how much they spent on Medicare enrollees with severe chronic illnesses. Researchers demonstrated that clinical decisions governing the frequency of use of such supply-sensitive care as physician visits, referrals to specialists, hospital care, and diagnostic testing are strongly affected by local capacity, which strongly influences both the quantity and per capita cost of care provided to patients with chronic illnesses. Their conclusion? That in-patient hospital care is not the best option. Other methods must be found to reduce overtreatment of the chronically ill in the inpatient setting, particularly by improving the coordination of care (Bachman et al., 2017; Postier et al., 2014; Wennberg & Fisher, 2008).

One of the major issues in healthcare decision making is the collaborative efforts of groups of physicians. There have been many studies on this topic. Kuhlmann, Gavin, and Galavotti evaluated 9 studies on integrating family planning services as part of an integrated health practice, and all reported overall satisfaction from the providers, clients, and community perspective, though only seven of the nine studies reported the measurement of the improvement, and none provided a cost benefit analysis (Kuhlmann, Gavin, & Galavotti, 2010).

White and Glazier reviewed 65 studies on cost benefit of hospitalists (special doctors hired by hospitals rather than traditional physicians who maintain hospital privileges for their patients). The majority show that hospitalists reduce patient stays and cost less, but don't necessarily provide better care. The authors were concerned that the issue has not gotten better despite the amount of research on the topic indicating problems with the method of using hospitalists instead of primary care physicians. However, they were not able to identify the underlying mechanisms driving the outcomes and associated quality of care so that it could be improved (White & Glazier, 2011).

Sikorski, Luppia, König, van den Bussche, and Reidel-Heller reviewed 108 articles and chose 11 that were randomized controlled trials training general practitioners in depression care. Training alone did not improve outcomes; organizational structure changes were necessary before changes were seen (Sikorski, Luppia, König, van den Bussche, & Riedel-Heller, 2012).

Chisholm-Burns et al reviewed studies on the effectiveness of pharmacists as part of the healthcare team, and concluded that the majority of studies were limited due to partial cost analysis, study design, and inappropriate statistical analysis. They encouraged future investigators to adhere to the guidelines and recommendations of the Panel of Cost-Effectiveness in Health and Medicine (Chisholm-Burns et al., 2010).

The efficacy of specialists versus primary care physicians and drug approval decision making was also the topic of study. Chauhan and Mason investigated 29 studies (out of the 1400 screened) for the reasons behind the slow progress in new prescription medicines in the United Kingdom, and concluded that though price was not the primary factor, the fact that specialists are more likely to be involved in the Drug and Therapeutic Committees gives them more access to the details of new drugs so that they are more likely to differentiate drugs with novel actions or identify areas with few alternatives. Primary care physicians are less likely to be involved in formal purchasing decision processes, and therefore are less likely to have new drugs on their consciousness (Chauhan & Mason, 2008; Mason, 2008).

Another issue with healthcare decision-making is the current penchant to try and limit healthcare to just medical factors and interventions. Many experts believe that there is a growing base of evidence to suggest that strategies to address the social determinants of

health must be integrated into health care models in order to achieve the triple aim of improved population health with higher care quality at lower costs (Bachman et al., 2017).

Research

There are several challenges to doing healthcare research and estimating the costs of the benefits of healthcare. Problems include the cost benefit methods themselves, the lack of ability to get any accurate costs because of the plethora of payment systems, the practice of cost shifting, and the impact of utilization and volume on costs.

Healthcare Research Issues

One of the major problems of current healthcare research is that much of it is funded by pharmaceutical companies and surgical device firms (Lexchin, 2012). This causes physicians, who read the research, to rely much more heavily on costly drugs and surgeries rather than including simple and more cost effective treatments.

Integrative medicine generally relies upon more natural treatments, but does not have the same kind of research funding behind it. While there are many studies that show its cost effectiveness (Demirkol et al., 2017; Kooreman & Baars, 2012; Lien et al., 2016; Morgan, Irwin, Chung, & Wang, 2014; Selfridge, 2012; Viksveen, Dymitr, & Simoens, 2014; Wu et al., 2014; Xiong, Wang, Li, & Zhang, 2015), authors of guidelines often insist on random control trials which decreases the chance that integrative health practices will be included in the guidelines. Random control trials measure efficacy (the possibility that the treatment works under study conditions), not effectiveness (whether the treatment actually works in real world conditions). Random control trials are much more difficult to design and much more expensive to complete with integrative healthcare practices than with simple drugs or surgical devices. Physicians would not usually recommend integrative practices because they are not within the guidelines for standard of care (Menard et al., 2015).

Estimate Cost Benefits

Cost Benefit Analysis themselves have severe limitations. Although newer cost effectiveness analysis methods try to make adjustments, most cost benefit research only measures quantity of life, not quality. Since healthcare technology and practice has reached the point where a person can be kept alive almost indefinitely regardless of age or infirmity, the impact of treatments on the quality of life can be enormously important, more-so than the quantity of life. Furthermore, in research the value assigned to the life year is traditionally \$50,000, the origins of which is several decades old and actually meaningless (Hoch & Smith, 2006).

There is no universally accepted standard for measuring the quality of life weights, and that estimation can result in drastically different results. Generally, researchers administer some assessment or preference based measure such as EQ-5D (EuroQol Health States), HUI3 (Health Utilities Index Mark 3), or SF-6D (a measurement of health and wellbeing). The assessments are then valued using different valuation techniques such as Time Trade-Off, Standard Gamble, Visual Analogue Scaling, Ranking and Discrete Choice Experiments.

Unger points out that Quality Adjusted Life Year (QALY) and other economic variables do not apply well to children who cannot be surveyed using EQ-5D, and often must be provided by proxy (i.e., their parents). Unger recommends considering the family perspective, and advocates a discrete-choice method for a willingness to pay model to assess different treatments (Ungar, 2011).

Pennsylvania Economic Association 2019 Conference Proceedings

Zimovetz, Wolowacz, Classi, and Birt reviewed 37 studies to treat major depressive disorder, and concluded that the variety of measurements (symptom free days, health state utilities, Disability Adjusted Life Year (DALY), QALY, and efficacy of second-line treatments) lead to difficulties in comparisons (Zimovetz, Wolowacz, Classi, & Birt, 2012).

Ferrusi, Leighi, Kulin, and Marshall concluded that researchers of comparative research studies rarely estimate anything other than costs, and that looking at costs does not provide enough information for decision-making support due to the uncertainty involved (Ferrusi, Leighi, Kulin, & Marshall, 2011).

Applying just financial factors to healthcare decisions is problematic. Detsky, and Laupacis state that QALY should not be used alone for decision making. Cost Analysis research can only provide cost effective measurement information relative to an arbitrary threshold. In other words, utilizing multiple factors for decision making will maximize the benefits within an allocated budget, but more economically attractive options may get overlooked. Furthermore, the assumptions used in the analysis may be susceptible to error and bias ("Disease Management Update," 2007).

Dalziel, Segal, and Mortimer found a number of different outcome measurements when they studied 245 health interventions. Outcomes included Life Year, QALY, and DALY. They concluded that each type of condition or modality needs to be judged on its own unique attributes; they cannot be grouped together with broad generalities. They looked at studies where the individual was able to reduce their own risk of disease or injury, or where a major cause of the condition was their own behavior (which includes almost all chronic diseases). They pointed out that these studies had a very low median incremental cost effectiveness ratio, where as diagnostic screenings, vaccinations, and mental disorders had the highest incremental cost-effectiveness ratio (Dalziel, Segal, & Mortimer, 2008).

Data from cost effectiveness studies cannot be accepted without being translated or adjusted for the country. Manca and Willan have proposed an algorithm that would help interpret the analysis for utilization in decision making or research in another country (Manca & Willan, 2006).

All of these issues with economic outcomes of health research means that, due to economic issues, the research does not always represent the actual underlying truth of the best treatments.

Another issue in cost analysis is: which costs are used? The base cost to provide the service? The cost to the patient? The cost to the insurance company? The cost to the government? The cost to society? For a single treatment, these may all be different amounts (deBrantes, Rastogi, & Soerensen, 2011; Newman & McMahon, 2011).

Tunis noted that the extent of cost benefit for any treatment or service is directly related to the choice of cost definition - which is not standardized. The study compared the estimates of a cost effectiveness results of two drugs using both the wholesale acquisition cost and the average wholesale price, and the cost effectiveness ratio went from .44 to 1.73, which would completely change the recommendation for treatment. The results were further complicated by the fact that there is not only a wholesale cost, but also a charged cost, an allowed cost, and a paid cost; often controlled by different parties (Tunis, 2009). Cutler and Marzilli found that the social cost of a resource was much different than the price. For example, the social cost of a new drug might be one-third the market price to insurance companies, and one-half the market price when paid for by one of the government healthcare options (Medicare or Medicaid) (Cutler & Marzilli Ericson, 2010; Gordon, 2012).

Prenger, Braakman-Jansen, Pieterse, der Palen, and Seydel found that behavioral intervention studies often do not include partial (though beneficial) changes. They discussed ways in which researchers could incorporate appropriate measures of partial change when reporting cost effectiveness of a treatment (Prenger, Braakman-Jansen, Pieterse, der Palen, & Seydel, 2012).

Peterson, Hollis, Pogge point out that cost benefits analysis incentivizes R&D for drugs of incremental or questionable value. The analysis provides greater returns on drugs that would be sold in high volumes, even if they did very little, while ignoring rare diseases or life saving drugs because they would only be sold in limited quantities (Peterson, Hollis, & Pogge, 2010).

Gemmill, Thomson, and Mossialos reviewed 173 studies regarding user charges (co-pays, co-insurance, deductibles, reference pricing, and formularies) on prescription drugs, which are purported to steer patients toward cost effective care. They found, however, that in practice they do lower the initial cost for healthcare but do not lead to long term control of pharmaceutical spending and do not contain total healthcare costs. They point out that providing harmful or ineffective commodities to those who are willing to pay is efficient, while providing effective and beneficial to those unable to pay is inefficient, a concept known as allocative efficiency (Gemmill, Thomson, & Mossialos, 2008).

Cost shifting is also an issue. There have been many attempts in legislation to lower costs using a variety of methods. Some researchers question the value of the different methods, claiming that sometimes savings at one level adds to costs at another level, i.e. cost shifting (Kaufman, 2011).

Roy and Madhavan reviewed 101 articles on Medicaid and Medicare policies on prescriptions drugs that solely focused on the costs of the drug themselves. Many of the studies revealed that when Medicare or Medicaid changed their policies in an attempt to rein in costs (for example, by restricting access through formularies or necessitating pre-authorization), they actually increased costs because patients had to visit their doctors to make the change - and the cost of the doctors visit would often wipe out the cost savings of the restriction (Roy & Madhavan, 2008).

Recent bills introduced in the legislature at the federal level incorporate the requirement of comparative effectiveness data, and there has been some research on the issue. Vernon, Golec, and Stevens warns that R&D costs for drug development will rise if additional comparative studies must be done in order to bring innovative treatments into the healthcare system (Vernon, Golec, & Stevens, 2010). Berger and Grainger from Eli Lilly, on the other hand, believe that comparative effectiveness analysis studies are the next step in evolving healthcare that will increase treatment options (Berger & Grainger, 2010). Like many other pharmaceutical companies, however, they are concerned that comparative effectiveness research will not be used as only one of many decision making point, but rather would dominate, causing cost-effectiveness guidelines to override healthcare decisions. Selker provides a good outline of this issue and describes guidelines for government agencies (such as keeping the policy making bodies and the research bodies separate). Selker advocates keeping the comparative effectiveness research scientific. Selker also believes that studies should be funded by the Agency for Health Quality Research rather than for-profit-industries (Selker, 2009).

Vos, et al, reviewed 339 studies of hospitals incorporating process improvement programs, and did not find much success. They identified three factors that hampered progress; 1) functional structure of the hospitals do not lend themselves to improvement,

Pennsylvania Economic Association 2019 Conference Proceedings

2) unfamiliarity with proper process improvement techniques, and 3) the limited areas where streamlining could be useful. The authors advised hospital management to understand the factors for failure in the existing literature and to take them into account before attempting their own process improvements (Vos et al., 2011).

Practitioners might complain that cost cutting impacts quality. However, Moore, McMullen, Woolford, and Berger did not find that quality was related to cost when they studied the variations of clinical process in birth control facilities. They recommended that clinics adopt best practices, and decrease variability in order to lower costs (Moore, McMullen, Woolford, & Berger, 2010).

Another very important issue is how utilization impacts costs in healthcare. The number of people expected to utilize a diagnostic test or treatment relates directly to its cost. An MRI machine, for example, might cost one million dollars to purchase and maintain throughout its product lifecycle. If the hospital that purchases the MRI machine only has one person who needs an MRI assessment, the cost for that one MRI scan would be one million dollars. But if 100,000 people use it, the cost of each of the 100,000 MRIs is ten dollars. (It goes without saying that if they charge \$1000 for each MRI, and 100,000 people use it, the hospital makes one hundred million dollars.) The Medical Expenditure Panel Survey published by the Agency for Healthcare Research and Quality measures utilization as one of its factors, and estimates its impact (though redesigns of the survey have minimized the quality of the estimates (Cohen, Ezzati-Rice, Zodet, Machlin, & Yu, 2011; "How safe is your hospital?," 2012).

CONCLUSIONS

A systematic review of the literature on economics and integrative health demonstrates that there has been a major upheaval in healthcare economics research. The review of the specific articles for themes seemed to fall under the following categories: **Society, Ethical, Process, Payment, Custom, and Research.**

Society Issues include the Rising Costs of Healthcare and the Growing Senior Population as well as the Growing Chronic Conditions and Diseases. Ethical issues include the Non-Economic Principles of Healthcare and the End of Life Care Management Issues. Process issues include the High Administrative Costs of Healthcare, Overtreatment and Waste, and Lack of Healthcare Information Technology Data Standards. Payment Issues are mainly impacted by the Multilayer Payment Structure of Healthcare in the United States. Custom Issues focus mostly on the Lack of High Quality Guidelines and Decisionmaking Methods. And finally, Research itself is an issue, with many impacts on the quality and source of research available for healthcare advocates including Healthcare Research Issues and Estimate Cost Benefits. Problems include the cost benefit methods themselves, the lack of ability to get any accurate costs because of the plethora of payment systems, the practice of cost shifting, and the impact of utilization and volume on costs.

In reviewing and describing the articles, their themes and categories, it appeared to the researchers that the bulk of the research shows support for the contention that economic issues can impact the quality of healthcare, and that some of these economic issues are interfering in high-quality healthcare – apart from the general issue that people with money can buy better healthcare than people without money. These economic issues seem to interfere with all healthcare – no matter what the source of healthcare funding. We suggest two rich avenues for further research.

One potential avenue to explore is what would happen if the incentives that trigger high incomes for some and high costs for others without generating health value to patients were to be abolished? Money doesn't disappear; it just shifts to the benefit of other parties. Tools to establish unjustified money-migration are often considered a feature of Clinical Economics, and additional studies in this topic are needed.

Another potential topic surrounds an as-yet-unexercised economic windfall in the United States which may be possible that could benefit society at large. The research hints at a huge amount of money that could be saved, while at the same time improving the quality of healthcare, by simply preventing rather than treating preventable diseases. We suggest that what is needed is an economic model to put more specific and supportable cost figures forward on how large a savings that might entail.

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**Pennsylvania Economic Association
2019 Conference Proceedings**

Appendix A: List of Articles found in Systematic Search
Table 3. Table of Articles Found in Systematic Search

Number	Authors	Yr	Primary Category	Before or After June 30, 2012
1	Abel, Rich, Griffin, & Purdy	2009	Ethical	Before
2	Aldridge & Kelley	2015	Ethical	After
3	Alexa, Marian, Jae Hak, Diana, & Stephanie	2010	Society	Before
4	Anderson et al.	2009	Society	Before
5	Artnak, McGraw, & Stanley	2011	Society	Before
6	Bachman et al.	2017	Custom	After
7	Baicker, Cutler, & Zirui	2010	Payment	Before
8	Baily	2011	Ethical	Before
9	Banham, Lynch, & Karnon	2011	Ethical	Before
10	Barthold, Nandi, Mendoza Rodríguez, & Heymann	2014	Process	After
11	Berger & Grainger	2010	Research	Before
12	Berry & Mirabito	2011	Payment	Before
13	Berwick	2003	Process	Before
14	Bong-Min	2009	Custom	Before
15	Bouhaddou et al.	2012	Process	Before
16	Brindle et al.	2003	Ethical	Before
17	Callens, Volbragt, & Nys	2006	Ethical	Before
18	Chan Osilla et al.	2012	Payment	Before
19	Chauhan & Mason	2008	Custom	Before
20	Chisholm-Burns et al.	2010	Custom	Before

**Pennsylvania Economic Association
2019 Conference Proceedings**

Number	Authors	Yr	Primary Category	
			Before or After June 30, 2012	
21	Cohen, Ezzati-Rice, Zodet, Machlin, & Yu	2011	Research	Before
22	Coleman	2011	Ethical	Before
23	Conrad	2016	Payment	After
24	Cutler & Marzilli Ericson	2010	Research	Before
25	Dalziel, Segal, & Mortimer	2008	Research	Before
26	Daniel, Damon, Mark, Mark, & Richard	2012	Process	Before
27	deBrantes, Rastogi, & Soerensen	2011	Research	Before
28	Demirkol et al.	2017	Research	Before
29	DeVries III	2010	Payment	After
30	Donnelly	2012		Before
31	Ferrusi, Leighl, Kulin, & Marshall	2011	Ethical	Before
32	Fleck	2011	Research	Before
33	Forgione, Vermeer, Surysekar, Wrieden, & Plante	2005	Payment	Before
34	Freudenberg	2017		Before
35	Gabbay et al.	2010	Society	After
36	Gemmill, Thomson, & Mossialos	2008	Custom	Before
37	Ghosh & Scott	2011	Researc	Before
38	Grabowski	2007	Process	Before
39	Gruenewald	2012	Ethical	Before
40	Gruman	2011	Ethical	Before
41	Hermer & Brody	2011	Process	Before
			Ethical	Before

**Pennsylvania Economic Association
2019 Conference Proceedings**

Number	Authors	Yr	Primary Category	
			Before or After June 30, 2012	
42	Hoch & Smith	2006	Research	Before
43	Jordan & Nicholls	2018	Payment	After
44	Kannel	1976	Ethical	Before
45	Karapinar-Çarkit et al.	2010	Process	Before
46	Kaufman	2011	Researc	Before
47	Kernick	2005	Ethical	Before
48	Knauf & Aronson	2009	Society	Before
49	Kooreman & Baars	2012	Research	Before
50	Kuhlmann, Gavin, & Galavotti	2010	Custom	Before
51	Kumar & Nigmatullin	2010	Society	Before
52	Kumar & Prevost	2011	Society	Before
53	Larg & Moss	2011	Payment	Before
54	Lauridsen, Norup, & Rossel	2008	Ethical	Before
55	Lexchin	2012	Custom	Before
56	Lien et al.	2016	Research	After
57	Lupari, Coates, Adamson, & Crealey	2011	Ethical	Before
58	Manca & Willan	2006	Research	Before
59	Martini, Garrett, Lindquist, & Isham	2007	Society	Before
60	Mason	2008	Custom	Before
61	Menard et al.	2015	Research	After
62	Moore, McMullen, Woolford, & Berger	2010	Research	Before

**Pennsylvania Economic Association
2019 Conference Proceedings**

Number	Authors	Yr	Primary Category	
			Before or After June 30, 2012	
63	Morgan, Irwin, Chung, & Wang	2014	Research	After
64	Mulvany	2010	Ethical	Before
65	M. Nelson	2010	Process	Before
66	A. L. Nelson, Cohen, Greenberg, & Kent	2009	Payment	Before
67	Nord	2010	Ethical	Before
68	Peterson, Hollis, & Pogge	2010	Research	Before
69	Petrou & Gray	2011	Ethical	Before
70	Postier, Chrastek, Nugent, Osenga, & Friedrichsdorf	2014	Ethical	After
71	Prenger, Braakman-Jansen, Pieterse, der Palen, & Seydel	2012	Research	Before
72	Riley & Lubitz	2010	Process	Before
73	Ruger	2008	Ethical	Before
74	Schimpff,	2012	Payment	Before
75	Schimpff,	2012	Payment	Before
76	Seals, Justice, & LaRocca	2016	Society	After
77	Selfridge	2012	Research	Before
78	Siebert	2003	Ethical	Before
79	Sikorski, Lupp, König, van den Bussche, & Riedel-Heller	2012	Custom	Before
80	Tunis	2009	Research	Before
81	Ungar	2011	Research	Before
82	Vernon, Golec, & Stevens	2010	Research	Before
83	Viksveen, Dymitr, & Simoens	2014	Research	After

**Pennsylvania Economic Association
2019 Conference Proceedings**

Number	Authors	Yr	Primary Category	
			Before or After June 30, 2012	
84	Vos et al.	2011	Research	Before
85	White & Glazier	2011	Custom	Before
86	Wu et al.	2014	Research	After
87	Xiong, Wang, Li, & Zhang	2015	Research	After
88	Zimovetz, Wolowacz, Classi, & Birt	2012	Research	Before
89	Zunic et al.	2011	Ethical	Before