



Identifying Potential Overuse of Non-Evidence-Based Health Care in Utah

A Report for the Utah Health Data Committee

Pursuant to 26-33a-117

Utah Department of Health
Office of Health Care Statistics
Center for Health Data and Informatics

288 North 1460 West
PO Box 144004
Salt Lake City, UT 84114-4004
Phone: 801-538-6700
<http://stats.health.utah.gov/>

Table of Contents

About the Office of Health Care Statistics	3
About the Utah Health Data Committee	3
HDC Mission Statement (Adopted 1994, Amended 2020)	3
Contact Information	4
Acknowledgements	5
Executive Summary	6
Introduction	11
Results	12
Utah’s All Payer Claims Database	12
Milliman’s Health Waste Calculator	12
Analysis Results	14
Limitations	22
Analysis Key Takeaways	22
Scientific Literature Review	24
Stakeholder Input	38
Recommendations to HHS from the Utah Health Data Committee	45
Appendices	47
Appendix A - Additional Milliman Health Waste Measures	47
Appendix B - Milliman’s Methodology and Top Measures by Prevalence	55
Appendix C - Milliman’s Health Waste Calculator Playbook	56
References	74

About the Office of Health Care Statistics

The Office of Health Care Statistics (OHCS) implements the goals and directions of the Health Data Committee (HDC) and requirements outlined in UCA §26-33a. The office collects, analyzes, and disseminates health care data. These data help people understand cost, quality, access, and value in our healthcare system and allow users to identify opportunities for *improvement*.

The data sets under the purview of the office include:

- **Consumer Assessment of Healthcare Providers and Systems (CAHPS)**—Annual customer satisfaction surveys relating to health plan performance.
- **Healthcare Effectiveness Data and Information Set (HEDIS)**—Annual quality measures relating to health plan performance.
- **Healthcare Facility Data (HFD)**—A collection of information about all inpatient, emergency room, and outpatient surgery/diagnostic procedures performed in the state.
- **All Payer Claims Data (APCD)**—A collection of data about health care paid for by third parties, including insurers, plan administrators, and dental and pharmacy benefits plans.
- **Patient Safety Surveillance and Improvement Program (PSSIP)**—A reporting mechanism which captures patient safety events (injuries, deaths, or other adverse events) associated with healthcare delivery and administration of anesthesia, which fosters conversations on how to minimize adverse patient safety events in Utah.

About the Utah Health Data Committee

The HDC was created by Utah Code 26-33a.(1). Members are appointed by the governor, confirmed by the Senate, and represent various perspectives from industry and the community—public health, purchasers, providers, payers, and patients. By law, members are required to have experience with health data.

HDC Mission Statement (Adopted 1994, Amended 2020)

The mission of the HDC is to support health improvement initiatives through the collection, analysis, and public release of healthcare information. Through public-private collaboration, the HDC actively participates in the planning, development, implementation, and maintenance of a statewide health data reporting system, which provides accurate and independently validated information regarding healthcare in the state of Utah. The HDC implements policies to transform

data into objective baseline, trend, and performance measurement information, which is made available while preserving patient privacy and confidentiality.

Contact Information

For more information, questions, or comments, please contact:

Carl Letamendi, PhD, MBA, MPH, GStat
Bureau Director, Office of Health Care Statistics
Utah Department of Health
cletamendi@utah.gov

Acknowledgements

The OHCS would like to thank several entities for their time and allowing the OHCS to present the results of this analysis. These include Comagine Health, the Utah Medical Association's Council of Trustees and Board of Directors, the 6|18 Workgroup, the Utah Insurance Department/Utah Health Insurance Association, the Utah Hospital Association executives, Medicaid staff, the Transparency Advisory Group and Utah Payers Advisory Subcommittee.

This report would have not been possible without the guidance, expertise and efforts put forth by those across the Center for Health Data and Informatics, including: Navina Forsythe, Carl Letamendi, Mike Martin, Lori Savoie, Sterling Petersen, Brantley Scott, Kimberly Partain McNamara, Sri Bose, Shyamkumar Sriram, and Jared Staheli.

Lastly, the Office of Health Care Statistics would like to thank all members of the Utah Health Data Committee for their thoughtful insight, commitment to improve the health of Utahns, and for engaging in thought provoking conversations that resulted in the value of this snapshot.

From the Utah Health Data Committee:

Jeffrey Eason, *Salt Lake County Health Department*

Jim Bradshaw, *Intermountain Healthcare*

Stephen Foxley, *Cambia Health Solutions/Regence BlueCross BlueShield of Utah*

Charles Hawley, *National Association of Health Data Organizations*

Dr. Patrice F. Hirning, *Intermountain Healthcare*

Dr. Stephen D. Neeleman, *HealthEquity*

Terri Nehorai, *Molina Health Plans*

Curtis Newman, *Iron Road Healthcare*

Tanji Northrup, *Utah Insurance Department*

Alan Ormsby, *AARP*

Laura Summers, *Kem C. Gardner Policy Institute, University of Utah*

Russell Trujillo, *MotivHealth*

*Dave Jackson, *NFP Insurance Brokerage and Consulting*

*Dr. Donna Milavetz, *Steward Health Care*

*Dr. Sarah Woolsey, *Comagine Health*

** Denotes prior HDC member*

Executive Summary

Overview

In 2020, *H.B. 195 - Identifying wasteful healthcare spending*, which enacted *UCA §26-33a-117 - Identifying potential overuse of non-evidence-based health care* was passed. The law requires the Department to contract with a nationally-recognized health waste calculator, to use the calculator to analyze data in the state All Payer Claims Database and flag entries the calculator identifies as potential overuse of non-evidence-based care. Additionally, the Department, or a contractor, is required to:

- analyze the data, review scientific literature about medical services that are best practice and literature about eliminating duplication in healthcare
- solicit input from Utah healthcare providers, health systems, insurers and other stakeholders regarding:
 - Duplicative health care quality initiatives and instances of non-alignment in metrics used to measure health care quality required by different health systems, and
 - Methods to avoid overuse of non-evidence-based health care;
- Present the results of the analysis, research and input obtained to the Utah Health Data Committee.

Subsequently, upon the Department's presentation to the committee, the committee is expected to make recommendations for action and opportunities for improvement based on the results, recommendations on methods to bring into alignment the various health care quality metrics different entities across the state use, and identify priority issues and recommendations for inclusion in an annual report. Lastly, the Department is tasked with compiling a report, and submitting it to the committee for approval, ahead of submission to the Health and Human Services Interim Committee, on or prior to November 1st of each year.

Methodology

The version of the Milliman Health Waste Calculator (HWC) used for this analysis (7.0) contains 48 measures for evaluating wasteful health care services in medical claims data. These measures address services related to diagnostic testing, screening tests, disease approach, preoperative evaluation, routine follow up monitoring and common treatments (such as prescription drugs), which under certain circumstances, may be unnecessary. The tool is informed by various well known sources, including the Choosing Wisely initiative of the American Board of Internal Medicine, the US Preventive Services Task Force, the American Medical Associations' Physician Consortium for Performance Improvement, the United Kingdom's National Institute for Health and Care Excellence, several medical specialty society

guidelines and numerous evidence-based research papers. The HWC classifies a service as either *necessary*, *likely to be wasteful*, or *wasteful*.

Necessary: Confirms that data suggests appropriate services were administered by the healthcare provider

Likely to be wasteful: Indicates the need to question the appropriateness of services rendered

Wasteful: Flags a cause for concern, as the service probably should not have occurred

Additionally, the HWC has two main methods for flagging health waste services. The *case rate* method counts costs from all lines of a particular claim ID where at least one claim line was identified as wasteful. In other words, if one individual procedure is flagged as *wasteful*, all other claim lines and their respective procedures are flagged wasteful. The *claim line* method counts costs from only the claim line where the line has been identified as *wasteful*.

For the purposes of this analysis, and the Office of Health Care Statistics' initial deep dive into these data, the *claim line* method was used. This maximized our ability to get closer to a "true" health waste dollar value, maintaining a conservative estimate, and results which may be more actionable. Moreover, only claims flagged "wasteful" were used, to achieve this aim.

Following receipt and analysis of the data provided to the OHCS by Milliman, the OHCS prepared a presentation which discussed the law, expectations from the Health Data Committee and the OHCS, a review of the data, and a few facilitative questions regarding duplicative health care quality initiatives, instances of non-alignment in measures used, and methods to avoid overuse of non-evidence based health care. Aside from disseminating findings, the purpose of these presentations was to collect feedback from various stakeholder groups. The groups presented to were:

- Utah Health Data Committee
- Utah Transparency Advisory Group
- Utah Insurance Department/Utah Health Insurance Association
- Medicaid ACOs 6|18 Work Group
- Utah Payers Advisory Subcommittee
- Comagine Health Utah Community Board
- Utah Medical Association Council of Trustees
- Utah Medical Association Board of Directors
- Utah Hospital Association leadership
- Comagine Health Partnership for Value

Findings

Following receipt of the data from Milliman, the OHCS conducted a deeper dive of the data, utilizing the claim line itemization method and conferring with the Division of Medicaid and Health Financing. Using claims submitted to the APCD for calendar year 2019:

- The total health waste dollars across 48 measures amounted to approximately \$42 million (before Medicaid rebates applied for two measures selected: opioids for acute disabling low back pain and two or more antipsychotic medications; the amount after applying the rebates is approximately \$38 million). This represents about 5% of total care spend for the 48 measures (denominator approximately \$830M).
- The top three health waste measures across the state were:
 - Opiates in acute disabling low back pain (74,628 claims flagged, approx. \$5M)
 - Two or more antipsychotic medications (20,192 claims flagged, approx. \$5M)
 - Annual Resting EKGs (77,554 claims flagged, approx. \$3M)
- When making observations across various groups, including Commercial only, Medicaid Fee-for-Service, Medicaid Accountable Care Organizations, Medicare only, adult populations and seniors, opiates in acute disabling low back pain are among the top two waste measures. The same holds true for urban and rural geographies.
- For the pediatric population, the top three notable health waste measures were:
 - CT scans for abdominal pain in children (600 claims flagged, approx. \$1.4M)
 - Pediatric head CT scans (1,388 claims flagged, approx. \$1.3M)
 - Antibiotics for acute upper respiratory ear infections (13,140 claims, approx. \$200K)
- The top three health waste measures for Utah's frontier geographies (less than 6 people per square mile) (2):
 - Preoperative baseline laboratory studies (1,696 claims flagged, approx. \$170K)
 - Annual resting EKGs (1,764 claims flagged, approx. \$170K)
 - Routine general health checks (785 claims flagged, approx. \$140K).

Each of the 48 measures in the HWC has a corresponding clinical guide, which provides scientific literature sources for the measure, descriptions for the measure, assumptions and caveats and algorithmic details. Each of these clinical guides are available upon request.

Feedback from Stakeholder Groups

During presentation of the results of the HWC analysis to the aforementioned stakeholder groups, feedback was collected regarding their thoughts surrounding duplicative health care quality initiatives and instances of non-alignment in measures used, and surrounding methods on how to avoid overuse of non-evidence-based health care.

The feedback received regarding duplicative instances of non-alignment spoke to:

- A high number of measures to track, for both payers and providers
- Disparate measures used across payers and lines of business
- External pressure from scorecard groups
- Defensive medicine resulting in duplication of procedures or tests
- Benefits in common measurement and administrative burden of measuring various things
- Focusing on a few measures may improve performance
- Regulatory agencies having different quality measurements is a barrier to alignment
- Leaving it to the clinician and the system to define their own measures and support them
- Lack of EMR interoperability resulting in duplication of records and services

Feedback received regarding methods to avoid overuse of non-evidence-based health care included:

- Health waste dollars is one of many tools which can be used
- Some of the measures are questionable, because if you follow the tool's best practice recommendations strictly over medical judgement, you may miss a life-threatening condition, which can be identified with a CT scan, for example
- Leveraging organizations such as the Utah Medical Association and the Utah Family of Family Physicians can be helpful in communicating the most recent best practice guidelines and working collaboratively
- Encouraging providers to substitute one thing for another or doing something new is easier than trying to get providers to stop doing something
- It may be worthwhile to further explore topics such as access issues in rural and urban settings, given that resource availability or limitations may drive provider behavior; alternative payment methodologies; and identifying who the top contributors to health waste are
- Concerns were expressed surrounding some of the measures, and requests to understand these measures more were common
- A recommendation was made to investigate the work done in Oregon state regarding opioid prescribing

- Partner with some of the existing initiatives across the state (such as mental health and chronic disease related) to share relevant clinical guidelines for measures of interest

Recommendations & Next Steps

As required by UCA §26-33a-117, the Utah Health Data Committee is tasked with making recommendations for actions and opportunities for improvement, recommendations on methods to bring into alignment various healthcare quality metrics, and identifying priority issues and recommendations for inclusion in an annual report.

Recommendations for action and opportunities for improvement based on the results of this analysis included:

- Provide deeper geographic breakdowns, such as hospital catchment areas
- Conduct a pilot project with a targeted group, such as healthcare facilities
- Organize a campaign centered around a measure of focus
- Explore drilling down to the provider level, and giving providers access to their own information
- Seek funding for continued monitoring, dissemination and new intervention development
- Explore whether payment arrangements influence wasteful spending
- Work to capture and understand non-claims-based payment arrangements

Recommendations on methods to bring into alignment the various health care quality metrics different entities in the state use were:

- Understand the challenges and values of alignment and get provider buy in so the incentives are aligned
- Convene Healthcare payers, UDOH, AUCH, and Comagine Health around healthcare alignment in our state – standardize reporting requirements where possible

Lastly, priority issues and recommendations to include in an annual report were:

- Compare health waste measures with patient outcomes
- Include a review and determination of which measures are more valuable
- Solicit additional feedback from the physician community and take a deeper dive
- Align improvement with existing projects to prevent waste but also prevent unnecessary mortality and morbidity
- Measure alignment efforts should continue to be explored
- Support value-based payment arrangements in health care; if a healthcare entity carries healthcare financial risk, they will clean up wasteful, duplicative spending

- Align ongoing healthcare initiatives with health waste efforts. Statistics and best practices should be rolled into current initiatives to jump start the use of health waste statistics

Introduction

This report has been prepared to satisfy the requirements depicted in *H.B. 195 - Identifying wasteful healthcare spending*, which enacted *UCA §26-33a-117 - Identifying potential overuse of non-evidence-based health care*. The bill requires OHCS to:

1. Analyze data in the APCD with a nationally-recognized health waste calculator that uses principles such as Choosing Wisely and is approved by the HDC to flag data entries the calculator identifies as potential overuse of non-evidence-based health care.
2. Review current scientific literature about medical services that are best practice.
3. Review scientific literature about eliminating duplication in healthcare.
4. Solicit input from Utah health care providers, health systems, insurers, and other stakeholders regarding duplicative health care quality initiatives and instances of non-alignment in metrics used to measure health care quality that are required by different health systems;
5. Solicit input from Utah health care providers, health systems, insurers, and other stakeholders on methods to avoid overuse of non-evidence-based health care.
6. Present the results of the analysis, research, and input to the HDC.

This document includes all of the results to be presented to the HDC. The bill further requires the HDC to:

7. Make recommendations for action and opportunities for improvement based on the results.
8. Make recommendations on methods to bring into alignment the various health care quality metrics different entities in the state use.
9. Identify priority issues and recommendations to include in an annual report.

Results

Pursuant to UCA §26-33a-117, the Department analyzed data in the APCD, using a nationally-recognized health waste calculator that uses principles such as Choosing Wisely and is approved by the HDC to flag data entries the calculator identifies as potential overuse of non-evidence-based health care. The following section describes the database at the center of this analysis, specifics surrounding the Health Waste Calculator and the results of the OHCS's analysis.

Utah's All Payer Claims Database

The OHCS is responsible for managing the Utah All Payer Claims Database (APCD) under authority granted to the Utah Department of Health (UDOH) and the Utah HDC in statute (3). Licensed commercial health insurance carriers and pharmacy benefit managers covering 2,500 or more Utahns are required to submit member eligibility, medical claims, dental claims, and pharmacy claims as well as a healthcare provider file by administrative rule. In addition to commercial insurance data, the APCD collects data from Medicaid. The OHCS contracts with Milliman MedInsight for APCD data collection and processing. Milliman also enhances these data with risk adjusters, cost calculations, quality measures, and patient-provider attribution before delivering the APCD back to the OHCS on a semi-annual basis. It is estimated that the APCD has data on 65-75 percent of the population who had eligibility for at least a portion of the year. For this analysis, 2019 APCD data were used.

Milliman's Health Waste Calculator

The Milliman Health Waste Calculator (HWC) is a tool which was designed for the purpose of facilitating identification of wasteful health services. The most recent version (7.0) of the HWC uses 48 measures. These measures span several areas of healthcare, including diagnostic testing, screening tests, disease approach, preoperative evaluation, routine follow up monitoring and common treatments.

The HWC's measures were informed by an array of national efforts, including Choosing Wisely, the U.S. Preventive Services Task Force, the American Medical Association's Physician Consortium for Performance, and other medical and research-based sources.

The HWC classifies a service as either *necessary*, *likely to be wasteful*, or *wasteful*. According to Milliman, the following definitions for each of these three categories are provided: (4)

Necessary: Confirms that data suggests appropriate services were administered by the healthcare provider

Likely to be wasteful: Indicates the need to question the appropriateness of services rendered

Wasteful: Flags a cause for concern, as the service probably should not have occurred

The HWC reports two separate figures for each wasteful service. The first is called the *case rate* and the other is the *claim line itemization*. Both figures report the amount that a provider was paid (also known as the *allowed amount*). However, the *case rate* includes all costs of a claim that had at least one claim line identified as *wasteful*. On the other hand, the *claim line itemization* approach only includes the costs for the specific service that was flagged as *wasteful* by the tool. The case rate approach may overstate the actual dollar amount of potential healthcare waste, while the claim line itemization approach may likely underestimate the amount. The Office of Health Care Statistics adopted a conservative approach when estimating the cost of wasteful healthcare services in Utah. As such, the *claim line* itemization approach was used for its deeper dive into the data. For reference, information provided by Milliman regarding the claim line and case rate methodologies is depicted in the appendix.

Additionally, plans that were considered “dental” or “pharmacy only” were omitted from the analysis. While there are some HWC measures generated from pharmacy claims, omission of these plans ensures that only members with complete coverage were included in the analysis. Behavioral only plans and secondary plans were also removed. One payer was removed from the analysis due to coding errors of their insurance types (e.g., commercial and Medicare types not coded correctly). These removed data represent about 10% of data supplied to the APCD.

Only services that were flagged *wasteful*, specifically, were included in OHCS’s analysis. In addition to flagging wasteful healthcare services, the HWC defines each of its measures along a risk for harm scale. Services can be labeled low, medium or high risk of harm. The definitions for each are listed below. (5)

Low risk for harm – Includes harm as a result of the low value service or its cascade that may result in a mild adverse event or complication resulting in the need for non-surgical and non-inpatient hospital treatment.

Medium risk for harm - Includes harm as a result of the low value service or its cascade that may lead to a surgical procedure, or inpatient hospital treatment.

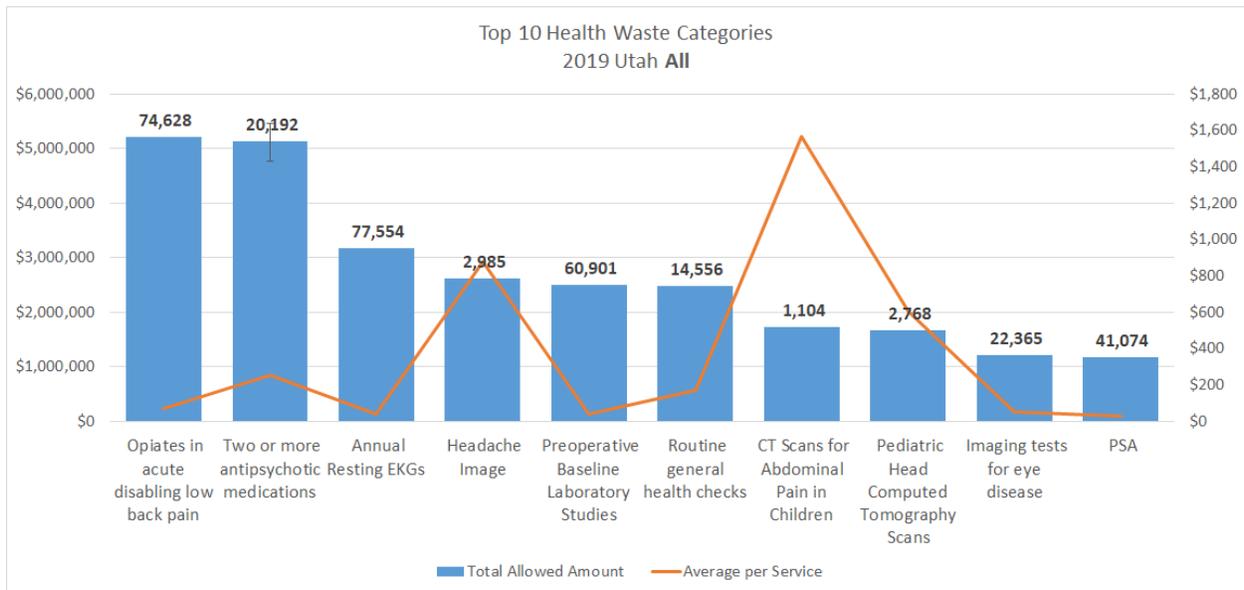
High risk for harm – Includes harm as a result of the low value service or its cascade that may lead to serious life or limb threatening adverse events such as developing a stroke or Myocardial infarction or death after a low value carotid endarterectomy or developing

long term consequences such as opioid abuse because of inappropriate opioid prescription etc.

Analysis Results

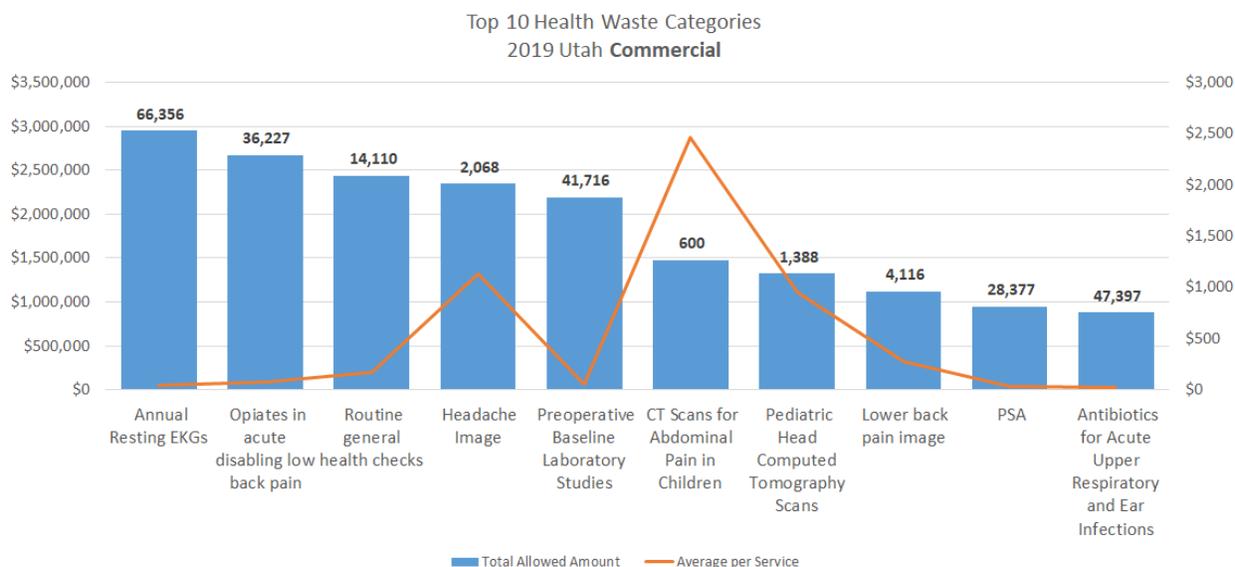
The top three wasteful services by total cost were: opiates in acute disabling low back pain, annual resting EKGs, and two or more antipsychotic medications. Notably, these three measures also have either a *high* or *moderate* risk of patient harm. A graph illustrating the top 10 services flagged “wasteful” in Utah for calendar year 2019 are shown in Figure 1. This figure represents commercial, Medicaid, and Medicare claims submitted to the APCD. The blue bars and the axis on the left indicate the total allowed amounts for that service. The number above the bar depicts the number of claims identified as “wasteful”, and the orange line illustrates the average cost per service, with the corresponding amount listed on the right axis scale. For example, in 2019, the measure which represents the highest amount of health waste in dollars was *opioid prescribing for acute disabling low back pain*. This made up just over \$5 million in health waste, according to the HWC, and was generated by 74,628 claims flagged “wasteful”. When comparing the average amount per service, while opioids prescribed for low back pain had the highest total waste dollar amount, the average *cost per service* (less than \$250) was lower than CT scans for abdominal pain in children, which is about \$1,600 per service on average.

Figure 1. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database; commercial, Medicaid and Medicare.



The health waste measures can also be analyzed by various groupings, including insurance type. The following four figures depict the top 10 services flagged by the health waste calculator, by commercial (Figure 2), Medicaid Fee-For-Service (FFS) (Figure 3), Medicaid Accountable Care Organizations (ACOs) (Figure 4), and Medicare (Figure 5).

Figure 2. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database; commercial.



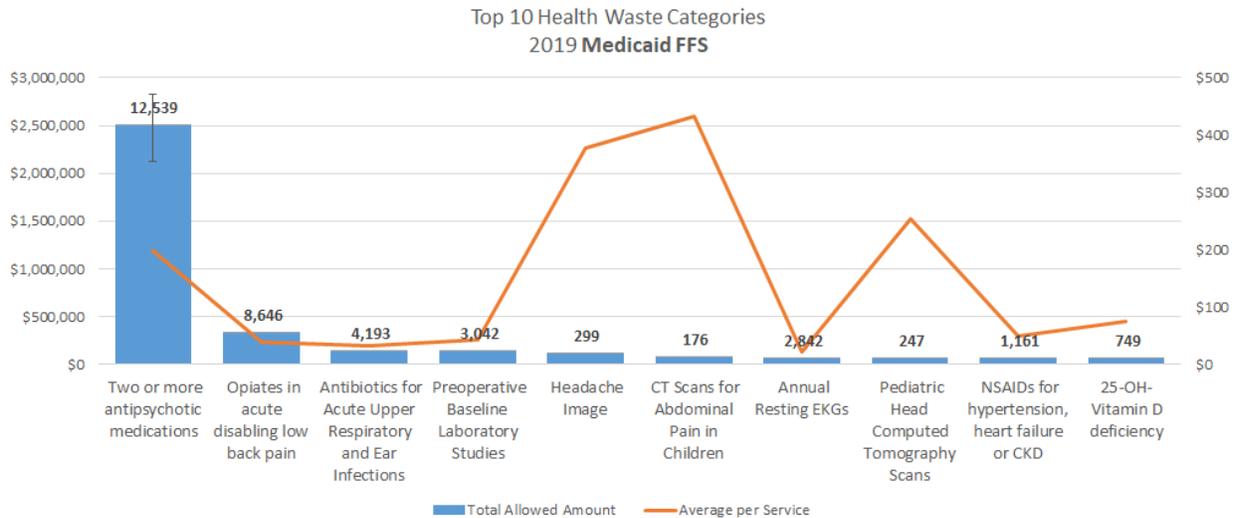
When observing claims for commercial insurance in 2019 submitted to the APCD, the results show that the top three measure headlines were annual resting EKGs (66,356 claims), opiates in acute disabling low back pain (36,227 claims), and routine general health checks (14,110 claims); health waste dollars for these services were between \$2 million and \$3 million each. It is important to note that for each of these measures, it does not suggest that, for example, annual resting EKGs or routine general health checks are always wasteful, but to consider their use in certain circumstances. Each of these measures has a corresponding description, source, specialty label, and other elements compiled by the tool. The descriptions of the three aforementioned measures are:

Annual Resting EKGs: Don’t order annual electrocardiograms (EKGs) or any other cardiac screening for low-risk patients without symptoms (source: Choosing Wisely) (6).

Opiates in Acute Disabling Low Back Pain: Don’t prescribe opiates in acute disabling low back pain before evaluation and a trial of other alternatives is considered (source: Choosing Wisely) (7).

Routine General Health Checks: Don't perform routine general health checks for asymptomatic adults (source: Choosing Wisely) (8).

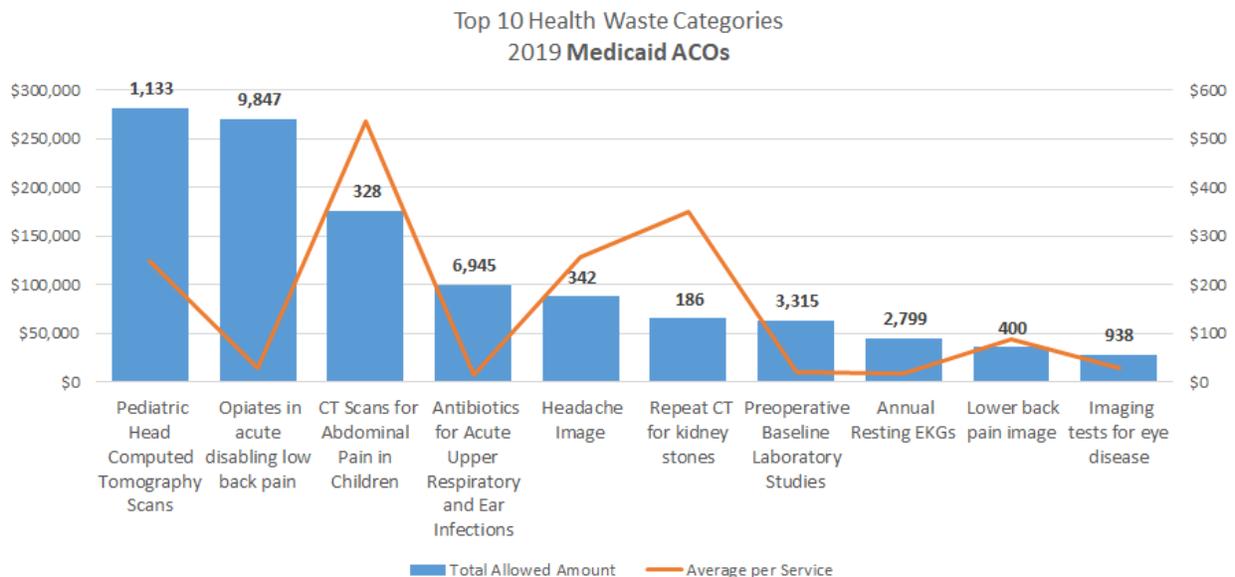
Figure 3. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database; Medicaid FFS.



When observing Medicaid Fee-For-Service, the top driver of health waste dollars was the prescription of two or more antipsychotic medications. The description for this measure states: *Don't routinely prescribe two or more antipsychotic medications concurrently.* This measure draws from Choosing Wisely and the American Psychiatric Association (9).

In 2019, this measure generated approximately \$2.5 million in health waste dollars, over 12,539 claims. Of note, at Medicaid's request, this measure takes into account the ordering of the claims if both prescriptions were received on the same day. For example, in cases where two prescriptions were received the same day, the first is classified as “necessary”, while the second as “wasteful”. The actual figure, when accounting for potential differences in the order of the claims, may be somewhere between \$2 million and about \$2.75 million (as depicted in the error bar on the column in Figure 3). Additionally, Medicaid requested that this report reflect the reduced pharmacy cost due to rebates Medicaid receives that are not reported in the claims submitted to the APCD. Specifically, the costs reflected in the “opiates in acute disabling low back pain” and “two or more antipsychotic medications concurrently” measures have the Medicaid rebate amount applied. It is unknown at this time to what degree similar rebates might affect other insurance types.

Figure 4. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database; Medicaid ACOs.



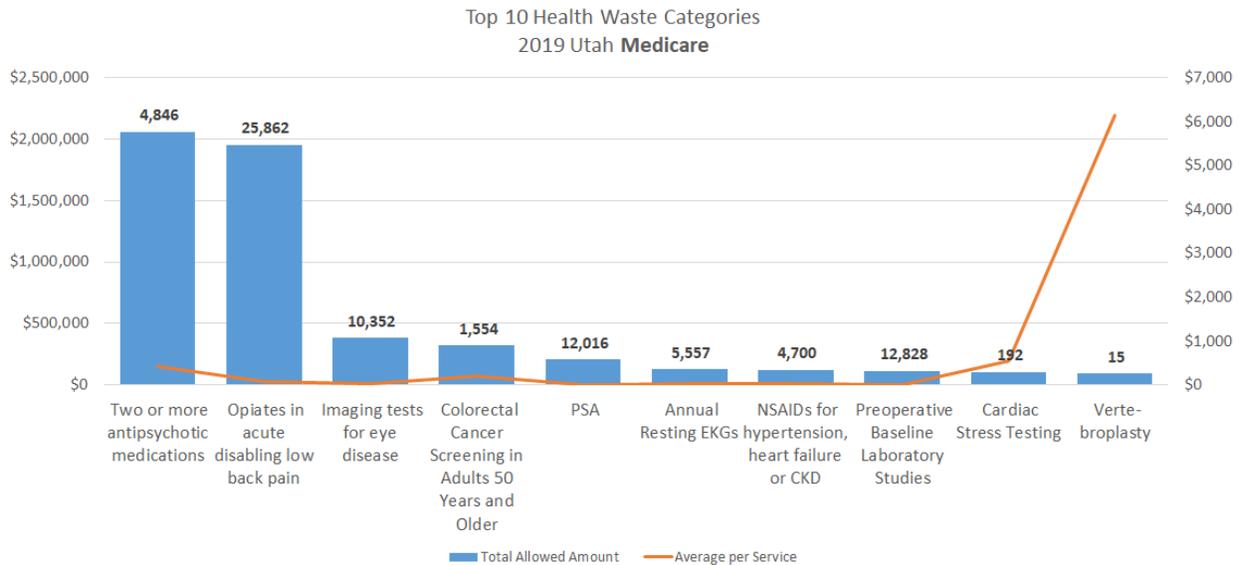
For Medicaid Accountable Care Organizations (ACOs), the top three measures for claims submitted to the APCD for the 2019 calendar year which generated the highest amounts of health waste dollars were: pediatric head computed CT scans (1,133 claims), opiates in acute disabling low back pain (9,847 claims) and CT scans for abdominal pain in children (328 claims). It is important to note that while these three measures represent the highest drivers of health waste dollars, antibiotics for acute upper respiratory and ear infection was flagged across 6,945 claims, which would make it the second most frequent health waste category in 2019. As mentioned previously, these measures’ titles do not suggest that performing that service is wasteful, but rather to consider the conditions when it should and should not be used. As an example, below are a few of the descriptions for some of the measures in Figure 4:

Pediatric Head Computed Tomography Scans: Don't order computed tomography (CT) head imaging in children 1 month to 17 years of age unless indicated (source: Choosing Wisely) (10).

CT Scans for Abdominal Pain in Children: Don't perform Computed tomography (CT) scans in the routine evaluation of abdominal pain (source: Choosing Wisely) (11).

Antibiotics for Acute Upper Respiratory and Ear Infections: Don't prescribe oral antibiotics for members with upper URI or ear infection (acute sinusitis, URI, viral respiratory illness or acute otitis externa) (source: Choosing Wisely) (12).

Figure 5. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database; Medicare.



When observing Utah Medicare claims for 2019, the two notable drivers of health waste dollars appear to be two or more antipsychotic medications (4,846 claims) and opiates in acute disabling low back pain (25,862 claims). Each of these two measures generated approximately \$2 million in health waste dollars. Although the analysis shows that these are the top drivers of health waste, there are other measures in Figure 5 which flagged over 10,000 claims as wasteful: imaging tests for eye disease (10,352 claims), prostate specific antigen (PSA) test (12,016 claims), and preoperative baseline laboratory studies (12,828 claims). The descriptions for these three measures are listed below:

Imaging Tests for Eye Disease: Don’t routinely order imaging tests for patients without symptoms or signs of significant eye disease (source: Choosing Wisely) (13).

Prostate Specific Antigen (PSA): Don’t perform PSA-based screening for prostate cancer in all men regardless of age (source: Choosing Wisely) (14).

Preoperative Baseline Laboratory Studies: Don’t obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery (source: Choosing Wisely).

While the top health waste services vary for each insurance type, opioids prescribed for acute disabling low back pain are among the top wasteful services. Each of the Milliman measures has an accompanying detailed clinical guide, which describes the measure, provides background

information and scientific evidence, and references. As an example, the recommendation to not prescribe opiates in acute disabling low back pain is derived from an American Academy of Physical Medicine and Rehabilitation (AAPM&R) Choosing Wisely recommendation from 2015. The language for this recommendation, according to the Milliman clinical guide, reads:

Don't prescribe opiates in acute disabling low back pain before evaluation and a trial of other alternatives is considered.

Early opiate prescriptions in acute disabling low back pain are associated with longer disability, increased surgical rates, and a greater risk of later opioid use. Opiates should be prescribed only after a physician evaluation by a licensed health care provider and after other alternatives are trialed.

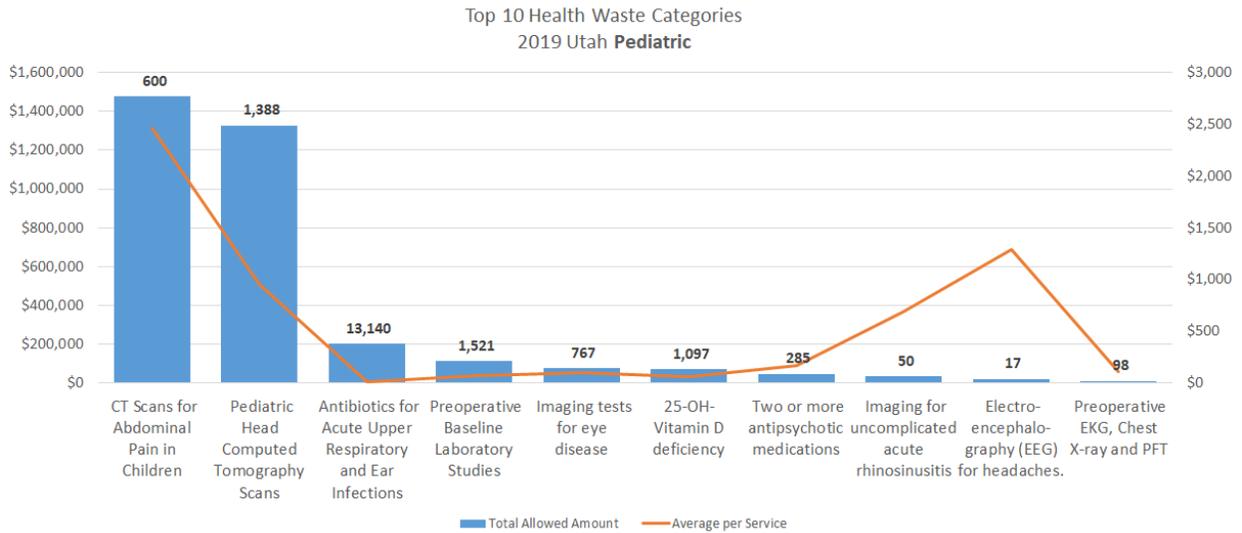
Different insurance types have different waste and average cost distributions. Commercial insurance showed a small decrease from one waste category measure to the next, while Medicaid and Medicare have most of their healthcare waste in only the first few measures. This difference is likely due to variance in utilization for the populations served by the different insurance types.

Medicaid Fee-For-Service shows that the cost for the 'two or more antipsychotic medications' measure represents over two-thirds of the total wasteful cost identified. This measure in particular flags the cost of the *second* antipsychotic medication prescribed as wasteful. In some cases, both the first and second medication were dispensed on the same day; which one is flagged as wasteful depends on the order of the claim prescription number. This methodology should be taken into consideration and all medications should be reviewed when assessing this measure.

Part of the difference in utilization may be explained by differences in age for each insurance type population. The commercial market has a broad age spread, while the Medicaid data has many younger adults and pediatric patients and the Medicare data represent mainly seniors. Breaking the commercial and Medicare data into age categories gives us the following graphs.

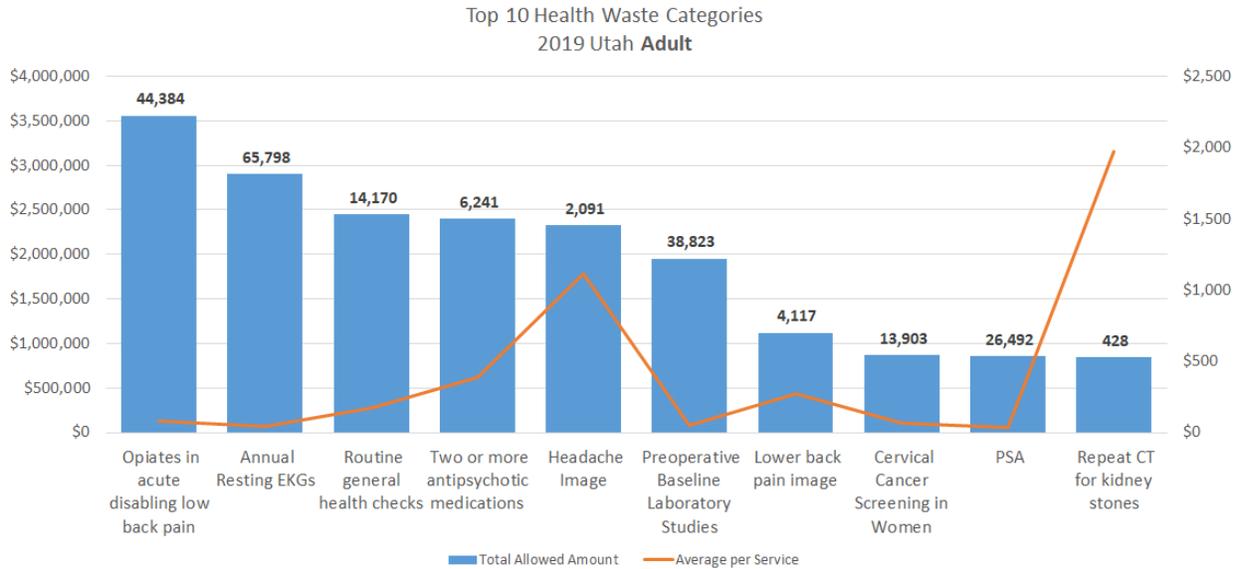
Since waste amounts are calculated at an individual prescription level, and Medicaid provided aggregate rebate amounts for two health waste calculator prescription measures (opioids in acute disabling low back pain and two or more antipsychotic medications) not broken down by demographics (e.g., age), the following charts reflect only commercial and Medicare data. Additional breakouts of Medicaid can be generated upon request.

Figure 6. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database. Pediatric population, ages 0-18, Commercial and Medicare only.



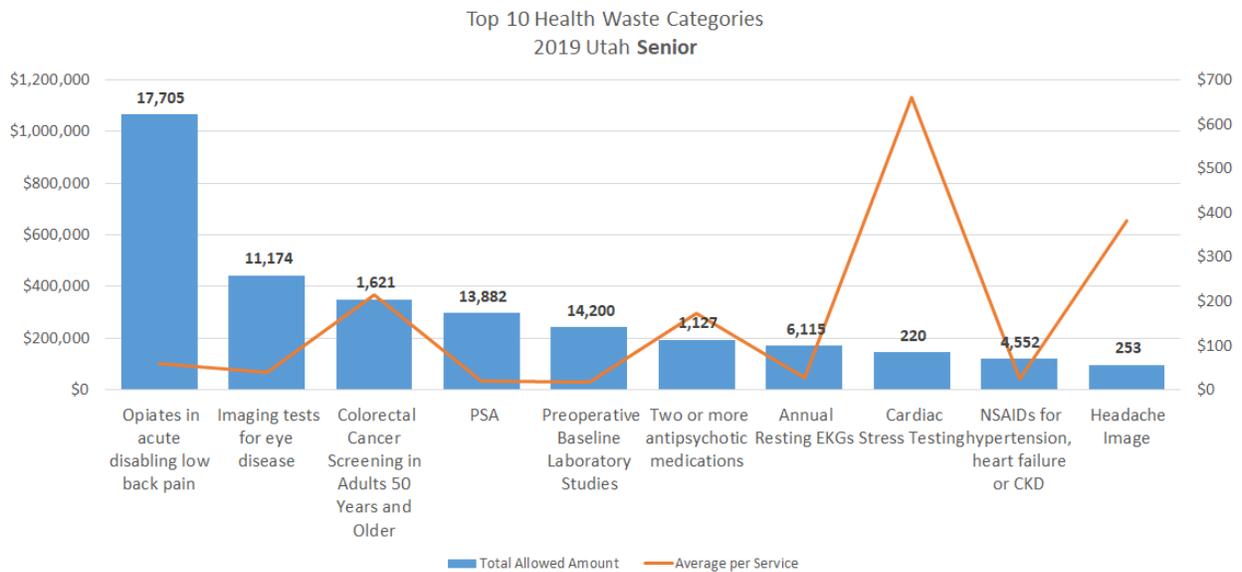
Within the pediatric population, the top two notable drivers of health waste dollars, using 2019 claims data, were CT scans for abdominal pain in children (600 claims) and pediatric head CT scans (1,388 claims). Of note, while these two generated the highest amount of health waste dollars (about \$1.4 million and approximately \$1.3 million, respectively), the measure with the highest number of claims flagged wasteful was antibiotics for acute upper respiratory ear infections.

Figure 7. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database. Adult population, ages 18-64, Commercial and Medicare only.



As noted in other observations, for the adult population, the top driver of health waste dollars is opiates in acute disabling low back pain (44,384 claims). This chart shows just over \$3.5 million in reimbursements for this measure. Similarly, for the senior population (Figure 8), opiates in acute disabling low back pain generated over \$1 million dollars across 17,705 claims flagged.

Figure 8. Top 10 measures flagged as “wasteful” in the state of Utah, using 2019 All Payer Claims Database. Senior population, ages 65+, Commercial and Medicare only.



These results can also be broken down into sex, geographic classifications and other possible observations, as well as combinations of these, for more targeted analyses in the future. For example, wasteful healthcare services can be observed for pediatric populations across rural, urban and frontier areas, or across local health districts, to see if there are any notable measures that stand out in certain geographic regions of the state.

Limitations

While this report is robust and provides numerous insights regarding health waste in the state of Utah, there are several limitations and nuances to be aware of. These limitations are:

- No pharmacy rebate amounts are available for commercial and Medicare.
- The focus is on claims Milliman flagged “wasteful”, which may differ from other assessments of health waste.
- At the epicenter of this analysis is the claim line methodology, in lieu of the case rate method. This results in a lower estimate than other health waste assessments.
- The APCD only contains claims submitted to the State, and does not include data for all Utahns. At present, the APCD contains claims data for approximately 65-75 percent of the population who had eligibility for at least a portion of the calendar year. As a result, any payments outside the claim system are not reflected in this analysis. For example, cash paying patients, some self-funded plans or those who are uninsured are not captured in the APCD.
- Not all patient diagnoses and health conditions are captured in the APCD. Due to the nature of claim billing, not all health conditions and history are recorded on the claims. For example, a patient may have had chronic back pain for several months, but may have either not sought care, or care was not submitted to the APCD.
- The APCD relies on the accuracy of the data entered and provided to the State. There exists a possibility, for example, for those entering data for services rendered by providers to make mistakes. These mistakes that are not correctly adjusted, within the sphere of medical billing, would be unknown to the State.

Analysis Key Takeaways

The following list represents some of the major key takeaways from the analysis of the Health Waste Calculator data:

- The total health waste dollars across 48 measures amounted to approximately \$42 million (before Medicaid rebates applied for two measures selected: opioids for acute disabling low back pain and two or more antipsychotic medications, the amount after applying the

rebates is approximately \$38 million). This represents about 5% of total care spend for the 48 measures (denominator approximately \$830M).

- The top three health waste measures across the state were:
 - Opiates in acute disabling low back pain (74,628 claims flagged, approx. \$5M)
 - Two or more antipsychotic medications (20,192 claims flagged, approx. \$5M)
 - Annual Resting EKGs (77,554 claims flagged, approx. \$3M)
- Across various observations, including Commercial only, Medicaid Fee-for-Service, Medicaid Accountable Care Organizations, Medicare only, adult populations and seniors, opiates in acute disabling low back pain are among the top two waste measures. The same holds true for urban and rural geographies.
- For the pediatric population, the top three notable health waste measures were:
 - CT scans for abdominal pain in children (600 claims flagged, approx. \$1.4M)
 - Pediatric head CT scans (1,388 claims flagged, approx. \$1.3M)
 - Antibiotics for acute upper respiratory ear infections (13,140 claims, approx. \$200K)
- The top three health waste measures for Utah's frontier geographies (less than 6 people per square mile) (1):
 - Preoperative baseline laboratory studies (1,696 claims flagged, approx. \$170K)
 - Annual resting EKGs (1,764 claims flagged, approx. \$170K)
 - Routine general health checks (785 claims flagged, approx. \$140K)

Scientific Literature Review about Medical Services that are Best Practice

The Milliman Health Care Waste measures were developed using the Choosing Wisely, the US Preventive Services Task Force, the American Medical Association's Physician Consortium for Performance, and various other medical and research-based sources. The Milliman Health Waste Calculator contains a total of 48 measures for measuring health care services that are deemed wasteful. The fifteen measures that are discussed in the literature review account for 76.5% of the overall wasted spending in the state of Utah in 2019. The remaining 33 metrics in the Health Waste Calculator accounted for 23.5% of total wasted health care spending; these remaining metrics can be found in Appendix A.

1. Use of Opiates in Acute Low Disabling Back Pain

According to the Milliman report, the prescription of opioids for acute low back pain is considered as wasteful except in specific circumstances. Acute back pain is any back pain that is lasting less than 4 weeks. Opioid overuse in pain management, especially in the management of lower back pain, has contributed to the ongoing national and state opioid epidemic. Between 2000 and 2019, around 4,495 deaths due to opioid prescription overdose were recorded in Utah (15). Opioid prescriptions for isolated back pain have been increasing in the US with Utah ranking at sixth place in the national ranking of over prescription of opioids (16). The efficacy of opioids in treating acute pain is well established, but the analgesic efficacy of opioids in the treatment of acute low back pain is not yet proven (17). Opioids should be prescribed only after adequate physical evaluation by a licensed health care provider and only after other alternatives have been tried (18).

According to the American College of Physicians, the first treatment of choice for acute back pain includes non-pharmacological treatment such as superficial heat, massage etc., followed by pharmacological treatment such as non-steroidal anti-inflammatory drugs (NSAIDs) or skeletal muscle relaxants (19-21). Opioids should be only considered in the treatment of chronic back pain when there is no response to non-pharmacological and non-pharmacological treatments and for the pain management in cancer and chronic sickle cell anemia (19-21). A meta-analysis showed that the use of opioids is not proven to be efficacious even in the treatment of chronic back pain (22).

Opioids were also associated with increased disability among patients. A study showed that among the patients who received an opioid prescription for acute work-related back injuries, patients who received opioids had twice the rate of disability to work compared to patients who were not prescribed opioids (23). Also, longer duration of work disability was associated with higher doses of opioids (18). Early initiation of opioid prescription in acute disabling low back

pain has been associated with longer disability, increased surgical rates, and a greater risk of opioid use at a later age (18). More than half of the regular opioid users have reported back pain (17). This raises questions about the effectiveness and addictive characteristics, such as dose tolerance and dependence, of opioids. Increase in drug misuse, complications, and fatal overdoses have been observed in persons taking opioids for the treatment of back pain (24). The prescription of opioids for acute pain has the potential to lead to long term use of opioids leading to drug dependence (25).

A study done in the UK among primary care patients with acute low back pain showed that patients receiving opioids had worse pain, functioning, self-efficacy, depression and even fear of movement compared to those receiving NSAIDs (26). Thus, the use of opioids in the treatment of acute back pain is considered to be wasteful except in cases where the acute back pain is caused by cancer or by sickle cell anemia. It should be noted, however, that some studies consider opioids to be a safer choice than NSAIDs for back pain in older people, especially with people aged 75 years or older. NSAIDs are associated with gastrointestinal, renal, and cardiovascular risks in this population, which are found to be absent with the use of opioids (27). This shows that there may be some indication for the use of opioids among the geriatric population.

2. Annual Resting Electrocardiograms

The Milliman report and the US Preventive Services Task Force (USPSTF) does not recommend the ordering of annual electrocardiograms (EKGs) and other cardiac screening procedures for low-risk patients aged 18 years or older without symptoms (28). Even the early detection of coronary artery stenosis in low-risk asymptomatic patients does not improve health outcomes (28). Also, there is always the possibility of false-positive tests which may lead to harm by misdiagnosis, and exposure to unnecessary invasive procedures, and even over-treatment (28). Thus, the harms of routine annual resting electrocardiograms may even exceed the potential benefit (28). Many physicians in the US perform EKGs and other cardiac screenings even in low-risk and asymptomatic patients mainly as a practice of defensive medicine, although USPSTF do not support their routine use as a diagnostic or screening tool (29).

Studies have shown that routine EKG testing also increased the propensity of subsequent cardiology testing and increased physician consultations although the risk of cardiac outcomes were similar to the group that did not receive any routine EKG testing (30). Although EKGs are low-cost procedures, increased EKG testing low-risk patients leads to an increase in advanced testing which increases the cost to the patients without any health benefits (30). Even though the EKGs is a noninvasive test, higher rates of EKGs often lead to higher rates of invasive diagnostic testing procedure, even without much health benefits (30).

In the asymptomatic patients, the risk for CHD could be predicted by Framingham risk score and other measures. EKGs are only recommended for adults in the intermediate and high-risk groups for coronary heart disease (31). A study by the USPSTF shows that EKGs do not provide any additional information that could not be obtained by Framingham risk score assessment, especially in low-risk patients (32). Studies show that ordering of an EKG even in a low-risk patient was associated with higher downstream cardiac testing and consultations (32). However, the Milliman report mentions that use of EKGs for screening in patients with inflammatory conditions, before a minor surgery, high risk markers or with cardiovascular symptoms are not deemed wasteful.

3. Use of Antibiotics for Acute Upper Respiratory and Ear Infections

In the US, URIs constitute around 25 million physician visits each year with around 20 to 22 million days of absence from work and school (33). Majority of upper respiratory infections are viral in nature and the use of antibiotics to treat them are ineffective and are potentially harmful (34). There are around 50 million annual antibiotic prescriptions in the US each year. Around 1 out of 5 pediatric ambulatory visits results in antibiotic prescriptions (35). A study done among 52,000 patients in a large ambulatory healthcare network around 65% of the patients were prescribed antibiotics for treatment (36). The Milliman report mentions that antibiotics should not be prescribed for apparent viral respiratory illnesses such as sinusitis, pharyngitis, bronchitis. Unnecessary use of antibiotics for viral respiratory illnesses leads to increase in antibiotic resistance and increases the probability of adverse events, in addition to increasing healthcare costs (37). In addition to the complications such as drug resistance, and other adverse effects associated with the use of antibiotics, there is also the possibility of severe adverse events such as anaphylaxis that may also occur (38).

The main conditions that cause URI and ear infections include common cold, influenza, rhinosinusitis, otitis media, pharyngitis, laryngitis, epiglottitis, bronchitis and tonsillitis (39). The Milliman report suggests that the exceptions are the upper respiratory infections caused by Group A streptococci disease (Strep throat) and pertussis (whooping cough) which require treatment with antibiotics (40).

However, there are wide indications for the use of antibiotics for a number of specific upper respiratory illnesses and ear infections. Antibiotics are preferred for the treatment for acute bacterial rhinosinusitis and also recommended for children aged 6 to 35 months with acute otitis media (41-43). Approximately 70% of children with pharyngitis have viral infections (44-46). Among the rest (30%) of children, pharyngitis is caused by bacterial infection, specifically group A beta-hemolytic streptococcus (47). Antibiotic Penicillin is used for the treatment of patients with streptococcal pharyngitis to decrease the risk of rheumatic fever, and alleviate symptoms

(48-51). Guidelines from the CDC and National Institute of Health and Clinical Excellence do not recommend the use of antibiotics for the treatment of acute bronchitis (52,53). However, a Cochrane review found a small decrease in symptoms including cough and number of days ill among the patients who received antibiotics. But still the authors did not recommend the use of antibiotics because of the possibility of adverse reactions and drug resistance (54). Studies show that antibiotic use is warranted in the case of acute otitis media, group A beta-hemolytic streptococcal pharyngitis, epiglottitis, or bronchitis caused by pertussis. Even some persistent cases of rhinosinusitis need the use of antibiotics (39). Only if there is an extension of the infection outside the ear canal, a need for systemic antibiotic therapy is recommended (55). Even for the treatment of acute mild to moderate sinusitis, antibiotics are not preferred unless the symptoms last for seven or more days (56).

If the patient with upper respiratory infection has comorbid conditions such as cystic fibrosis, pneumonia, streptococcal infection, chronic bronchitis, bronchiectasis, or an underlying immunocompromising condition then antibiotics are prescribed (57). For patients with malignant otitis externa, possibly due to pseudomonas infection, the use of antibiotics is not considered wasteful (55). For patients with symptoms of complicated acute rhinosinusitis for more than 10 days, then the use of antibiotics is warranted (55).

4. Preoperative Baseline Laboratory Studies

The Milliman report recommends not to obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) performed 30 days or fewer prior to undergoing low-risk elective surgery. Baseline laboratory tests include complete blood count, basic or comprehensive metabolic panel, coagulation studies when blood loss (or fluid shifts) is expected to be minimal. Very low risk surgery includes eye surgery, GI endoscopy (without stents), dental procedures. Low risk surgery includes hernia repair, ENT procedures without planned flap or neck dissection, diagnostic cardiac catheterization, interventional radiology, GI endoscopy with stent placement, cystoscopy (58).

Clinical history and complete physical examination should determine the need for pre-procedure laboratory studies (59). Specific investigations are ordered based on the patient's preexisting medical conditions or other risk factors. For example, an EKG should be only ordered if the patient has an underlying heart disease, a blood glucose test if the person has diabetes, a potassium test if the patient is on diuretics, patients with liver disease will require CBC and coagulation studies (60-64). Preoperative testing is only recommended in patients who have some abnormal findings in the basic health assessment and examinations done by physicians (64).

Physicians may feel that obtaining all baseline laboratories before surgery may be an effective way to protect against any unexpected complications, but the American Society of Anesthesiology recommends that physicians use caution in which tests to perform taking into consideration the risks and benefits of the tests (65). Many other studies also find no benefit of pre-operative tests in low-risk surgeries (66-69). Studies show that routine preoperative testing has resulted in delay or cancellation of the procedures in less than 2% of the cases (70). RCTs done among patients planned for cataract surgery found no effect of the routine tests such as EKG, metabolic panel, and CBC on procedure cancellation (70).

The Milliman report suggests that preoperative routine baseline laboratory testing is not required for elective low-risk procedures. However, they may be needed in the emergency or urgent care settings. Another low-risk procedure are urologic procedures and routine urine analysis are indicated for them without being considered wasteful (71,72).

5. Routine Prescription of Two or More Antipsychotic Medications Concurrently

The Milliman report recommends against the prescription of two or more antipsychotic medications concurrently. With the lack of additional benefits and efficacy in using multiple psychotic medications concurrently, there are also potential safety issues such as medication errors, potential risk of drug interactions, and also noncompliance (73). Antipsychotic polypharmacy has been associated with a number of side effects including hyper salivation, hyperprolactinemia, sedation, cognitive impairment, diabetes, and dyslipidemia (74). In addition, antipsychotic polypharmacy is associated with higher treatment cost and medication expenses (74).

Antipsychotic drug polypharmacy has been recommended for specific diseases and for specific indications. The World Health Organization recommends the use of antipsychotic polypharmacy in patients with psychoses who do not respond to monotherapy by following adequate close monitoring (75). Guidelines from the UK's National Institute for Health and Clinical Excellence (NICE) highlight that antipsychotic combinations should be used only for a short period of time when the medications are changed (76).

For diseases like schizophrenia, the use of two or more antipsychotics are only used as a last resort for treatment (76,77). Guidelines from the American Psychiatric Association for the treatment of patients with Schizophrenia indicate there are potential benefits in prescribing multiple antipsychotic medications (78). Specifically, the combination with clozapine and non-clozapine polypharmacy have been found to be effective in Schizophrenia treatment (79-81).

Studies show that in cases where there are three failed treatments with psychotic drug monotherapy, where one failed treatment is with the drug Clozapine, then the use of two or more

antipsychotic medications may be prescribed (82,83). Also, in cases where there is a plan to cross-taper to monotherapy, then a second antipsychotic medication could be used (82,83).

6. Population-based Screening for 25-OH-Vitamin D Deficiency

The Milliman report does not recommend the performance of population-based screening for Vitamin D (1, 25-dihydroxyvitamin D) unless the patient has hypercalcemia or decreased kidney function. The USPSTF studies did not find any direct benefits of screening for vitamin D deficiency in adults (84,85). Laboratory testing of Vitamin D deficiency is recommended only in high-risk patients where aggressive therapy is needed. This includes patients with osteoporosis, chronic kidney disease, malabsorption, and obese individuals (86-88). Vitamin D testing for the management of osteoporosis and prevention of falls are recommended by the American Congress of Obstetricians and Gynecologists, American Geriatric Society, and the National Osteoporosis Foundation (70).

Even for medical practitioners, the ordering of Vitamin D testing is confusing. 1,25-dihydroxyvitamin D is an active form of vitamin and does not measure Vitamin D stores in the body and thus is not a test for Vitamin D deficiency (89,90). Also, in Vitamin D deficiency, the levels of 1,25-dihydroxyvitamin D increases and does not go down (89,90). Guidelines by the endocrine society only recommend the screening of individuals with deficiency (91). However, the clinical practice guidelines of the endocrine society recommend the screening of Vitamin D deficiency with 25-OH-Vitamin D among persons with low Vitamin D intake, people with little or no sun exposure and people with decreased Vitamin D absorption (92).

Serum 1,25 (OH)₂ may be normal or even elevated in individuals with Vitamin D deficiency due to secondary hyperparathyroidism (92). Measurement of 1,25(OH)₂ is useful in detecting some acquired and inherited disorders of Vitamin D and phosphate metabolism, including chronic kidney disease, hereditary phosphate losing disorders, oncogenic osteomalacia, pseudovitamin D-deficiency rickets, Vitamin D-resistant rickets, as well as chronic granuloma forming disorders such as sarcoidosis and some lymphomas (92).

Guidelines from the Endocrine Society and Choosing Wisely mention that screening for 25-OH-Vitamin D deficiency in a number of health conditions including rickets, osteomalacia, osteoporosis, chronic kidney disease, hepatic failure, malabsorption syndromes, hyperparathyroidism, under specific medications like anticonvulsants, pregnant and lactating women, older adults with history of falls, older adults with history of non-traumatic fractures, obese children and adults, granuloma-forming disorders such as sarcoidosis (92,93).

7. Imaging for Uncomplicated Headache

Headache constitutes 3% of the emergency department visits and 1.3% of outpatient visits (94). The Milliman report does not recommend imaging for uncomplicated headache without any neurological symptoms. The report also recommends not to perform neuroimaging studies in patients with stable headaches that meet criteria for migraine. Imaging of patients with headaches that do not have specific risk factors for structural disease will not change the clinical outcome or clinical management (95).

A diagnosis of migraine needs to be made to avoid missing patients with serious headaches. Careful clinical examination is needed to make the diagnosis and rule out any neurological findings (96-98). Very detailed history and physical examination will help to reduce the need for imaging and also to identify red flags such as neurologic signs, papilledema, neck stiffness, an immunocompromised state which may need further evaluation and possible imaging (99). Imaging is also not recommended for individuals who present with isolated headache in the absence of any abnormal neurological findings (100).

American College of Radiology ACR Appropriateness Criteria for headache does not recommend CT scan for primary headache while MRI is recommended for primary headache (100). It is not recommended to perform a computer tomography (CT) imaging for headache when an MRI is available, except in emergency settings. Emergency settings include conditions such as hemorrhage, acute stroke or head trauma. Neoplasms, vascular diseases, cervicomedullary lesions, and high and intracranial pressure disorders are better detected by MRI scan (98,101-103). No biologic risks are associated with the use of MRI, while the use of CT head is associated with substantial radiation exposure which may lead to increased risk of cancers (98,101-103). Head imaging with MRI is considered appropriate in elderly individuals with raised erythrocyte sedimentation rate or temporal tenderness (100). Head imaging with CT or MRI is appropriate in complicated headaches including thunderclap headache, headache associated with Horner syndrome or vertebral dissection. CT or MRI without contrast is considered appropriate in post-traumatic headache, headache with neurologic deficits, and pregnancy. MRI is considered appropriate in trigeminal headache, cancer, encephalitis, meningitis, and immunocompromised conditions (100). CT and MRI are considered appropriate for patients with epilepsy, ataxia and in the case of a cerebrovascular event (104-106).

8. Routine General Health Checks for Asymptomatic Adults

Annually, in ambulatory health care settings, more than \$6.79 billion were spent on unnecessary tests during routine general health checkups (107). According to the Milliman report it is not recommended to perform routine general health checks for asymptomatic adults. Although a general check will help in establishing a trusting relationship between a doctor and patient and

increases the opportunity for preventive counselling and screening, doing annual general health checkups every year may not be effective (108). Annual general checkups have not been shown to reduce morbidity, mortality and hospitalizations (108).

Evidence from a Cochrane review shows that for asymptomatic adults without any health conditions such as chronic medical condition, mental health problems, or other health concerns it is not recommended to perform routine annual general health checkups including a comprehensive physical examination and laboratory testing (109). There was also no reduction in morbidity and mortality when annual checkups were done (109). However, USPSTF recommends eight different screening for specific diseases and conditions even though the patients are asymptomatic. For example, asymptomatic adults aged 35 to 70 years who are obese or overweight recommends screening for diabetes. USPSTF and Canadian Task Force on Period Health Examination recommend screening tests at variable intervals and focused health checkups based on patient-specific risk factors (110,111). Focused checkups on the patients age and risk the visit intervals should be tailored rather than annual examination (108).

A study on the effectiveness of annual physical examinations showed that some of the examinations and tests that are components of the annual exam are effective in early detection and treatment. For example, the USPSTF recommends blood pressure every 2 years, weight, and PAP smear for sexually active women up to the age of 65 years. At the same time, other components of the annual examination are not found to be an effective disease detection tool. For example, pelvic examination for ovarian cancer, pap smear for women aged 65 years or more, testicular examination for testicular cancer, abdominal examination for pancreatic cancer, thyroid examination for thyroid cancer (112).

The Milliman recommendations are only for adults under the age of 65 years, since people over 65 years are covered under Medicare. Annual examinations even in adults over 65 years may be wasteful, although the USPSTF has increased the intensity of screenings and examinations required for that age group (113), but still whether they will require the wide spectrum of examinations required under the annual routine examinations is still questionable.

9. CT Scans for Abdominal Pain in Children

In the emergency departments, there is an increasing utilization of CT imaging for evaluation of children (114). Around 3.4 million children with abdominal pain present in the ED department every year in the US (115). Milliman's report mentions that CT scans are not necessary in the routine evaluation of abdominal pain in children. Excessive radiation exposure due to CT scan may increase the lifetime risk of developing cancer among children due to the acute sensitivity of the children's organs (116). The use of CT scans in children is associated with increased risk of many diseases including cancer due to high radiation exposure (117). A study in Lancet showed

that children exposed to CT scan have at least three times higher risk of developing leukemia and other tumors (118). Another study showed that among children that are undergoing abdominal scans increased the risk of cancer at a different rate among girls and boys. Among girls the risk of cancer in later life is 1 for every 300 to 400 abdominal scans and among boys it is 1 for every 700 to 800 abdominal scans (119).

The American Academy of Pediatrics does not recommend the use of CT especially if an ultrasound examination is not done first (120). Even for specific conditions such as appendicitis in children, only ultrasound is the imaging of choice (120). The sensitivity of ultrasound in detecting appendicitis and also the lack of radiation exposure hazards along with a cheaper cost makes it a better health and cost-effective tool for the detection of one of the causes of acute abdominal pain in children (120).

CT scan is accurate in the detection of appendicitis among children, but it is still not recommended and ultrasound is the first choice of investigation (121,122). Only in cases where the ultrasound findings are ambiguous, then a CT scan is recommended (121,122). Only in conditions where the ultrasound findings are inconclusive or when the bowels are difficult to probe in children with abundant adipose tissue, CT scans are considered appropriate (117). In children with abdominal trauma or suspected malignancy, then CT scan is indicated (117).

10. Pediatric Head Computed Tomography Scans

The Milliman report does not recommend the use of head CT scans in the pediatric population. Use of CT scans in children not only has low use in diagnosis but is also associated with significant risks of cancer due to exposure to ionizing radiation (123). CT scanning of the head is done among 50% of the children who visit the emergency departments. Most of the CT scans are necessary, however they increase the risk of exposure to ionizing radiation. The brains of children are more susceptible to ionizing radiation. The unwarranted use of CT scans also increases the health system costs. Clinical decision making before diagnostic CT scanning is recommended (124-127).

The American Academy of Pediatrics does not recommend CT scans for children who have simple febrile seizures (128). The American College of Radiology also does not recommend the CT scanning of children with primary headache and classify them as ‘not appropriate’ (129,130). Even the CT scanning of children with mild head injuries is not recommended (124). The Pediatric Emergency Care Applied Research Network (PECARN) Pediatric Head Injury/Trauma algorithm can be used by clinicians to determine whether a CT scan is required for a minor head injury based on the traumatic head injury scores and guidelines (131).

CT scans in children are considered appropriate only in the cases of thunderclap headache, moderate or severe head injury, minor head trauma with high risk factors (altered mental status, clinical evidence of basilar skull fracture), suspected non-accidental trauma, post-traumatic seizures, subacute closed head injury with cognitive or neurological deficit (132). In conditions where the child has headache with increased intracranial pressure or other positive neurological signs then a CT should be done only if an MRI is not available (129). Even in the cases of first generalized seizure or intractable or refractory seizure or partial seizures a CT scan may be done if an MRI is not available (133).

11. Routine Orders of Imaging Tests for Patients without Symptoms or Signs of Significant Eye Disease

The Milliman report does not recommend the routine ordering of imaging tests for patients without symptoms or signs of significant eye disease. Routine eye imaging includes visual-field testing, optical coherence tomography testing, retinal imaging of patients with diabetes, neuroimaging or fundus photography. A comprehensive physical examination and history will help in detecting if the eye disease is present or has the potential to worsen. If symptoms or signs of eye disease are suspected, then imaging may be done for further evaluation and treatment (134-137).

The American Academy of Ophthalmology recommends a comprehensive exam based on various risk factors for eye disease. Eye imaging is only recommended only if it is warranted after a comprehensive eye examination is done (138).

The Milliman report also recommends against ordering retinal imaging tests for children without symptoms or signs of eye disease. Although retinal imaging will be useful in identifying the retinal or optic nerve pathology. Their routine use in asymptomatic children is not recommended (139).

12. Performance of PSA-based Screening for Prostate Cancer in all Men Regardless of Age

Milliman's report recommends against routine performance PSA screening for prostate cancer. USPSTF recommends against PSA-based screening for prostate cancer in men of all ages since it leads to significant over-diagnosis of prostate tumors (140). There is also a higher likelihood of false-positive results in PSA screenings. False positive results lead to increase in unnecessary invasive prostate biopsies and also lead to decrease in quality of life and also unnecessary mental distress (141-143).

Only in circumstances where an appropriate family history of prostate and other cancers screening using PSA is considered to be appropriate (141-143). PSA screening is recommended in individuals with risk factors for prostate cancer such as higher age, black ancestry, and family history of first-degree relatives having prostate cancer (144).

The American Urological Association also recommends against all routine PSA screenings for men under 40 years of age; against all routine PSA screenings in men aged 40 to 54 years with average risk; and shared-decision making is recommended for all men aged 55 to 69 years (145). For men aged 70 years or older, routine PSA screenings are not recommended with a life expectancy of less than 10 to 15 years (145).

For men at average risk, screening can be started at age 55 years, for men at high risk screening can be started at 45 years and men with highest risk such as those having two or more first-degree relatives with prostate cancer before age 65 years, then screening can be started at age 40 (143).

PSA testing is recommended in men previously diagnosed with prostate cancer, people undergoing prostate cancer treatment, monitoring disease progression after therapy, establishing baseline level before starting therapy, to detect early recurrence of prostate cancer (140,145).

Presence of symptoms like frequency, urgency and hesitancy may not warrant a PSA testing since there is no evidence this is beneficial and may be possibly due to benign prostatic hypertrophy or urinary tract infection (140).

13. Use of Imaging for Low Back Pain within the First Six Weeks, unless Red Flags are Present

Milliman report recommends against imaging for non-specific acute low back pain within the first six weeks, unless red flags are present. The possible red flags include severe or progressive neurological deficits, suspected osteomyelitis, bowel or bladder dysfunction, fever, history of cancer, history of intravenous drug use, immunosuppression, steroid use (146,147).

The guidelines by the American College of Radiology recommends against imaging for low back pain without any red flags (148). Imaging is also appropriate in patients who have undergone up to 6 weeks of medical management and physical therapy with no improvement, low velocity trauma, osteoporosis, elderly individuals, and people with steroid use (148). CT and X-ray are considered appropriate when there is suspicion of cancer, infection or immunosuppression and MRI is considered appropriate under the suspicion of infection, cancer or immunosuppression prior to lumbar surgery and in patients with cauda equina syndrome or neurological deficits (148).

It is not recommended to perform an imaging for low back pain before completing a detailed physical examination. Use of spine imaging without completing a history and physical examination does not improve health outcomes and also increase healthcare costs (149). After adequate history and physical examination if the back pain could not be attributed to any specific disease or clinical condition, doing an imaging has shown not to improve the health outcomes (150).

Without specific clinical indications such as a history of cancer with metastases, known aortic aneurysm, progressive neurological deficit imaging low back pain in the first weeks after pain begins should be avoided (151-155). Imaging also has the potential to disclose incidental findings and may divert the attention from the underlying cause of back pain (151-155). The use of imaging in elderly aged 70 years or more are considered appropriate (148).

14. Ordering of Unnecessary Cervical Cancer Screening (Pap smear and HPV test) in Women who have had Adequate Prior Screening and are not Otherwise at High Risk for Cervical Cancer

Milliman does not recommend the performance of routine annual cervical cytology screening (pap tests) in women aged 30 to 65 years of age. The American Academy of Family Physicians guidelines also recommend against screening women older than 65 years of age for cervical cancer who have had adequate prior screening because screening them does not provide much health benefit (156,157). Adequate prior screening is defined as three consecutive negative Pap smear results, or two consecutive negative human papillomavirus (HPV) tests within 10 years prior to the last screening test, with the most recent test occurring within the past 5 years. (158,159).

Recommendations from the USPSTF recommend against performing pap smears on women who are 21 years of age or younger who have had a hysterectomy for a non-cancer disease (160). Many studies show that population level cervical cancer screening does not add any clinical value especially in women younger than 21 years, and older than 65 years who have had adequate prior screening and are not otherwise at high risk (158,159,161,162).

Annual cervical cytology has shown to have no increased benefit over cervical screening performed at 3-year intervals (163). Many studies show that population level cervical cancer screening does not add any clinical value especially in women younger than 21 years, and older than 65 years who have had adequate prior screening and are not otherwise at high risk (158,159,161,162).

It is also not recommended to screen women younger than 30 years of age for cervical cancer with HPV testing or cytology because they cause harms including leading to more frequency

testing and higher exposure to more invasive diagnostic procedures such as colposcopy and cervical biopsy and also associated psychological anxiety and distress (164-166).

For low risk HPV types that cause genital warts or very minor cell changes on the cervix, there is no medical indication to perform a HPV test since the infection is not associated with disease progression and there is no treatment or therapy change even when a low-risk HPV is identified (167,168). Routine cervical screening indications and exclusions do not apply for women with cervical cancer, women who are infected with HIV, immunocompromised, or women who were exposed to diethylstilbestrol in utero (159).

The Milliman report identifies women aged 21-64 years who had screening with cervical cytology once in 3 years with no prior total hysterectomy and women aged 30-64 years who had screening with cervical cytology and HPV testing once in 5 years with no prior total hysterectomy and women aged 21 years and above who are at high risk of cervical cancer (high-grade precancerous lesion or cervical cancer or women who are immunocompromised) or with abnormal Pap smear have been identified as not wasteful.

15. Repeat CT for Kidney Stones

Milliman report recommends avoiding ordering of CT of abdomen and pelvis in young otherwise healthy emergency department patients (aged less than 50 years) with known histories of kidney stones, or ureterolithiasis, presenting with symptoms consistent with uncomplicated renal colic (169-171).

The American Urological Association and the Agency of Healthcare Research and Quality recommend CT scan as the imaging modality of choice only during the initial presentation of patient with suspected kidney stones and only recommend the imaging by ultrasound or plain x-ray among known cases of previous nephrolithiasis and for people with recurrent symptoms of kidney stones (172-174). The International Society of Nephrology mentions that the repeated use of CT scans among patients with recurrent kidney stones increases radiation exposure and associated health risks and also increases unwanted healthcare costs. The risks of repeated CT usage are higher among younger patients (175,176).

Complications of kidney stones include fever, hydronephrosis, obstruction and these will need a CT scan for appropriate evaluation and the use of CT scan in these situations were also not considered as waste by the Milliman report.

Other Measures

The rest of the 33 measures that are identified as best practices to reduce health waste by the Milliman report constitute 23.5% of the health waste in Utah for calendar year 2019. The measures include vision therapy for patients with dyslexia, cardiac stress testing, brain imaging studies (CT or MRI) for simple syncope, MRI for rheumatoid arthritis, DEXA screening for osteoporosis, Immunoglobulin G (IgG) or Immunoglobulin E (IgE) tests in the evaluation of allergy, diagnostic testing for chronic urticaria, electroencephalography for headaches, imaging of the carotid arteries for simple syncope, antibiotics prescription for adenoviral conjunctivitis, CT Head/Brain for sudden onset hearing loss, oral antibiotics for uncomplicated acute tympanostomy tube otorrhea, imaging for uncomplicated acute rhinosinusitis, cough and cold medicines in children under four years of age, preoperative EKG, chest x-ray and pulmonary function testing, preoperative cardiac echocardiography or stress testing, sperm function testing, postcoital test for infertility, inductions of labor or cesarean deliveries before 39 weeks, arthroscopic lavage and debridement for knee osteoarthritis, voiding cystourethrogram for urinary tract infection, antidepressants monotherapy in bipolar disorder, vertebroplasty, renal artery revascularization, colorectal cancer screening in adults 50 years and older, multiple palliative radiation treatments in bone metastases, CT scans for emergency room evaluation of dizziness, coronary artery calcium scoring for known CAD, bleeding time testing, peripherally inserted central catheters in stage III-V CKD patients, NSAIDs for hypertension, heart failure or chronic kidney disease, coronary angiography, and pulmonary function testing before cardiac surgery.

Review Scientific Literature about Eliminating Duplication in Healthcare

When considering duplication in healthcare, a notable contributing factor is the lack of interoperability among electronic health record systems. Researchers from Children's Hospital Boston (CHB) analyzed records of 85 patients with adult congenital heart disease (ACHD) transferred between two sites from January 1st, 2006 and December 31, 2007, between CHB and Brigham and Women's Hospital (BWH) (177). The two sites are connected by a bridge, have a shared model to care for patients with ACHD, and use separate electronic health record systems. Despite close collaboration and proximity of the sites, there existed evidence of duplication of testing among the sample of 85 patients. According to the researchers, "duplicate testing occurred in 27/85 (32%) patients and was categorized as 'not clinically indicated' in 17/85 (20%) patients... Fifty percent of the patients with duplicative testing had more than one test duplicated." (p. 342). Aside from this study, it was challenging to identify scientific literature specifically centered around elimination of duplication in healthcare.

Stakeholder Input

As part of the Department's expectation to convene stakeholders across the state regarding the results of the Utah Health Waste Calculator and to compile input regarding duplicative health care quality initiatives, non-alignment in metrics used to measure health care quality and avoidance of overuse of non-evidence based health care, the Office of Health Care Statistics (OHCS) presented to several stakeholder groups the results of the analysis, and solicited input regarding findings and recommendations. In total, over 584 guests were invited to meetings across the following workgroups, who provided invaluable feedback for this report:

- Utah Health Data Committee Meeting May 18th, 2021
- Utah Transparency Advisory Group Meeting May 25th, 2021. The Utah Transparency Advisory Group (TAG) is a subcommittee of the Utah Health Data Committee (HDC). The mission of the TAG is to identify opportunities to make high value information on health care cost and quality available to Utahns—including businesses, consumers, and providers. The TAG also plans outreach and connections with stakeholders across Utah, and provides expertise, guidance, feedback, and input on data publications, to comply with state law (26-33a).
- Utah Insurance Department/Utah Health Insurance Association Meeting June 22, 2021
- Medicaid ACOs 6|18 Work Group July 28th, 2021
- Utah Payers Advisory Subcommittee August 4, 2021. The UPAS, one of the subcommittees of the Utah Health Data Committee, provides a forum for entities who submit data to the All Payer Claims Database, to share information and ideas on how to make the data submission process easier or more effective. This subcommittee also helps identify opportunities to provide valuable information to payers serving Utahns. This committee was formerly known as the Payer Task Force (PTF).
- Comagine Health Utah Community Board August 10, 2021
- Utah Medical Association Council of Trustees August 19, 2021
- Utah Medical Association Board of Directors August 26, 2021
- Utah Hospital Association leadership September 3, 2021
- Comagine Health Partnership for Value September 14, 2021

The presentations to the stakeholders concluded with OHCS raising a few questions to attendees. These questions were:

1. What can be done regarding duplicative health care quality initiatives?
2. How do we work to avoid instances of non-alignment in metrics used?
3. What do you think are some methods that could help avoid overuse of non-evidence-based health care?

- a. Provider perspective?
- b. Payer perspective?
- c. Other stakeholders?

In addition to the stakeholder meetings, to satisfy statutory obligations depicted in 26-33a-117(3)(d), which calls on the Department to “solicit input from Utah health care providers, health systems, insurers, and other stakeholders regarding duplicative health care quality initiatives and instances of non-alignment in metrics used to measure health care quality that are required by different health systems,” the Office of Health Care Statistics (OHCS) conducted semi-structured interviews with five healthcare payers. Three additional healthcare payers provided feedback via email.

OHCS staff conducted the interviews from July–October 2020. Interviews were limited to 30 minutes and focused on the following questions:

- Does your organization evaluate physician and/or facility performance using measures from national organizations, such as NCQA (HEDIS), PQA, or CMS?
- If yes, what measures are you currently using? Do the measures vary by line of business or plan? How often do the lists of measures change?
- How often does your organization provide performance feedback to contracted providers?
- What difficulties do you encounter when evaluating physician and/or facility performance?

One OHCS staff member was tasked with taking notes while another staff member conducted the interview. The semi-structured format of the interview and the open-ended nature of the questions allowed OHCS staff to follow “topical trajectories”, to better understand how healthcare payers are constructing and using performance measures for providers.

The following payers (including Medicaid) participated in interviews or responded to questions via email: Aetna, EMI, Humana, Medicaid, Regence BCBS, SelectHealth, Tall Tree, University of Utah.

Stakeholder Input Regarding Duplicative Health Care Quality Initiatives and Instances of Non-Alignment in Metrics Used to Measure Health Care Quality that are Required by Different Health Systems:

- When similar but not completely duplicative measures are used for reporting and tracking, it can cause confusion with payers and providers. Providers have 70+ things to

track. It is suggested to identify a few key metrics that everyone is interested in, learn about each organization's definition and try to come to a consensus for a common Utah definition.

- Most healthcare payers seem to have different provider performance measures across lines of business (e.g., Medicare, Medicaid, and commercial) and plans (e.g., different product offerings within a line of business). Based on the results of OHCS's semi-structured interviews, most payers interviewed seem to be using HEDIS or HEDIS-like measures.
- There is external pressure from "scorecard groups", to differentiate metrics in order to make some systems or providers stand out. CMS is a notable key player in that space. There is also a trust factor; if you don't put the measure on the list, then providers may ignore it. That has to be acknowledged somehow.
- Defensive medicine could lead to duplicate procedures or multiple tests. It was suggested that tort reform may help address the defensive medicine concerns. In addition to defensive medicine, some facilities may have financial incentives for running a test. Perhaps measures should be taken to ensure there are no financial incentives for running a test.
- Healthcare providers who contract with Medicare, Medicaid, or commercial payers are often subject to performance measurement using a variety of different metrics, even from within a single payer. Feedback mechanisms vary from live results in an online portal to paper reports provided on a quarterly basis. To optimize results, providers often must submit "supplemental data" to payers, clarifying information about patients and procedures.
- Some payers reported that their contracted providers are able to select from a "menu" of measures, allowing the providers flexibility to choose things that they want to focus on. Some payers reported giving providers access to online portals with live measurement results, while others indicated that they provide monthly or quarterly email, paper, or online reports. Most payers stated their performance reports are segmented by line of business, meaning a provider could receive multiple reports from a single payer.
- It is generally a good exercise to measure common things. There is a notable amount of administrative burden in measuring different things, and doing this across payers can be difficult. Steps have been taken to give providers the option to opt into performance-based contracts. We can use common benchmarks around HEDIS, which is a positive thing. Outlining each organization's quality improvement projects and where they are working on those projects may help to close the gap. Participants were unsure how to get plans, clinics, healthcare systems, UDOH, Comagine, AUCH, and others, aligned such that there isn't duplication. Prior efforts made to get entities to work on the same quality initiatives have been unsuccessful.

- While there is a high administrative burden, providers can focus on a few measures at a time, which may drive better performance. Aligning measures would be a huge win for Utah's health centers and something they would love to see. An additional benefit of measurement alignment, aside from reducing administrative burden, is the emphasis on what you really want to improve on. Most payers referenced the recent alignment work by a workgroup convened by Comagine, which focused on Medicare Advantage. However, most payers were reluctant to reveal which measures were being used, citing the need for internal legal & compliance clearance.
- Different products exist across regulatory agencies, which may be a barrier to alignment. For example, STARS, Medicaid states choose their own measures, and there is the marketplace which uses the Quality Rating System (QRS) hierarchy. There is some alignment between the HWC measures and HEDIS measures. It might be beneficial to focus on measures where we have HWC and HEDIS data to support the need for change/improvement.
- Healthcare delivery (clinics and health systems) work to improve their own clinics. Insurance companies look across clinics to do quality improvement in multiple clinics where their patients are cared for. There are also quality improvement-focused entities, like UDOH, Comagine, and AUCH. It has not been figured out how to align UDOH, Comagine, and AUCH. It was expressed that expecting alignment with health plans and healthcare delivery on top of that would be near impossible. A suggestion was made for OHCS to go back to the payers which it interviewed in 2020, and explore the creation of a table of who uses what measures, which may facilitate determining how much alignment there is.
- Unsure if the goal should be measurement alignment. It may be best to leave it to the clinician/system to define their own measurement, and work with them to help them achieve those measurement goals. Why fight the patient *and* the provider? It's not going to work.
- EMRs are not linked, which may result in duplication of records and services.
- Recommendation to use HEDIS and/or other established standards to drive and track quality initiatives rather than coming up with new initiatives.
- A recommendation was made to explore how value benchmarks are aligned with the HWC indicators.
- It was suggested that it is important to help providers seek to achieve the highest standard of health.

Stakeholder Input on Methods to Avoid Overuse of Non-Evidence-Based Health Care:

- Health waste measures can be valuable tools in a toolbox when discussing what care should be provided, but they are only one tool. For example: While ultrasounds are less

expensive, there is a culture of practicing defensive medicine that leads doctors to often opting for a more expensive CT scan over an ultrasound, so they don't miss anything. On the other hand, there are additional benefits to using ultrasound over CT in the form of reduced radiation exposure. Identifying "waste" in the health care system will require grappling with these nuances. Thus, there are diagnostic and adverse effect differences between a CT scan and an ultrasound. Evaluating wasteful services at the provider level will be helpful.

- Regarding imaging and headaches, it is true that you don't have to image all headaches, but there exists the possibility of there being an acute bleed, for example. When this is presented, no one will get paid for any imaging or headaches. The same for CT scans. Indeed, most kids don't require CT scans, but there are a small percentage of children that do, because you could catch a life-threatening condition that way. Medicine is an art and a science. Recommendation to put important nuances on the data slides. Oftentimes, these nuances are important.
- There was concern that not all physicians and clinical staff are aware of the most recent best practice guidelines. There was a suggestion to identify key conditions and evidence-based practices and work collaboratively to get those guidelines to physicians. This includes working with physician groups (UMA, UT Academy of Family Physicians, etc.). Then it's about exploring if education leads to adoption, and if not, identify the gaps. Also, when it comes to evidence-based medicine, it is hard to prove that what was done in practice made patients feel better or live longer.
- Many of the measures are related to testing that may not be necessary. Most doctors don't have a vested interest in testing. In some of the larger medical group settings, there is a dividend that reflects peripheral income of hospitals. There is going to be an element of defensive medicine to consider. Physicians can use their best clinical judgement and make sure there is no incentive to order a test. It may be the case that those in ER settings may do more of these, it is important to understand the settings behind these figures. What is really helpful from a patient and system perspective is to look at episodes of care; how quickly can a provider use the efficiency of the entire system to help the patient.
- Wasteful services could be identified as a cost differential between a preferred care and wasteful care. For example, when best practices suggest using an ultrasound before a CT scan, should the amount of waste identified refer to the total cost of the CT scan or the additional cost of the CT scan over an ultrasound? It is suggested to show the frequency of services of each measure, in addition to the total cost and average cost per service. Also, displaying average cost per service in the graphics tends to divert attention away from the number of consumers affected by the wasteful service. Recommend replacing average cost lines with the number of consumers.

- Encouraging providers to substitute one thing for another (e.g., switch from prescribing one drug for another drug) or instructing them to do something “new” is easier than trying to get providers to stop doing something (e.g., a CT scan for minor head trauma). Deeper dives may have to be done to explore complex measures, such as the two or more antipsychotic medication measures. More information needs to be considered to make sure that it is indeed wasteful versus necessary. Across measures, there are notably not many surgical procedures. It is probably not worth presenting measures with low counts.
- Suggestion to look further into access issues at the urban/rural level. Capabilities and resources might drive some provider behavior (e.g., no access to ultrasound machines, so CT scans are used instead). Explore whether there are specific regional or clinic trends. Is this prevalent in certain parts of the state in particular? If we can zero in on *who* is generating the most waste, that may be helpful to know. Who are the ‘offenders’, the 20% that are creating 80% of the healthcare waste? There are differences between rural and urban Medicaid recipients, health waste and distance to services, visibility of cost to members, co-pays, etc.
- There was a suggestion to look at ways to do alternative payment methodologies. Fee for service payments from payers to providers rewards doing certain things. Paying for quality in lieu of quantity is challenging. There are considerations when it comes to prior authorization needed.
- There were many requests to review and understand the methodology of the Health Waste Calculator. Consider comparing Milliman’s tool with another tool that assesses health waste, to ensure there is no bias in the reporting. This is a physician education issue, and these are concerns elevated in specialty societies. Others agreed, and expressed that these data may be biased, so exploring other calculator tools may be helpful. If this could be done, then those categories/measures could be more carefully assessed. This method for determining health waste might work well if *all* patients presented in the *same* way for *every* single problem and *every* single illness.
- A concern was raised regarding the routine general health checks as a measure used for the Health Waste Calculator, given that routine general health checks is common practice. CMS requires routine general health checks. The UMA has been pushing for checkups, so less is spent on the back end. Hard data is needed to support this being a measure of health waste. There is a reason why insurance companies pay for routine general health checkups which have no out of pocket costs. Suggestion to further explore why this is considered wasteful.
- Payer perspective – around value-based payments. Paying for healthcare that leads to improved health outcomes. Reward providers for utilizing the evidence-based care models, which add high value to improved health outcomes and preventing serious and acute situations down the road. Need agreement between payers and providers as to what

these evidence-based care models are, so there is alignment between the provider and the plan. Collaboration and communication from both sides.

- Participants wondered what the best way to send this information (the analysis) to providers was and how to get them to change their practices. It is a challenge to make this relevant to individual practitioners, and provide the right tools. Providing instruction on evidence-based care, clinically relevant instruction and current standards has shown to be an effective intervention.
- Attendees were given the opportunity to suggest additional analyses and paths forward. Some of the suggestions made included:
 - Providing additional detail on why the state has seen a decrease in total waste spending since 2016. It was clarified that this was due to a loss of self-funded plan data rather than any improvements in reducing waste.
 - Pediatric imaging breakdown by geography.
 - More age cohort breakdowns.
 - More per member per month (PMPM) data - this was noted as being especially useful to payers.
 - New analyses using high-deductible/HSA plans as a variable. OHCS plans to look into this, but there is a question of data quality on this variable.
 - Thinking about data presentations that align with various stakeholders' actionable interests. For instance, if there is a measure already being used by the stakeholder, give them the data in a way they can easily understand and take action on.
 - Suggest investigating the work done in Oregon regarding opioid prescribing.
 - There are many initiatives in our state surrounding mental health and chronic disease initiatives in the state. It may be conducive to partner with some of these initiatives and share the relevant clinical guideline(s) for a measure that would be of interest.
 - While we have the payer code, what is more complicated is what other payments are happening outside the claims system (those who have other payment arrangements).
 - Measure alignment efforts should continue and be augmented

Recommendations from the Utah Health Data Committee

As required in UCA 26-33a-117, the Utah Health Data Committee is expected to: make recommendations for action and opportunities for improvement based on the results of this analysis, make recommendations on methods to bring into alignment the various healthcare quality metrics different entities in the state use, and identify priority issues and recommendations to include in an annual report. The recommendations depicted below represent feedback provided for each of these three key items, resources permitting.

Recommendations for action and opportunities for improvement based on the results

1. UDOH OHCS conduct a deeper geographic breakdown, such as catchment areas of hospitals, local health department impact areas, and others, depending on the audience. Perform a test with a small set of reports to a targeted group, and facilitate a conversation about potential actions. This could be positioned as a pilot project.
 - a. Depending on the focus and measures, perhaps focus on healthcare facilities first.
 - b. Provide actionable data for this subsetted population. For example, a set of Health Waste Calculator results, in a report specific to a facility, for their review.
 - c. Organize a campaign, centered around a measure of focus selected.
2. UDOH OHCS explore the possibility of drilling down to the provider level. If users/providers can access their own information, or a report was specific to physicians, this would help the physician value the data that is being shared.
3. Funding from the Legislature for continued monitoring and dissemination of HWC results for expanding and developing new interventions to reduce wasteful health care spending in Utah.
4. Funding for an analysis which explores payers' contracts, if possible.
5. UDOH OHCS explore answering the question: *do payment arrangements influence wasteful spending?* Possibility to observe and compare traditional Fee-for-service, Accountable Care Organizations and alternative payment arrangements.
6. UDOH OHCS sort out and better capture and understand the non-claims payment arrangements, and compare
7. UDOH OHCS Continue with this analysis – This is data that is not looked at very often and should be continued. Include more surgery level analysis among other improvements suggested.
8. UDOH OHCS can leverage ongoing healthcare initiatives with any future health waste initiative. There is good alignment here with the opioid epidemic and chronic disease efforts, for example. Statistics and best practices should be rolled into current initiatives to jump start the use of health waste statistics.

9. The Health Data Committee recommends considering the steps outlined in Milliman's *Health Waste Calculator Playbook* (see Appendix C).
10. UDOH OHCS should explore what other states have done with Health Waste Calculator results.
11. UDOH OHCS to work with Milliman to ensure documentation can help providers understand the general approach with how outputs are generated.
12. UDOH OHCS should identify if there are other products/services which determine health waste, to evaluate the Health Waste Calculator with other available tools.

Recommendations on methods to bring into alignment the various health care quality metrics different entities in the state use

1. UDOH OHCS should facilitate conversations to further understand the challenges and values of alignment and get provider buy in.
2. UDOH OHCS should consider convening healthcare payers, AUCH, and Comagine Health around healthcare alignment in the state for the purpose of exploring standardization of reporting requirements, where possible.

Priority issues and recommendations for OHCS to include in an annual report

1. Compare health waste measures with patient outcomes.
2. Facilitation of stakeholder conversations which discuss and prioritize measures of most importance.
3. Solicit feedback from the physician community and take a deeper dive.
4. Include evidence to support value-based arrangements in health care. During COVID, it was found that healthcare entities that were in value-based arrangements did not abuse the loosening of telehealth billing codes. If a healthcare entity carries healthcare financial risk, they will clean up wasteful, duplicative spending.

Many of these recommendations would require additional funding for the resources to implement.

Appendices

Appendix A - Additional Milliman Health Waste Measures

This appendix contains the remaining Milliman Health Waste Calculator metrics not discussed in the main body of the literature review.

1. Don't order unnecessary screening for colorectal cancer in adults older than age 50 years

Bibbins-Domingo et al. (2016) contains recommendations from the US Preventive Services Task Force (178). Unnecessary screening (i.e., screening more often than the intervals specified in the Table (p. 2566) is identified as wasteful.

2. Don't use dual-energy x-ray absorptiometry (DEXA) screening for osteoporosis in women younger than 65 or men younger than 70 with no risk factors

The study by Calonge et al. (2011) provided a summary of recommendations from the U.S. Preventive Services Task Force on appropriate times to screen for osteoporosis (179). They recommend that for women, screening begins at age 65 and make no recommendation for men. However, clinical guidelines from the American College of Physicians suggest that for men, being over the age of 70 constitutes a notable risk factor.

3. Don't obtain brain imaging studies (CT or MRI) in the evaluation of simple syncope and a normal neurological examination

Mendu et al. (2009) examined the cost-effectiveness of various tests in diagnosing and evaluating syncope and concluded that many unnecessary tests are obtained to evaluate syncope. Selecting tests based on history and examination and prioritizing less expensive and higher yield tests would ensure a more informed and cost-effective approach to evaluating older patients with syncope (p. 1299) (180).

4. Don't perform unproven diagnostic tests, such as immunoglobulin G (IgG) testing or an indiscriminate battery of immunoglobulin E (IgE) tests, in the evaluation of allergy

A study by Cox et al. (2008) intended to provide a general overview of allergy diagnostics for health care professionals who care for patients with allergic disease (181).

5. Don't routinely do diagnostic testing in patients with chronic urticaria

A retrospective analysis (182) of a random sample of adult patients (n=356) with chronic urticaria from 2001–2009 concluded that laboratory testing in CUA patients referred for an Allergy and Immunology evaluation rarely lead to changes in management resulting in improved outcomes of care (p. 239).

6. Don't prescribe nonsteroidal anti-inflammatory drugs (NSAIDs) in individuals with hypertension or heart failure or CKD of all causes, including diabetes

The use of NSAIDs can have effects complicating treatment for certain conditions. Clinical guidelines on the treatment of high blood pressure (183) suggest avoiding systemic NSAIDs when possible and clinical guidelines for CKD also note that acetaminophen may be safer than NSAIDs for the short-term administration to patients with CKD.

7. Don't perform electroencephalography (EEG) for headaches

A literature review (184) assessing the utility of electroencephalogram in the evaluation of patients presenting with headache concludes that EEG is not indicated in the routine evaluation of patients presenting with headache (p. 1263).

8. Don't perform imaging of the carotid arteries for simple syncope without other neurologic symptoms

A scientific statement (185) from a host of cardiology-based organizations states that imaging of the brain is indicated only “[w]hen a neurological basis of syncope is suspected” (p. 481).

9. Don't order antibiotics for adenoviral conjunctivitis (pink eye)

The American Academy of Ophthalmology's clinical guidelines (186) document on the treatment of conjunctivitis mentions that viral conjunctivitis will not respond to anti-bacterial agents (p. 101).

10. Don't order computed tomography (CT) scan of the head/brain for sudden hearing loss

Clinical practice guidelines (187) published by a panel of physicians recommend against using CT scans in the initial evaluation of a patient with sudden hearing loss. The guidelines mentioned that computed tomography scanning has potential significant adverse events, which include radiation exposure and side effects of intravenous contrast, while offering no useful information that would improve initial management (p. 10). They do, however, note that there are still circumstances where CT scanning would be appropriate (p. 10).

11. Don't routinely obtain radiographic imaging for patients who meet diagnostic criteria for uncomplicated acute rhinosinusitis

Clinical practice guidelines for the management of sinusitis suggest, based on the evidence available, that clinicians should not obtain radiographic imaging for patients who meet diagnostic criteria for acute rhinosinusitis, unless a complication or alternative diagnosis is suspected (188).

12. Don't use coronary artery calcium scoring for patients with known coronary artery disease (including stents and bypass grafts)

While coronary artery calcium scoring is useful for the diagnosis of coronary artery disease, once diagnosed, further performance of this test offers little value. The clinical recommendations on the use of this procedure from the American Heart Association Committee on Cardiovascular Imaging and Intervention, Council on Cardiovascular Radiology and Intervention, and Committee on Cardiac Imaging, Council on Clinical Cardiology can be found in Budoff et al. (2006). (189)

13. Don't perform routine head CT scans for emergency room visits for severe dizziness

Dizziness and vertigo are one of the more common reasons patients arrive at emergency departments (190). These authors conclude that rising costs [associated with patients presenting to the ER with dizziness] over time appear to reflect the rising prevalence of ED visits for dizziness and increased rates of imaging use (p. 689). The authors also note that CT use is ineffective in patients with dizziness because of the test's extremely low sensitivity and documented low yield (pp. 689-690).

14. Don't schedule elective, non-medically indicated inductions of labor or Cesarean deliveries before 39 weeks, 0 days gestational age

Because early term delivery is associated with increased neonatal and infant morbidity, inducing delivery or performing a Cesarean section for non-medical reasons before 39 weeks of gestation is not recommended by the The American College of Obstetricians and Gynecologists (191).

15. Don't prescribe oral antibiotics for uncomplicated acute tympanostomy tube otorrhea

Clinical practice guidelines (192) for the pediatric use of antibiotics in conjunction with tympanostomy tubes, which are tubes used to drain fluid from the ear canal, strongly recommend the use of topical (i.e., applied directly to ear) antibiotics over oral antibiotics. Randomized control trials demonstrate that topical antibiotics are superior in terms of clinical cure, bacterial eradication, and patient satisfaction (p. 26).

16. Don't prescribe or recommend cough and cold medicines for respiratory illnesses in children under four years of age

While many parents and health professionals consider [cough and cold medicines] safe and effective in treating cough and cold symptoms, a systematic review (193) of the scientific literature finds that few available studies of the effectiveness of these medicines reach current scientific standards, and for some drugs, there are no studies in children. There is only poor evidence for their effectiveness in treating cough and other cold symptoms. None would be accepted for these indications if presented now as new drugs (p. 91). While the use of these drugs is generally safe, the authors note that even rare adverse events could be important if use is common (p. 91).

17. Don't perform MRI of the peripheral joints to routinely monitor inflammatory arthritis

The evidence for widespread use of MRI in the management of inflammatory arthritis remains promising but their use is still experimental and sometimes controversial, and their merits in routine clinical practice have yet to be defined (194). Even more recent reviews of the evidence still cite the need for additional studies.

18. Don't perform an arthroscopic knee surgery for knee osteoarthritis

A randomized control trial to monitor the efficacy of arthroscopic surgery on treating osteoarthritis of the knee found no additional benefits to optimized physical and medical therapy (195).

19. Don't prescribe antidepressants as monotherapy in patients with bipolar I disorder

Currently, there is a lack of consensus on the use of antidepressants to treat bipolar I disorder. While research has been done on this subject, there is a lack of an established methodology for studying the efficacy of antidepressants and in the studies that have been conducted, conclusions have varied (9)

20. Don't obtain baseline diagnostic cardiac testing or cardiac stress testing in asymptomatic stable patients with known cardiac disease undergoing low or moderate risk non-cardiac surgery

Clinical recommendations, based on an evaluation of the evidence by the American College of Cardiology and American Heart Association (196), were categorized into three classes based on a risk-benefit analysis. Under the recommendations for Noninvasive Stress Testing Before Noncardiac Surgery, the Class III recommendations, indicating services that have a risk profile which outweigh the benefits, instruct that this noninvasive testing not be performed for any patients undergoing a low-risk noncardiac surgery or for any patients without clinical risk factors for intermediate-risk noncardiac surgery (p. 690).

21. Don't perform advanced sperm function testing, such as sperm penetration or hemizona assays, in the initial evaluation of the infertile couple

22. Don't perform a postcoital test (PCT) for the evaluation of infertility

In a set of clinical recommendations (197) from the American Urological Association and the Practice Committee of of the American Society for Reproductive Medicine, the use of these less commonly used tests, including sperm penetration assay, hemizona assay, and routine postcoital testing, should not be used in the routine evaluation of men with infertility since these specialized tests are usually not required for diagnosis (p. 127).

23. Don't obtain EKG, chest X rays or Pulmonary function test in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery

While a battery of preoperative tests prior to many surgeries has historically been common practice, evidence suggests that there is little value in performing these tests routinely. As explained by Kumar & Srivastava (198), the tests ordered in the absence of clinical indication, while frequently abnormal, fail to predict perioperative complication and seldom influence anesthetic management while producing many false positive, false negative, or borderline results contributing to unnecessary psychological and economical burden and postponement of surgery (p. 176).

24. Don't perform coronary angiography in patients without cardiac symptoms unless high-risk markers present

In a set of clinical guidelines (199) from a host of professional cardiology organizations, Table 1.2 (p. 391) identifies appropriate diagnostic tools for the detection of coronary artery disease in asymptomatic patients. The use of coronary angiography for these patients is classified as “R,” meaning the use of this procedure is rarely appropriate.

25. Don't perform revascularization without prior medical management for renal artery stenosis

An update of an existing Cochrane literature review from 2003 (200), which included new, large-scale trials, continues to conclude that there is insufficient evidence that revascularization in the form of balloon angioplasty, with or without stenting, is superior to medical therapy for the treatment of atherosclerotic renal artery stenosis in patients with hypertension (p. 2).

26. Don't perform vertebroplasty for osteoporotic vertebral fractures

An update of an existing Cochrane literature review from 2015 (201) examined new evidence from randomised and quasi-randomized controlled trials of the effect of vertebroplasty in osteoporotic vertebral fractures which compared the real procedure to a sham version of the procedure. The authors found no evidence that vertebroplasty has any important benefit in terms of pain, disability, quality of life or treatment success in the treatment of acute or subacute osteoporotic vertebral fractures (p. 2).

27. Don't place peripherally inserted central catheters (PICC) in stage III–V Chronic Kidney Disease (CKD) patients without consulting nephrology

Due to the potential complications of PICC lines, including vein damage, circulation impairment, and jeopardization of future fistula construction or function (202), an arteriovenous fistula is preferred in stage III-V CKD patients who will require regular venous access for hemodialysis. According to the American Society of Diagnostic and Interventional Nephrology in general, a PICC line should not be placed in patients at risk for future hemodialysis vascular access. A request for a PICC in a stage 3–5 CKD patient should be halted, and substituted (p 189).

28. Don't perform voiding cystourethrogram (VCUG) routinely in first febrile urinary tract infection (UTI) in children aged 2–24 months

A voiding cystourethrogram (VCUG) is a procedure used in the diagnosis of UTI. Clinical guidelines (203) from the American Academy of Pediatrics recommend avoiding the use of this procedure as the risks associated with radiation (plus the expense and discomfort of the procedure) for the vast majority of infants outweigh the risk of delaying the detection of the few with correctable abnormalities until their second UTI (p. 604).

29. Don't recommend more than a single fraction of palliative radiation for an uncomplicated painful bone metastasis

The American Society for Radiation Oncology (ASTRO) Clinical Affairs and Quality Committee conducted a literature review and consulted with experts in the field (204) to arrive at appropriate usage of radiotherapy in the treatment of bone metastases. In the case of an uncomplicated painful bone metastasis, the authors do not believe that any additional trials are needed to confirm the use of single-fraction RT in these circumstances (p. 969).

30. Don't perform stress cardiac imaging or advanced non-invasive imaging in the initial evaluation of patients without cardiac symptoms unless high-risk markers are present

In a set of clinical guidelines (205) from a host of professional cardiology organizations, Table 1.2 (p. 391) identifies appropriate diagnostic tools for the detection of coronary artery disease in asymptomatic patients. The use of various stress tests for these patients in low-risk and intermediate-risk categories is classified as “R,” meaning the use of this procedure is rarely appropriate. In higher-risk groups, these tests are classified as “M,” indicating the procedure *may* be appropriate.

31. Don't use bleeding time test to guide patient care

The American Society for Clinical Pathology (206) released a list of procedures that are of questionable value. In regards to the bleeding test, they state that the bleeding time test is an older assay that has been replaced by alternative coagulation tests. The relationship between the bleeding time test and the risk of a patient actually bleeding has not been established. Further, the test leaves a scar on the forearm. There are other reliable tests of coagulation available to evaluate the risks of bleeding in appropriate patient populations (p. 1).

32. Don't recommend pulmonary function testing prior to cardiac surgery, in the absence of respiratory symptoms

The American Society of Thoracic Surgeons (207) released a list of procedures that are of questionable value. In regards to performing pulmonary function testing in the absence of respiratory symptoms prior to cardiac surgery, they note that in the absence of respiratory symptoms or suggestive medical history, pulmonary function testing is quite unlikely to change patient management or assist in risk assessment (p. 2).

33. Don't recommend vision therapy for patients with dyslexia

Although dyslexia was conceptualized in the past as a visual disorder (208), it is now most commonly understood to be language-based (p. 818). As such, the use of vision therapy to treat dyslexia is not supported by the evidence. Scientific evidence does not support the claims that visual training, muscle exercises, ocular pursuit-and-tracking exercises, behavioral/perceptual vision therapy, "training" glasses, prisms, and colored lenses and filters are effective direct or indirect treatments for learning disabilities. There is no valid evidence that children who participate in vision therapy are more responsive to educational instruction than children who do not participate (p. 818).

Appendix B - Milliman's Methodology and Top Measures by Prevalence

Waste Cost Analysis – Accounting for Variation in Contracts

- Counting wasteful costs is an art, not a science
- Due to contracting nuances, best practice for estimating cost of waste specific to your data is to set a standard price per wasteful service
- When standard pricing assignment is not available, the Health Waste Calculator Cost Model offers two additional methodologies for counting costs:

- Case Rate** - counts costs from all lines for a particular claim ID where at least one claim line has been identified as "wasteful"
- Claim Line Itemization** - counts costs from only the claim line(s) where the line(s) has been identified as "wasteful"

Example: Claim with 4 lines where line 3 is tagged as a wasteful procedure



- For some HWC measures, Claim Line Itemization may be more appropriate and for others the Case Rate methodology (e.g. For pre-operative lab tests, the Case Rate methodology seems to overstate the potential savings)

Milliman MedInsight

15

Top Measures by Prevalence (Waste Services)

Measure	Degree of Harm	Total Waste Services	Members with Waste*	Quality Index	Waste Index
AAPMR05: Opiates in acute disabling low back pain Don't prescribe opiates in acute disabling low back pain before evaluation and a trial of other alternatives is considered	H	120,190	44,527	10%	90%
AFP05: Annual Resting EKGs Don't order annual EKGs or any other cardiac screening for low-risk patients without symptoms	M	105,732	97,009	71%	29%
AP00: Antibiotics for Acute URI and Ear Infections Don't prescribe oral antibiotics for members with upper URI or ear infection (acute sinusitis, URI, viral respiratory illness or acute otitis externa)	L	94,404	83,437	0%	100%
ASA01a: Preoperative Baseline Laboratory Studies Don't obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery	L	72,495	61,910	18%	82%
APA01: Two or more antipsychotic medications Don't routinely prescribe two or more antipsychotic medications concurrently	M	33,241	4,402	89%	11%
Total		637,059	478,475	60%	40%

Reporting period: CY 2019, 26,049,017 member months, processed historic claims to 2008

*This is the sum of distinct members for each measure, but one member could have wasteful services under more than one measure.

Milliman MedInsight

21

Appendix C - Milliman's Health Waste Calculator Playbook

Health Waste Calculator Playbook



Milliman MedInsight

September 2021

Improving the efficiency of healthcare is an ongoing challenge that must be tackled to get utilization and costs under control and improve value. Helping leaders and front-line healthcare staff identify and quantify wasteful healthcare services can have a significant impact on improving healthcare efficiency. As a result, Milliman MedInsight® teamed up with VBID Health to create an analytical product, the MedInsight Health Waste Calculator™, to quantify and report on these potentially unnecessary services.

The Health Waste Calculator, informed by American Board of Internal Medicine Foundation's Choosing Wisely Campaign recommendations advanced by the physician community identifies and quantifies specific low value services. These recommendations are utilized in the Health Waste Calculator to analyze data to identify potentially wasteful services and to consider person-level attributes such as age, gender, and related diagnoses to assign a degree of appropriateness:

- Not Wasteful: Confirms that data suggests appropriate services were administered by the healthcare provider
- Likely to be wasteful: Indicates the need to question the appropriateness of services rendered
- Wasteful: Flags a cause for concern, as the service probably should not have occurred

In addition to including measures such as those from Choosing Wisely®, and the U.S. Preventive Services Task Force's D grade service recommendations, Milliman's MedInsight team collaborates with VBID Health and its thought leaders Michael Chernew, PhD, and Mark Fendrick, MD, to establish a continuous pipeline of new measures that extends the scope and potential impact of the Health Waste Calculator to reduce wasteful services.

- *Clinically Integrated Networks* are leveraging the Health Waste Calculator at the physician-level to provide clinicians with their utilization rates relative to their peers, and drive success in value-based care payment programs.
- *Currently seven states* are utilizing their All Payer Claims databases and the Health Waste Calculator to facilitate statewide Health Waste reduction initiatives.
- *Health Plans* are including efficiency metrics in Value Based Care contracts with providers; the Health Waste Calculator provides a wide variety of clinically vetted metrics to select for this purpose.

This playbook provides the key steps that organizations implement to get maximal value from the Health Waste Calculator.



Health Waste Calculator Playbook

Step 1: Assembling the team

It is essential to create a multi-disciplinary Steering Group to drive Health Waste Calculator projects and initiatives forward. We recommend including, at a minimum, representatives from the clinical team, network management/contracting, reporting and analytics, and an identified individual to manage the project.

Suggested Team Members:

- **Clinical Lead** – CMO, Medical Director for Quality, Director of Medical Affairs, Director of Service Line
- **Project Management** – Medical Economics, Provider Network, Project Management
- **Provider Network** – Provider Liaison, Provider Network Management, Contracting
- **Reporting/Analytics** – Analyst, Data Scientist, Business Intelligence, Medical Economics

Securing a Commitment of Time

Health Waste Initiative team members should expect to devote at least several hours per week to this initiative. One member of the team should be assigned to lead the project, ensure regular meetings are scheduled and productive, and track progress of the initiative steps. Possible activities team members can expect to participate in include:

- Reviewing Health Waste Calculator provider data for accuracy
- Understanding Health Waste Calculator measures and clinical rationale
- Designing reporting for various internal and external audiences
- Facilitating conversations with outlier providers



Health Waste Calculator Playbook

Step 2: Selecting Measures of Focus

There are several common ways to prioritize Health Waste Calculator findings for intervention: by total wasteful dollar spend, number of members / patients affected, risk of member/patient harm, percentage of services identified as wasteful, or degree of physician engagement (identifying measures local providers feel particularly strongly about reducing or especially able to influence). Here are the top ideas we've collected from existing Health Waste Calculator Clients:

- **Prioritizing by Total Wasteful Spend:** The Health Waste Calculator provides an estimate of total dollars spent on services identified as wasteful. The total potential dollars saved through a focused initiative around a measure is a key consideration. The calculator provides a financial calculation for the individual waste service (line) or the full encounter (case). MedInsight's measure-level guidance on whether to use line or case is available in Appendix A.
- **Prioritizing by Members/Patients Affected:** The MedInsight Health Waste Calculator provides a count of unique members/patients that have received a service designated as wasteful. In practice, the most common low value services are those low unit cost services done at high frequency. Therefore, it is important to consider high prevalence when prioritizing wasteful services to target. This is particularly useful for quality improvement initiatives as the services measured by the Health Waste Calculator can be directly harmful or be accompanied by downstream physical, financial and/or emotional harm.
- **Prioritizing by Risk of Patient Harm:** Each MedInsight Health Waste Calculator measure is rated in terms of its propensity for causing physical harm to members/patients. Measures with a High (H) risk of harm are typically invasive procedures or those with directly harmful impacts. Measures with a Medium (M) risk of harm are typically those commonly associated with downstream harm or iatrogenic effects, including but not limited to repeat testing, cascading tests and procedures and other incidents. Measures with a Low (L) risk of harm are not harmless, but have either a lower risk of cascading or iatrogenic effects, or the any direct impact are less severe. These ratings refer only to physical harm. Financial and emotional harm must also be considered in any quality improvement strategy.
- **Prioritizing by Providers Affected (Number and/or Engagement):** Early initiatives may be most successful when supported by a limited number of engaged providers. An organization may want to select measures that are concentrated among a smaller number of providers, or may start first with the most prevalent measures among a large practice with high engagement. Establishing early 'wins' through targeted interventions can create momentum to expand to additional measures or additional practices.
- **Provider Variation:** Where there is a high degree of provider variation within a measure, it may indicate that practice patterns differ greatly between providers. When some providers have high rates of utilization and others have very low, it may be possible to focus efforts on high utilization providers, and share best practices from low utilization providers.
- **Prioritizing Existing Initiatives:** Similarly, when partnering with provider practices there may already be quality initiatives underway focused on wasteful services. Selecting a measure that is already a focus can create early success stories to share with other provider organizations, and early incentive rewards (if available) for practices to encourage continued partnership on reducing wasteful care.
- **Prioritizing Readily Achievable Process-Oriented Changes:** When thinking about the measures that have the strongest support for change among provider groups, some measures may require relatively simple process-oriented changes through a clinical decision support system or EMR edit. While other measures involve more ideological discussions about the recommendation. Focusing on measures with process-oriented solutions may also help with early efforts.



Health Waste Calculator Playbook

- Patient-Driven Services:** Some services are sensitive to the preference of members/patients, and may be requested by members/patients. For example, members/patients may ask their provider to perform diagnostic procedures, or prescribe a medication. A full list of services that may be more provider or member driven is available in Appendix B.
 - When working with provider organizations, prioritizing services that aren't likely to be requested by members/patients can be easier to gain buy-in for early initiatives.
 - As a health plan or employer organization, focusing on services that are patient/member-driven can be key items to prioritize for member/patient education, copay increases, etc. to directly influence member/patient behavior.

Conducting a Prioritization Exercise:

Data generated from the Health Waste Calculator is designed to facilitate prioritization by the number of members/patients affected, by wasteful spend, by Waste Index and by the risk of member/patient harm. Additionally, provider and specialty-level reporting can help identify specialties, physician practices, or individual providers to focus efforts. The Health Waste Calculator Storyboard within the MedInsight Portal provides the following reporting to enable measure selection:

Dashboard #1:

Attrib PCP (Provider - PCP Attrib)		Attrib PCP Clinic (Provider - PCP Attrib)				
All		All				
Health Waste Calculator Playbook #1						
Waste Label	Total Was...	Total Was...	Waste Was...	Distinct ...	Distinct ...	Waste Ris...
1 AAP00 - Pediatric Head Comp...	\$206,690.90	199	0.805668	240	172	Low
2 AAPMR05 - Opiates in acute d...	\$998,596.26	12,991	0.947280	4932	2778	High
3 ACC00 - Cardiac Stress Testing	\$297,928.48	256	0.095988	2328	1365	Medium
4 ACPY01 - Syncope Image	\$37,866.46	30	0.789473	37	32	Low
5 ACR01 - Headache Image	\$921,771.67	710	0.760171	871	652	Low
6 ACRH03 - MRI for Rheumatoid...	\$8,777.81	10	1.000000	10	9	Low
7 AFP00 - Cervical Cancer Scre...	\$235,470.29	2,764	0.104590	22092	5621	Medium
8 AFP02 - Lower back pain image	\$322,746.52	1,463	0.443871	3201	1717	Medium
9 AFP03 - DEXA	\$59,211.71	293	0.235720	1215	827	Low
10 AFP05 - Annual Resting EKGs	\$1,054,816.61	21,245	0.415063	30583	7334	Medium
11 AI02 - Immunoglobulin G / im...	\$134,433.28	589	0.639522	860	631	Low
12 AI03 - Diagnostics chronic urti...	\$2,561.92	28	1.000000	27	25	Low
13 AN01 - Electroencephalograph...	\$148,505.23	68	0.618181	104	93	Low
14 AN02 - Imaging of the carotid ...	\$21,419.98	36	0.507042	71	65	Medium
15 AO02 - Imaging tests for eye di...	\$417,988.83	4,201	0.303124	7082	3308	Low
16 AO03 - Antibiotics for adenovi...	\$1,394.98	85	0.955056	88	84	Low
17 AOHN01 - CT head/brain for su...	\$23,212.39	26	0.619047	39	32	Low
18 AOHN02 - Oral antibiotics for u...	\$206.61	4	1.000000	3	3	Low



Health Waste Calculator Playbook

Step 3: Establishing Interventions

The Health Waste Calculator measures are, for the most part: high volume, low cost, healthcare interventions that are ordered by primary care physicians and specialists. Most intervention levers aim to 1.) educate primary care physicians and specialists about low value services and/or provide visibility to providers into their own use of wasteful services 2.) Incorporate specific Health Waste Calculator measures in physician report cards and incentive programs 3.) use health plan levers to stop payment for wasteful services 4.) Engage members/patients in reducing their own use of wasteful services. It is possible and recommend to leverage multiple strategies at once to maximize impact.

Top Intervention Levers for Health Waste Initiatives:

Initiative Type	Initiative Description	Example
Physician-focused Initiatives	Data Insight – distribute reporting to providers to show the volume of wasteful services performed on their attributed members/patients	Smarter Care Virginia provides detail on wasteful service utilization at several levels of detail. One provider who received data on their own service utilization identified that a high volume of Vitamin D screenings were due to a lab bundle that was regularly ordered. The lab bundle was edited.
	Data Transparency - Providing transparency across providers by publishing data on rates of utilization of wasteful services across multiple clinics allowing providers to see peers' performance to motivate provider action to reduce wasteful services	The Washington Health Alliance has published reporting on wasteful services in the state of Washington, including provider-level metrics across all large medical groups and clinics.
Physician Report Cards and Incentive Programs	Targeted Provider Conversations – identifying a group of providers with outlier utilization of wasteful services among attributed members/patients, share data and best practices in a dedicated conversation with a clinical expert	Another Smarter Care Virginia participant, Ballad Health, is focusing on reducing PICC lines in CKD patients through a variety of levers, including: patient education, provider education, and dedicated conversations with providers with high levels of PICC line utilization.
	Adding Health Waste Calculator measures to physician report cards and / or quality incentive programs will engage physician and physician groups on efforts to reduce waste.	Several health plans have used this approach to reduce waste.
Health Plan Initiatives	Claim Edits/Utilization Management – removing coverage or adding a prior-authorization review of services can reduce what the plan pays for health waste	Several large payers have removed coverage for Vitamin D screening through a claims edit to deny payment. At least one payer reported a degree of provider abrasion as many of these services are included in lab bundles (versus being explicitly ordered), but those denials initiated a review of those bundled services.
	Copay/coinsurance – increasing the patient responsibility for low value services to reduce utilization	Copay or coinsurance increases can help steer patients away from low value services.
Patient/Member-based Initiatives	Patient/member education – providing educational materials and outreach focused on patients to reduce utilization of low value services	Virginia's Sentara Quality Care Network created mailers to inform patients about when to use pre op services and annual exams



Health Waste Calculator Playbook

Additional Resources:

1. Appendix C: This table contains a breakdown of the most effective levers by organization type; aiding health plans, Accountable Care Organizations, health systems, and employer organizations in selecting relevant strategies.
2. Sample patient education materials from ChoosingWisely.org - <https://www.choosingwisely.org/patient-resources/>

Learn more:
www.choosingwisely.org/patient-resources



5 QUESTIONS to Ask Your Doctor Before You Get Any Test, Treatment, or Procedure

- 1 Do I really need this test or procedure?
- 2 What are the risks and side effects?
- 3 Are there simpler, safer options?
- 4 What happens if I don't do anything?
- 5 How much does it cost, and will my insurance pay for it?

© 2016 Consumer Reports



Imaging tests for lower-back pain
You probably don't need an X-ray, CT scan, or MRI

Xrays, CT scans, and MRIs are called imaging tests because they take pictures, or images, of the inside of the body. You may think you need one of these tests to find out what is causing your back pain. But these tests usually don't help. Here's why:

The tests will not help you feel better faster. Most people with lower-back pain feel better in about a month, whether or not they have an imaging test.

People who get an imaging test for their back pain do not get better faster. And sometimes they feel worse than people who took over-the-counter pain medicine and followed simple steps, like walking, to help their pain.

Imaging tests can also lead to surgery and other treatments that you do not need. In one study, people who had an MRI were much more likely to have surgery than people who did not have an MRI. But the surgery did not help them get better any faster.





Health Waste Calculator Playbook

Step 3a: Gaining Provider Buy-in

While measures should be vetted and validated by payer and provider clinical leadership during the measure selection process, there is also a need to gain broad-base support for selected measures among the clinicians who have the greatest control over these interventions. The measures selected play a role in gaining provider buy-in; organizations may choose to select measures where there is already a high degree of buy in, or even existing initiatives. Existing relationships are another consideration in measure selection; first choosing measures that are most prevalent among specialties, group practices, or individual providers with strong existing relationships can speed adoption. In this section we'll focus on the subsequent steps: identifying outlier providers and providing education and outreach.

Educational Resources and Support

- Regular department meetings
- Dedicated Lunch and Learn meetings
- One-page pamphlets for leave-behind distribution
- Data that shows the scale of the problem (see Dashboard 1)
- Examples of educational materials:
 - From the Washington State Medical Association can be found here: <https://wsma.org/choosing-wisely>
 - Smarter Care Connections Podcast from Smarter Care Virginia
 - Dedicated teaching/training for physician leaders from Smarter Care Virginia (excerpts in Appendix D)

Additional thoughts on creating an environment of respectful data sharing are available in an article in the American Journal of Managed Care titled "[A 10-Step Program to Successfully Reduce Low Value Care](#)" by Howard Beckman, John Mafi and Beth Bortz.



Health Waste Calculator Playbook

Sample Educational Material from Washington State Medical Association (<https://wsma.org/choosing-wisely>)

DROP THE PRE-OP!

Physicians Agree: All patients need pre-op EVALUATION, but a low-risk patient having a low-risk procedure does not need pre-op TESTING.

Providing high-quality care to patients includes eliminating unnecessary tests, treatments and procedures.

A recent study in Washington state¹, reveals that at least 100,000 patients received unnecessary pre-op testing during a one-year period, at an estimated cost of over \$92 million—a very conservative estimate.

Routine preoperative lab studies, pulmonary function tests, X-rays and EKGs on healthy patients before low-risk procedures are not recommended because they are unlikely to provide useful, actionable information.

Choosing Wisely® Recommendations

“ Don't obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery – specifically complete blood count, basic or comprehensive metabolic panel, coagulation studies when blood loss (or fluid shifts) is/are expected to be minimal.”
—American Society of Anesthesiologists

“ Don't order annual electrocardiograms (EKGs) or any other cardiac screening for low-risk patients without symptoms.”
—American Academy of Family Physicians

There are a variety of reasons why unnecessary pre-op tests are ordered, such as:

- Broadly ordering the same pre-op tests for all patients/procedures—based on habit without thoughtful reflection—regardless of a patient's health or a procedure's risk.
- A desire to be “thorough” and/or concern that an incomplete pre-op form may delay the procedure for the patient.
- Discomfort with uncertainty and concern about malpractice.
- A mistaken belief that all insurers require pre-op testing.

¹ First, Do No Harm. <https://www.wacommunitycheckup.org/media/47156/2018-first-do-no-harm.pdf>

Benefits of Reducing Unnecessary Pre-op Testing

For patients:

- Reduces unnecessary time spent at a lab or clinic.
- Reduces patient's financial burden.
- Reduces waiting for test results and anxiety from false-positive results.
- Reduces unnecessary delay before procedure.

For physicians:

- Provides evidence-based care to patients and avoids unnecessary care.
- Reduces time spent reviewing, documenting and explaining test results that add no value and won't impact a decision regarding procedure.
- Reduces risk exposure from not carefully documenting follow-up on all pre-op tests.



An initiative of the IATIF Foundation

WASHINGTON STATE TASK FORCE







For more information and resources, visit:
wsma.org/Choosing-Wisely





Health Waste Calculator Playbook

Step 3b: Targeted Provider Conversations

Conversations with individual providers or physician groups about their use of low value services can be an incredibly powerful lever to reduce utilization of low value services. When initiated, these conversations should be approached with care, ensuring they remain a collaborative attempt to understand care variation and provide education about low value care. These conversations should be conducted by a clinical leader (often the Medical Director or CMO), should avoid judgement, should be focused around sharing variation in the data and appropriateness criteria for the measure. Data denial is a common response by providers when viewing performance data for the first time; the clinical leader should be prepared for this reaction and committed to maintaining a collaborative environment.

Identify Providers Through Data

When identifying provider practices for engagement focused on reducing waste there are two factors to consider: total volume of wasteful services and relative rate of wasteful service utilization. Practices or providers selected for outreach should have both a high volume of wasteful service and a high rate of wasteful service compared to peers.

Once measures are selected, Health Waste Calculator data can be pulled at the individual provider level to identify which practices to engage. Practices selected should provide a significant volume of services, and also have a relatively high rate of Percent Wasteful services. Some practices may have high volume, but be relatively strong performers in the percentage of overall services triggering a measure. These targeted practices should be the focus of outreach and educational support. For MedInsight Portal users, Dashboard 2 is designed to support this step:

Dashboard #2:

Waste Label
[7 values included] AAPM05 - Opiates in acute ...

Health Waste Calculator Playbook #2

	All Waste Label			AAPM05 - Opiates in acute disabling low back pain			ACC00 - Cardiac Stress Testing			ACR01 - Headache Image			AFP00 - Cervical Cancer Screening in Women			AFP02 - Lowb	
	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Utilization	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Utilization	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Utilization	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Utilization	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Utilization	Waste Wasteful Events	W. W. Int. W.
- Access Primary Care...	182	58.5%	879	86	96.6%	247	1	6.3%	62	3	100.0%	12	10	11.0%	192	9	
- Affiliated OB / Newb...	77	25.0%	736	12	100.0%	26	0	0.0%	13	1	25.0%	22	26	10.7%	491	3	
- Affiliated Primary Ca...	131	41.6%	808	52	98.1%	142	2	9.5%	88	6	75.0%	25	11	7.3%	266	5	
- Affiliated Primary Ca...	157	55.1%	789	83	91.2%	228	0	0.0%	69	7	100.0%	18	5	6.0%	176	12	
- Assurance Primary C...	155	45.2%	849	54	87.1%	154	1	6.3%	67	5	83.3%	28	27	17.0%	297	7	
- Assured Primary Car...	217	49.7%	1113	85	95.5%	232	2	11.1%	101	10	83.3%	46	22	12.0%	320	13	
- Bay Shore Primary C...	173	46.6%	937	55	96.5%	161	1	5.6%	99	2	40.0%	18	22	12.6%	309	13	
- Bay Shore Primary C...	162	45.9%	932	60	82.2%	204	0	0.0%	58	6	100.0%	17	21	13.1%	312	9	
- Bay Shore Primary C...	170	53.6%	869	91	88.3%	304	0	0.0%	59	4	100.0%	14	14	13.5%	183	4	
- Brewster Primary Ca...	259	66.4%	1006	191	99.5%	553	2	14.3%	32	3	100.0%	10	17	15.7%	160	8	
- Canfield Primary Car...	142	43.3%	870	49	89.1%	154	0	0.0%	55	5	83.3%	33	8	5.5%	280	3	
- Central Primary Care...	146	46.2%	910	70	98.6%	174	2	9.5%	113	3	60.0%	30	6	6.1%	188	8	



Health Waste Calculator Playbook

Step 4: Creating Regular Reporting

A one-time intervention rarely results in a successful reduction of wasteful services. Once measures are selected and implemented, regular data updates to track progress should be implemented to ensure a continued focus on targeted measures. This reporting can take several forms, and several levels:

- **PCP/Provider Practice Level Reporting:** The most direct performance intervention is to provide reporting to clinicians on the relative use of wasteful services among their attributed members/patients. Overall rates of utilization and total cost of wasteful services are key criteria. Clinicians may also find patient lists valuable for chart review or tracking back referral of wasteful services.
 - See Dashboard #1 with filter for practice
 - Or Dashboard #3 (below) to show performance changes over time
- **Cross-Practice Transparency Reporting:** Providing transparency across providers by publishing data on rates of utilization of wasteful services across multiple clinics can motivate provider action to reduce wasteful services. The Washington Health Alliance reports on wasteful services in the state of Washington, including provider-level views.
 - See Dashboard #2 with filter for selected measures
 - Example from the Washington Health Alliance First, Do No Harm Report, October 2019:
<https://www.wacommunitycheckup.org/media/47217/first-do-no-harm-oct-2019.pdf>



Health Waste Calculator Playbook

Step 5: Establishing an Ongoing Waste Reduction Process

Organizations generally select 3-10 Health Waste Measures per year to focus interventions. With dozens of available Health Waste measures, programs must develop an ongoing culture of waste reduction. This includes two facets 1.) ongoing tracking of ROI and 2.) expansion to new measures, possibly with new initiatives

- Ongoing Tracking of ROI:** The Steering Committee and key stakeholders associated with the project should receive regular updates on the utilization trends for all selected measures, and wasteful services overall. This summary reporting should include breakdowns specific to intervention type; for example, a breakdown by PCP or Clinic if provider-centric initiatives are selected. See Dashboard #3 (below)

Dashboard #3: This dashboard is available for MedInsight Portal users, and is designed to show performance over time on selected Health Waste Calculator Measures.

Incurred Rolling 12 Attrib PCP Clinic (Provider - PCP Attrib) Attrib PCP (Provider - PCP Attrib)

All All All

Health Waste Calculator Playbook #3

	Actual			Prior			Prior Change %		
	Waste Allowed Line	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Waste Allowed Line	Waste Wasteful Events	Waste Waste Index (% Wasteful)	Waste Allowed Line	Waste Wasteful Events	Waste Waste Index (% Wasteful)
AAPO0 - Pediatric Head C...	\$64,982.07	61	91.0%	\$48,099.10	53	75.7%	35.1%	15.1%	20.2%
AAPMR05 - Opiates in ac...	\$257,377.63	3,801	93.9%	\$266,403.90	3,779	95.0%	-3.4%	0.6%	-1.2%
ACC00 - Cardiac Stress Te...	\$109,861.43	88	10.1%	\$86,402.16	74	9.5%	27.2%	18.9%	6.2%
ACPY01 - Syncope Image	\$9,101.66	9	90.0%	\$13,045.91	11	78.6%	-30.2%	-18.2%	14.5%
ACR01 - Headache Image	\$296,917.82	202	78.6%	\$235,533.83	203	75.2%	26.1%	-0.5%	4.5%
ACRH03 - MRI for Rheum...	\$1,050.66	1	100.0%				Infinity	Infinity	Infinity
AFPO0 - Cervical Cancer ...	\$124,426.69	1,454	17.9%	\$85,751.79	1,031	13.1%	45.1%	41.0%	36.5%
AFPO2 - Lower back pain l...	\$112,721.20	526	54.2%	\$97,108.23	502	52.5%	16.1%	4.8%	3.3%
AFPO3 - Dexa	\$9,549.97	50	13.5%	\$17,366.39	79	19.5%	-45.0%	-36.7%	-30.7%
AFPO5 - Annual Resting E...	\$288,140.07	5,745	35.6%	\$292,191.33	5,773	38.5%	-1.4%	-0.5%	-7.4%
AI02 - Immunoglobulin G /...	\$42,141.71	194	67.8%	\$43,141.61	195	65.7%	-2.3%	-0.5%	3.3%
AI03 - Diagnostics chronic...	\$1,375.65	7	100.0%	\$660.01	11	100.0%	108.4%	-36.4%	0.0%
AN01 - Electroencephalog...	\$48,655.02	25	80.6%	\$46,290.13	22	53.7%	5.1%	13.6%	50.3%
AN02 - Imaging of the car...	\$4,422.63	8	44.4%	\$5,859.65	10	52.6%	-24.5%	-20.0%	-15.6%

- Expansion to New Measures and Initiatives:** Once meaningful progress has been achieved, a new set of measures should be evaluated and implemented using Steps 1-4 above. Existing initiatives may be expanded, or new initiatives may be added to continue to generate Health Waste savings. Several ideas for creating a regular process for measure expansion include:
 - Creating an annual focus for measures, where measures are added or replaced annually
 - Selecting new value based measures for each VBC contract renewal
 - Re-evaluation of selection as new measures are released into the Health Waste Calculator
 - Implementing several initiatives (provider-based, health plan-based, and patient-based)





Health Waste Calculator Playbook

Appendix A: Line vs Case Level Measurement

Waste Label and Description		Line or Case Recommendation
Common Treatments		
AO03	Antibiotics for adenoviral conjunctivitis	Line
AOHN02	Oral antibiotics for uncomplicated acute TTO	Line
AP02	Cough and cold medicines in children<4 years	Line
AP00	Antibiotics for Acute Upper Respiratory and Ear Infections	Line
AAD04	Oral antibiotics for treatment of atopic dermatitis	Line
ASA06	Inappropriate opioid prescription	Line
Diagnostic Testing		
AFP02	Lower back pain image	Line
ACR01	Headache Image	Line
ACPY01	Syncope Image	Line
AIO2	Immunoglobulin G / immunoglobulin E testing	Case
AI03	Diagnostics chronic urticaria	Case
AN01	Electroencephalography (EEG) for headaches.	Case
AN02	Imaging of the carotid arteries for simple syncope	Line
AOHN01	CT head/brain for sudden hearing loss.	Line
AOHN04	Imaging for uncomplicated acute rhinosinusitis	Line
SCCT01	Coronary artery calcium scoring for known CAD	Case
JH001	ED CT Scans For Dizziness	Line
ASRM02	Sperm Function Testing	Case
ASRM03	Postcoital Test for Infertility	Case
URA06	Repeat CT for kidney stones	Line
AO02	Imaging tests for eye disease	Line
DOR28	Voiding Cystourethrogram for Urinary Tract Infection	Case
AAP00	Pediatric Head Computed Tomography Scans	Line
ACC00	Cardiac Stress Testing	Case
SCP05	Bleeding Time Testing	Case
AACE04	Total or free T3 level	Line
JAMA06	PTH for CKD	Line
ACOE03	X-ray for diagnosis of plantar fasciitis/heel pain	Line
AME01	Testosterone testing in hypogonadism or hyperandrogenism	Line
NEJM02	Tests for Cellulitis	Line



Health Waste Calculator Playbook

Waste Label and Description		Line or Case Recommendation
Disease Approach		
SNP04	NSAIDs for hypertension, heart failure or CKD	Line
COGY01	Inductions of labor or Cesarean deliveries	Case
DOR21	Arthroscopic Lavage and Debridement for Knee OA	Case
DOR85	Antidepressants Monotherapy in Bipolar Disorder	Line
AP05	CT Scans for Abdominal Pain in Children	Line
DOR124	Renal Artery Revascularization	Case
DOR121	Vertebroplasty	Case
SNP01	PICC stage III–V CKD	Case
HPM03	Multiple Palliative Radiation Treatments in Bone Metastases	Case
APA01	Two or more antipsychotic medications	Line
AAPOS03	Vision therapy for patients with dyslexia	Case
ASRO04	Proton beam therapy for prostate cancer	Line
ASRO05	Intensity modulated radiotherapy (IMRT)	Case
JAMA08	Carotid endarterectomy in asymptomatic patients	Case
NEJM01	Surgery for a torn meniscus	Case
Preoperative Evaluation		
ASA01a	Preoperative Baseline Laboratory Studies	Line
ASA02	Preop Cardiac Echocardiography or Stress Testing	Case
ASA01b	Preoperative EKG, Chest X ray and PFT	Line
STHS05	PFT prior to cardiac surgery	Case
Routine FU/Monitoring		
ACRH03	MRI for Rheumatoid Arthritis	Case
Screening Tests		
URG01	PSA	Case
GE01	Colorectal Cancer Screening in Adults 50 Years and Older	Case
AFP03	Dexa	Line
AFP05	Annual Resting EKGs	Line
SCP01	25-OH-Vitamin D deficiency	Case
SNUC01	Coronary angiography	Case
AFP00	Cervical Cancer Screening in Women	Line
SGIM02	Routine general health checks	Case



Health Waste Calculator Playbook

Appendix B: Provider vs Member Driven Services

Measure Headline	Provider or Member Driven
Annual EKGs or Cardiac Screening	Provider
Antibiotics for Adenoviral Conjunctivitis	Provider
Antidepressants Monotherapy in Bipolar Disorder	Provider
Arthroscopic Lavage and Debridement for Knee Osteoarthritis	Provider
Coronary Artery Calcium Scoring for Known CAD	Provider
Cough and Cold Medicines in Children Under 4 Years	Provider
CT Head/Brain for Sudden Hearing Loss	Provider
Dexa	Provider
Diagnostics Chronic Urticaria	Provider
ED CT Scans for Dizziness	Member
Electroencephalography (EEG) for Headaches	Provider
Headache Image	Member
Imaging of the Carotid Arteries for Simple Syncope	Provider
Immunoglobulin G/ immunoglobulin E Testing	Provider
Inductions of Labor or Cesarean Deliveries before 39 Weeks	Provider
Lower Back Pain Image	Member
MRI for Rheumatoid Arthritis	Provider
NSAIDs for Hypertension, Heart Failure, or CKD	Provider
Postcoital Test for Infertility	Provider
PSA	Member
Radiographic Imaging for Uncomplicated Acute Rhinosinusitis	Provider
Sperm Function Testing	Provider
Syncope Image	Member
Oral Antibiotics for Uncomplicated Acute Tympanostomy Tube Otorrhea	Provider
Renal Artery Revascularization	Provider
CT Scans for Abdominal Pain in Children	Provider
Imaging Tests for Eye Disease	Provider
Preoperative Baseline Laboratory Studies	Provider
Preoperative ECG, Chest X Ray, and PFT	Provider
Repeat Computed Tomography for Known Kidney Stones	Provider
Screening for 25-OH-Vitamin D Deficiency	Member
Colonoscopy	Member
Preoperative Cardiac Echocardiography or Stress Testing	Provider
Coronary Angiography	Provider
Peripherally Inserted Central Catheters in Stage III-V CKD Patients	Provider
Multiple Palliative Radiation Treatments in Bone Metastases	Provider
Voiding Cystourethrogram for Urinary Tract Infection	Provider
Vertebroplasty	Provider
Cervical Cancer Screening in Women	Provider
Cardiac Stress Testing	Provider
Pediatric Head Computed Tomography Scans	Provider
Antibiotics for Acute Upper Respiratory and Ear Infections	Member
Bleeding Time	Provider
PFT Prior to Cardiac Surgery	Provider
Opioids for Acute Back Pain	Member
Concurrent Use of Two or More Antipsychotic Medications	Provider
Routine general health checks	Member
Vision Therapy for Patients with Dyslexia	Provider



Health Waste Calculator Playbook

Appendix C: Levers by Organization Type

Understanding the Effectiveness of Interventions by Organization Type

Lever	Definition	Health Plan	Accountable Care Organization/ Health System	Employer Group
Utilization Management and Claims Rules	Adding a claim edit to deny payment for a service, or require prior-authorization to require clinical review prior to receiving a service. Not suitable for all measures	High	Low unless utilization management has been delegated to the ACO	Low
Benefit Design	Removing coverage for a service or adding or increasing the payments employees/ members/patients are asked to pay for a service.	High	None	High
Patient Education and Outreach	Providing educational materials to members/patients via mail, email or at the point of care with information on the clinical necessity of common low value services	High	High	High
PCP Engagement/ Education	Outreaching to primary care providers to provide data reporting and education on low value services.	Medium	High	None
Specialist Engagement /Education	Outreaching to specialist providers to provide data reporting and education on low value services.	Medium	High	None



Appendix D: Smarter Care Virginia presentation, Physician Engagement: Creating an Effective, Respectful Program (excerpts)

Conducting Consensus Meetings

- Remember the importance of autonomy
- Avoid judgment, ask “What is appropriate?”
- Conduct conversations in the context of evidence and specialty society recommendations
- Continuously refocus on “What **can** we say?”
- Work to accept showing variation graphs or comparison data within a context of appropriateness criteria



Creating the Environment

- Work through the practice manager using outreach staff if available (G,I)
- Provide the reason for the visit as a **usual** part of organizational activity. “We are working hard to help our members deliver the best possible care. Currently, we are focusing on improving heart failure guideline adherence and would like to visit with Dr. Jones or your group to discuss our initiative” (G,I)
- Conduct communications with respect, transparency, and a non-judgmental tone. (“Anything I know about you, you can know”)
- Suggest that the office manager and key staff are invited to attend if the physician(s) desires (*suggesting nothing terrible is coming*). (I)





Delivering the News

- First, show data (G,I)
- Ask for thoughts on why the variation (G,I)
- Then show the practice (G) or individual (I) placement on the graph
- REMEMBER the stages of change (G,I)
- If a practice, then show the variation within the group (G)

Getting to Collaboration

- DON'T Argue or look for acknowledgment or acceptance (G,I)
- Allow time for the practitioner/group to ruminate on the data (G,I)
- Expect the data to be questioned (G,I)
- Ask what the next step(s) should be (G,I)
- Transition to the Outreach Staff (G,I)





Health Waste Calculator Playbook

Appendix E: Additional Reading

- [Aligning to Drive Value White Paper – Washington Health Alliance](#)
 - Publication date: July 2021
- [First Do No Harm – Washington Health Alliance](#)
 - Publication dates: Feb 2018, Dec 2018, Oct 2019
- [Low-Cost, High-Volume Health Services Contribute The Most To Unnecessary Health Spending](#)
 - Publication authors and date: Mafi et al., 2017
- [Utilization and Spending on Low-Value Medical Care Across Four States](#)
 - Publication author and date: VBID Health, 2020
- [Waste in the Medicare Program: a National Cross-Sectional Analysis of 2017 Low-Value Service Use and Spending](#)
 - Publication authors and date: Reid et al., 2020
- [Better Health for Oregonians: Opportunities to Reduce Low-Value Care](#)
 - Publication author and date: Oregon Health Leadership Council, Oregon Health Authority, July 2020
- [The American Journal of Managed Care](#)
 - Publication authors and date: Beckman et al, 2021

References

1. Utah Health Data Authority Act. Available from: <https://le.utah.gov/xcode/Title26/Chapter33A/26-33a.html>
2. County Classifications Map. Available from: <https://ruralhealth.health.utah.gov/portal/county-classifications-map/>
3. Utah Code 26-33a-104 Utah State Legislature. Available from: <https://le.utah.gov/xcode/Title26/Chapter33A/26-33a-S104.html>.
4. MedInsight Health Waste Calculator. Available from: <https://www.medinsight.milliman.com/-/media/medinsight/pdfs/medinsight-health-waste-calculator.ashx>
5. Milliman MedInsight. Available from: <https://www.medinsight.milliman.com/en/>
6. American Academy of Family Physicians. Choosing Wisely. Don't order annual electrocardiograms or any other cardiac screening for low-risk patients without symptoms. Available from: <https://www.choosingwisely.org/clinician-lists/american-academy-family-physicians-annual-electrocardiograms/>
7. American Academy of Physical Medicine and Rehabilitation. Choosing Wisely. Don't prescribe opiates in acute disabling low back pain before evaluation and a trial of other alternatives is considered. Available from: <https://www.choosingwisely.org/clinician-lists/aapmr-opiates-for-low-back-pain/>
8. Society of General Internal Medicine. Choosing Wisely. Five Things Physicians and Patients Should Question. Available from: <http://www.sгим.org/File%20Library/SGIM/About%20Us/News/Choosing-Wisely-Rational.pdf>
9. American Psychiatric Association. Choosing Wisely. Don't routinely prescribe two or more antipsychotic medications concurrently. Available from: <https://www.choosingwisely.org/societies/american-psychiatric-association/>
10. Choosing Wisely. CT Scans for Children with Head Injuries. Available from: <https://www.choosingwisely.org/patient-resources/ct-scans-for-children-with-head-injuries/>
11. American Academy of Pediatrics. Choosing Wisely. Computed tomography (CT) scans are not always necessary in the routine evaluation of abdominal pain. Available from: <http://www.choosingwisely.org/clinician-lists/american-academy-pediatrics-ct-scans-to-evaluate-abdominal-pain/>
12. Infectious Diseases Society of America. Choosing Wisely. Avoid prescribing antibiotics for upper respiratory infections. Available from: <https://www.choosingwisely.org/clinician-lists/infectious-diseases-society-antbiotics-for-upper-respiratory-infections/>
13. American Academy of Ophthalmology. Choosing Wisely. Don't routinely order imaging tests for patients without symptoms or signs of significant eye disease. Available from: <https://www.choosingwisely.org/clinician-lists/american-academy-ophthalmology-routine-imaging-for-patients-without-symptoms-or-signs-of-eye-disease/>
14. American Academy of Family Physicians. Choosing Wisely. Prostate Cancer Screening. <https://www.choosingwisely.org/clinician-lists/american-academy-family-physicians-prostate-cancer-psa-test/>

15. Health Indicator Report. Drug Overdose and Poisoning Incidents. Public Health Indicator Based Information System (IBIS). Utah's Public Health Data Resource. Available from: <https://ibis.health.utah.gov/ibisph-view/indicator/view/PoiDth.Opi.html>
16. Raad, Micheal, Pakpoor, Jina, Harris, Andrew B, Puvanesarajah, Varun, Marrache, Majd, Canner, Joseph K, & Jain, Amit. (2020). *Opioid Prescriptions for New Low Back Pain: Trends and Variability by State*. *Journal of the American Board of Family Medicine*, 33(1), 138–142. <https://doi.org/10.3122/jabfm.2020.01.190254>
17. Deyo RA, Von Korff M, Duhrkoop D. Opioids for low back pain. *BMJ*. 2015 Jan 5; 50:g6380. doi: 10.1136/bmj.g6380. PMID: 25561513; PMCID: PMC6882374.
18. Webster BS, Verma SK, Gatchel RJ. Relationship between early opioid prescribing for acute occupational low back pain and disability duration, medical costs, subsequent surgery and late opioid use. *Spine*. 2007 Sep 1;32(19):2127–32.
19. Qaseem A, Wilt TJ, McLean RM; for the Clinical Guidelines Committee of the American College of Physicians. Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians. *Ann Intern Med*. Epub ahead of print 14 February 2017. DOI: 10.7326/M16-2367.
20. CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016. *Recommendations and Reports / March 18, 2016 / 65(1); 1–49*. Accessed at: <https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm> [Accessed August 30, 2021]
21. Yawn B.P., Buchanan G.R., Afenyi-Annan A.N. Management of Sickle Cell Disease Summary of the 2014 Evidence-Based Report by Expert Panel Members. *JAMA*. 2014; *JAMA*. 2014;312(10):1033-1048.
22. Mafi. JN, McCarthy.EP, Davis. RB, Landon. BE, Worsening Trends in the Management and Treatment of Back Pain. *JAMA Intern Med*. 2013; 173(17):1573-1581
23. Franklin GM, Stover BD, Turner JA, Fulton-Kehoe D, Wickizer TM. Early opioid prescription and subsequent disability among workers with back injuries: the Disability Risk Identification Study Cohort. *Spine* 2008;33:199-204.
24. Okie S. A flood of opioids, a rising tide of deaths. *N Engl J Med* 2010;363:1981-5
25. Von Korff M, Saunders K, Ray GT, Boudreau D, Campbell C, Merrill J, et al. De facto long-term opioid therapy for noncancer pain. *Clin J Pain* 2008;24:521-7.
26. Ashworth J, Green DJ, Dunn KM, Jordan KP. Opioid use among low back pain patients in primary care: is opioid prescription associated with disability at 6-month follow-up? *Pain* 2013;154:1038-44.
27. American Geriatrics Society Panel. Pharmacological management of persistent pain in older persons. *J Am Geriatr Soc* 2009;57:1331-46.
28. U.S. Preventive Services Task Force (USPSTF).
29. Jonas, Daniel E, Reddy, Shivani, Middleton, Jennifer Cook, Barclay, Colleen, Green, Joshua, Baker, Claire, & Asher, Gary N. (2018). Screening for Cardiovascular Disease Risk With Resting or Exercise Electrocardiography: Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA : the Journal of the American Medical Association*, 319(22), 2315–2328. <https://doi.org/10.1001/jama.2018.6897>
30. Bhatia RS, Bouck Z, Ivers NM, Mecredy G, Singh J, Pendrith C, Ko DT, Martin D, Wijeyesundera HC, Tu JV, Wilson L, Wintemute K, Dorian P, Tepper J, Austin PC, Glazier RH, Levinson W. Electrocardiograms in Low-Risk Patients Undergoing an Annual Health

- Examination. *JAMA Intern Med.* 2017 Sep 1;177(9):1326-1333. doi: 10.1001/jamainternmed.2017.2649. PMID: 28692719; PMCID: PMC5710571.
31. Chou R, Arora B, Dana T, Fu R and et al. Screening Asymptomatic Adults for Coronary Heart Disease With Resting or Exercise Electrocardiography: Systematic Review to Update the 2004 U.S. Preventive Services Task Force Recommendation. Evidence Synthesis No. 88. AHRQ Publication No. 11-05158-EF-1. Rockville, MD: Agency for Healthcare Research and Quality; September 2011. Accessed at: <http://www.uspreventiveservicestaskforce.org/uspstf11/coronarydis/cvdes.pdf> [Accessed September 05, 2021]
 32. Moyer VA. U.S. Preventive Services Task Force (2012). Screening for coronary heart disease with electrocardiography: U.S. Preventive Services Task Force recommendation statement. *Ann. Intern. Med.* 157 (7): 512-518, Accessed at: <http://www.uspreventiveservicestaskforce.org/uspstf11/coronarydis/chdfinalrs.pdf> [Accessed September 05, 2021]
 33. Heikkinen T, Järvinen A. The common cold. *Lancet.* 2003;361(9351):51–59.
 34. Chow AW, Benninger MS, Brook I, Brozek JL, Goldstein EJ, Hicks LA, Pankey GA, Seleznick M, Volturo G, Wald ER, File TM Jr. IDSA clinical practice guideline for acute bacterial rhinosinusitis in children and adults. *Clin Infect Dis.* 2012 Apr; 54(8):e72-112.
 35. Aaron M. Harris, Lauri A. Hicks, Amir Qaseem Appropriate Antibiotic Use for Acute Respiratory Tract Infection in Adults: Advice for High-Value Care from the American College of Physicians and the Centers for Disease Control and Prevention. American College of Physicians. March 15, 2016; Vol. 164 No. 6
 36. Gill JM, Fleischut P, Haas S, Pellini B, Crawford A, Nash DB. Use of antibiotics for adult upper respiratory infections in outpatient settings: a national ambulatory network study. *Fam Med.* 2006;38(5):349–354.
 37. O'Brien KL, Dowell SF, Schwartz B, Marcy SM, Phillips WR, Gerber MA. Cough illness/bronchitis-principles of judicious use of antimicrobial agents. *Pediatrics* [Internet]. 1998; 101(supplement):178–81.
 38. Centor RM, Allison JJ, Cohen SJ. Pharyngitis management: defining the controversy. *J Gen Intern Med.* 2007;22(1):127–130.
 39. Smucny J, Fahey T, Becker L, Glazier R. Antibiotics for acute bronchitis. *Cochrane Database Syst Rev.* 2004;(4):CD000245.
 40. Zoorod R, Sidani MA, Fremont RD, Kihlberg C. Antibiotic use in acute upper respiratory tract infections. *Am Fam Physician.* 2012 Nov 1; 86(9):817-22.
 41. Rosenfeld RM, Andes D, Bhattacharyya N, et al. Clinical practice guideline: adult sinusitis. *Otolaryngol Head Neck Surg.* 2007;137(3 suppl):S1–S31.
 42. Tähtinen PA, Laine MK, Huovinen P, Jalava J, Ruuskanen O, Ruohola A. A placebo-controlled trial of antimicrobial treatment for acute otitis media. *N Engl J Med.* 2011;364(2):116–126.
 43. Hoberman A, Paradise JL, Rockette HE, et al. Treatment of acute otitis media in children under 2 years of age. *N Engl J Med.* 2011;364(2):105–115.
 44. Institute for Clinical Systems Improvement. Diagnosis and treatment of respiratory illness in children and adults: percentage of patients with strep pharyngitis who had rapid group A

- strep test or strep culture. <http://qualitymeasures.ahrq.gov/content.aspx?id=32415>. Accessed September 05, 2021
45. Bisno AL, Gerber MA, Gwaltney JM Jr, Kaplan EL, Schwartz RH; Infectious Diseases Society of America. Practice guidelines for the diagnosis and management of group A streptococcal pharyngitis. *Clin Infect Dis*. 2002;35(2):113–125.
 46. Bisno AL. Acute pharyngitis: etiology and diagnosis. *Pediatrics*. 1996;97(6 pt 2):949–954.
 47. Cooper RJ, Hoffman JR, Bartlett JG, et al.; American Academy of Family Physicians; American College of Physicians-American Society of Internal Medicine; Centers for Disease Control. Principles of appropriate antibiotic use for acute pharyngitis in adults: background. *Ann Intern Med*. 2001;134(6):509–517.
 48. Bisno AL, Gerber MA, Gwaltney JM Jr, Kaplan EL, Schwartz RH; Infectious Diseases Society of America. Practice guidelines for the diagnosis and management of group A streptococcal pharyngitis. *Clin Infect Dis*. 2002;35(2):113–125.
 49. Bisno AL. Acute pharyngitis: etiology and diagnosis. *Pediatrics*. 1996;97(6 pt 2):949–954.
 50. Choby BA. Diagnosis and treatment of streptococcal pharyngitis. *Am Fam Physician*. 2009;79(5):383–390.
 51. Lan AJ, Colford JM, Colford JM Jr. The impact of dosing frequency on the efficacy of 10-day penicillin or amoxicillin therapy for streptococcal tonsillopharyngitis: a meta-analysis. *Pediatrics*. 2000;105(2):E19.
 52. Gonzales R, Bartlett JG, Besser RE, et al.; American Academy of Family Physicians; American College of Physicians-American Society of Internal Medicine; Centers for Disease Control; Infectious Diseases Society of America. Principles of appropriate antibiotic use for treatment of uncomplicated acute bronchitis: background. *Ann Intern Med*. 2001;134(6):521–529.
 53. National Institute for Health and Clinical Excellence. Respiratory tract infections—antibiotic prescribing. <http://www.nice.org.uk/nicemedia/live/12015/41323/41323.pdf>. Accessed September 07, 2021
 54. Smucny J, Fahey T, Becker L, Glazier R. Antibiotics for acute bronchitis. *Cochrane Database Syst Rev*. 2004;(4):CD000245.
 55. Rosenfeld RM, Schwartz SR, Cannon CR, Roland PS et al. Clinical Practice Guideline: Acute Otitis Externa. *Otolaryngology–Head and Neck Surgery*; 2014, Vol. 150(1S) S1–S24
 56. Ahovuo-Saloranta A, Borisenko OV, Kovanen N, et al. Antibiotics for acute maxillary sinusitis. *Cochrane database of systematic reviews* 2008:CD000243.
 57. Hersh AL, Jackson MA and Hicks LA. Principles of Judicious Antibiotic Prescribing for Upper Respiratory Tract Infections in Pediatrics. *Pediatrics*. December 2013; Volume 132, Number 6.
 58. Risk Stratification before elective surgery. UCLA Health. UCLA Anesthesiology & Perioperative Medicine. Available at: <https://www.uclahealth.org/anes/risk-stratification>
 59. Kumar A, Srivastava U. Role of routine laboratory investigations in preoperative evaluation. *J Anaesthesiol Clin Pharmacol*. 2011;27(2):174–9.
 60. Schein OD, Katz J, Bass EB, Tielsch JM, Lubomski LH, Feldman MA, Petty BG, Steinberg EP. The value of routine preoperative medical testing before cataract surgery. *N Engl J Med* [Internet]. 2000;342:168-75.

61. Keay L, Lindsley K, Tielsch J, Katz J, Schein O. Routine preoperative medical testing for cataract surgery. *Cochrane Database Syst Rev.* 2012, Issue 3. Art. No.: CD007293. DOI: 10.1002/14651858.CD007293.pub3.
62. Bartley GB, Narr BJ. Preoperative medical examinations for patients undergoing ophthalmic surgery. *Am J Ophthalmol* 1991;112(6):725-7.
63. Keay L, Lindsley K, Tielsch J, Katz J, Schein O. Routine preoperative medical testing for cataract surgery. *Cochrane Database of Syst Rev.* 2009, Issue 2. Art. No.: CD007293. DOI: 10.1002/14651858.CD007293.pub2.
64. Card R, Sawyer M, Degnan B et al. Perioperative protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement. (ICSI); 2014 Mar. 124 p.
65. Apfelbaum, Jeffrey L, Connis, Richard T, Nickinovich, David G, Pasternak, L Reuven, Arens, James F, Caplan, Robert A, Fleisher, Lee A, Flowerdew, Richard, Gold, Barbara S, Mayhew, James F, Rice, Linda Jo, Roizen, Michael F, & Twersky, Rebecca S. (2012). *Practice advisory for preanesthesia evaluation: An updated report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation.* *Anesthesiology* (Philadelphia), 116(3), 522–538. <https://doi.org/10.1097/ALN.0b013e31823c1067>
66. Matulis J, Liu S, Mecchella J et al. Choosing Wisely: A Quality Improvement Initiative to Decrease Unnecessary Preoperative Testing. *BMJ Quality Improvement Reports* 2017; 6: doi:10.1136/bmjquality.u216281.w6691.
67. Balk EM, Earley A, Hadar N, Shah N, Trikalinos TA. Benefits and Harms of Routine Preoperative Testing: Comparative Effectiveness. *Comparative Effectiveness Review No. 130.* (Prepared by Brown Evidence-based Practice Center under Contract No. 290- 2012-0012-I.) AHRQ Publication No. 14-EHC009-EF. Rockville, MD: Agency for Healthcare Research and Quality; January 2014. 6.
68. Card R, Sawyer M, Degnan B et al. Perioperative protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement. (ICSI); 2014 Mar. 124 p. 7.
69. American Society of Anesthesiologists. ASA Physical Status Classification System. Last approved by the ASA House of Delegates on October 15, 2014. Accessed at: <http://www.asahq.org/resources/clinical-information/asa-physical-status-classificationsystem> [Accessed September 05, 2021]
70. Balk EM, Earley A, Hadar N, Shah N, Trikalinos TA. Benefits and Harms of Routine Preoperative Testing: Comparative Effectiveness. *Comparative Effectiveness Review No. 130.* (Prepared by Brown Evidence-based Practice Center under Contract No. 290- 2012-0012-I.) AHRQ Publication No. 14-EHC009-EF. Rockville, MD: Agency for Healthcare Research and Quality; January 2014
71. Apfelbaum JL, Connis RT, Nickinovich DG et al. Practice advisory for preanesthesia evaluation: an updated report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation. *Anesthesiology.* 2012 Mar; 116(3):522–38.
72. Card R, Sawyer M, Degnan B et al. Perioperative protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement. (ICSI); 2014 Mar. 124 p
73. American Psychiatric Association. Practice guideline for the treatment of patients with schizophrenia, second edition. *Am J Psychiatry.* 2004 Feb; 161 (2 Suppl):1-56. Available from: <http://psychiatryonline.org/content.aspx?bookid=28§ionid=1682213>.

74. Gallego JA, Nielsen J, Hert MD, Kane JM and Correll CU. Safety and Tolerability of Antipsychotic Polypharmacy. *Expert Opinion on Drug Safety*, 23(4) (2009) 346–388.
75. World Health Organization. Combination of two or more antipsychotic medications for psychotic disorders. 2012. Accessed at: http://www.who.int/mental_health/mhgap/evidence/psychosis/q2/en/ [Accessed September 06, 2021].
76. National Collaborating Centre for Mental Health (2010). *The NICE Guidelines on Core Interventions in the Treatment and Management of Schizophrenia in Primary and Secondary Care (update)*. London: The British Psychological Society and the Royal College of Psychiatrists
77. Buchanan RW Kreyenbuhl J Kelly DL Noel JM et al. (2010). The 2009 schizophrenia PORT psychopharmacological treatment recommendations and summary statements. *Schizophrenia Bulletin* 36, 71-93.
78. Keepers, G. A., Fochtman, L. J., Anzia, J. M., Benjamin, S., Lyness, J. M., Mojtabai, R., Servis, M., Walaszek, A., Buckley, P., Lenzenweger, M. F., Young, A. S., Degenhardt, A., & Hong, S.-H. (2020). The American Psychiatric Association Practice Guideline for the Treatment of Patients With Schizophrenia. *The American Journal of Psychiatry*, 177(9), 868–872. <https://doi.org/10.1176/appi.ajp.2020.177901>
79. Cipriani A Boso M Barbui C (2009). Clozapine combined with different antipsychotic drugs for treatment resistant schizophrenia. *Cochrane Database of Systematic Reviews*, CD006324.
80. Uchida H Suzuki T Takeuchi H Arenovich T et al. (2011). Low dose vs. standard dose of antipsychotics for relapse prevention in schizophrenia: meta-analysis. *Schizophrenia Bulletin* 37, 788 – 799
81. Stroup TS McEvoy JP Ring KD Hamer RH et al. (2011). A randomized trial examining the effectiveness of switching from olanzapine, quetiapine, or risperidone to aripiprazole to reduce metabolic risk: comparison of antipsychotics for metabolic problems (CAMP). *American Journal of Psychiatry* 168, 947–956.
82. Stahl SM, Grady MM. A critical review of atypical antipsychotic utilization: comparing monotherapy with polypharmacy and augmentation. *Curr Med Chem*. 2004; 11(3):313-27.
83. McEvoy JP, Lieberman JA, Stroup TS, Davis SM, Meltzer HY, Rosenheck RA, Swartz MS, Perkins DO, Keefe RS, Davis CE, Severe J, Hsiao JK, CATIE Investigators. Effectiveness of clozapine versus olanzapine, quetiapine, and risperidone in patients with chronic schizophrenia who did not respond to prior atypical antipsychotic treatment. *Am J Psychiatry*. 006; 163(4):600- 10.
84. LeFevre M, Screening for Vitamin D Deficiency in Adults: U.S. Preventive Services Task Force Recommendation Statement. *Annals of Internal Medicine*. 25 November 2014 162(2):133-140
85. Krist, Alex H, Davidson, Karina W, Mangione, Carol M, Cabana, Michael, Caughey, Aaron B, Davis, Esa M, Donahue, Katrina E, Doubeni, Chyke A, Epling, John W, Kubik, Martha, Li, Li, Ogedegbe, Gbenga, Owens, Douglas K, Pbert, Lori, Silverstein, Michael, Stevermer, James, Tseng, Chien-Wen, & Wong, John B. (2021). *Screening for Vitamin D Deficiency in Adults: US Preventive Services Task Force Recommendation Statement*.

- JAMA : the Journal of the American Medical Association, 325(14), 1436–1442.
<https://doi.org/10.1001/jama.2021.3069>
86. Sattar N, Welsh P, Panarelli M, Forouchi NG. Increasing requests for vitamin D measurement: Costly, confusing, and without credibility. *Lancet* [Internet]. 2012 Jan 14 [cited 2021 Sep 05]; 379:95-96
 87. Lu CM. Pathology consultation on vitamin D testing: Clinical indications for 25(OH) vitamin D measurement [Letter to the editor]. *Am J Clin Pathol* [Internet]. 2012 May [cited 2021 Sep 06]; 137:831.
 88. Holick M, Binkely N, Bischoff-Ferrari H, Gordon CM, Hanley DA, Heaney RP, Murad MH, Weaver CM; Endocrine Society. Evaluation, treatment, and prevention of vitamin D deficiency: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab* [Internet]. 2011 Jul [cited 2021 Sep 07]; 96(7):1911-1930.
 89. Bikle D, Adams J, Christakos S. Primer on the metabolic bone diseases and disorders of mineral metabolism. Washington: American Society for Bone and Mineral Research. c2008. Chapter 28, Vitamin D: production, metabolism, mechanism of action, and clinical requirements. P. 141–9.
 90. Holick MF. Vitamin D deficiency. *N Engl J Med*. 2007; 357:266–81.
 91. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, Murad MH, Weaver CM; Endocrine Society. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2011 Jul; 96 (7):1911– 30
 92. Hollick M., Neil C., et al, Evaluation, Treatment and Prevention of Vitamin D Deficiency, An Endocrine Society Clinical Practice Guideline. *The Journal of Clinical Endocrinology & Metabolism*. July 2011, 96(7): 1911–1930.
 93. American Academy of Clinical Pathology. Choosing Wisely. Five things physicians and patients should question. February 21, 2013. Accessed at: <http://www.choosingwisely.org/clinician-lists/american-society-clinical-pathology-population-based-screening-for-vitamin-d-deficiency/>. [Accessed Sep 5, 2021].
 94. Beithon J, Gallenberg M, Johnson K et al. Healthcare Guideline Diagnosis and Treatment of Headache. Institute for Clinical Systems Improvement. January 2013. Accessed at: https://www.icsi.org/_asset/qwrznq/headache.pdf [Accessed Sep 06, 2021]
 95. Institute for Clinical Systems Improvement (ICSI). Diagnosis and treatment of headache. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2011 Jan. 84 p.
 96. Silberstein SD. Practice parameter: evidence-based guidelines for migraine headache (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology*. 2000 Sep 26;55(6):754–62.
 97. Frishberg BM. The utility of neuroimaging in the evaluation of headache in patients with normal neurologic examination. *Neurology*. 1994 Jul;44(7):1191–7.
 98. Neuroimaging for the evaluation of chronic headaches: an Evidence-based analysis. *Ont Health Technol Assess Ser*. 2010;10(26):1–57.
 99. Hainer BL. and Matheson EM. Approach to Acute Headache in Adults. *American Academy of Family Physicians*. 2013;87(10):682-687.

100. American College of Radiology. ACR Appropriateness Criteria®. Headache 2013. Accessed at: <https://www.guideline.gov/summaries/summary/47673> [Accessed Sep 06, 2021]
101. Evans R. Diagnostic testing for migraine and other primary headaches. *Neurol Clin.* 2009 May;27(2):393–414.
102. Semelka RC, Armao DM, Elias J Jr, Huda W. Imaging strategies to reduce the risk of radiation in CT studies, including selective substitution with MRI. *J Magn Reson Imaging.* 2007;25(5):900–09.
103. Brenner DJ, Hall EJ. Computed tomography—an increasing source of radiation exposure. *N Engl J Med.* 2007;357(22):2277–84
104. American College of Radiology. ACR Appropriateness Criteria®. Seizures and Epilepsy 2014. Accessed at: <https://acsearch.acr.org/docs/69479/Narrative/> [Accessed September 16, 2021].
105. American College of Radiology. ACR Appropriateness Criteria®. Ataxia 2012. Accessed at: <https://acsearch.acr.org/docs/69477/Narrative/> [Accessed September 06, 2021].
106. American College of Radiology. ACR Appropriateness Criteria®. Cerebrovascular Disease 2016. Accessed at: <https://acsearch.acr.org/docs/69478/Narrative/> [Accessed September 06, 2021].
107. Kale MS, Bishop TF, Federman AD, Keyhani S. “Top 5” Lists Top \$5 Billion. *Arch Intern Med.* 2011; 171(20):1858-1859
108. Boulware LE, Marinopoulos S, Phillips KA, Hwang CW, Maynor K, Merenstein D, Wilson RF, Barnes GJ, Bass EB, Powe NR, Daumit GL. Systematic review: the value of the periodic health evaluation. *Ann Intern Med.* 2007 Feb 20; 146(4):289-300.
109. Krogsboll LT, Jorgensen KJ, Gronhoj Larsen C, Gotzsche PC. General health checks in adults for reducing morbidity and mortality from disease: Cochrane systematic review and metaanalysis. *BMJ.* 2012; 345: e7191
110. Hanna E Bloomfield, Timothy J Wilt, Evidence brief: Role of annual comprehensive physical examination in the asymptomatic adult, VA- ESP Project #09-009;2011.
111. Thompson S and Tonelli M. General health checks in adults for reducing morbidity and mortality from disease [editorial]. *Cochrane Database of Systematic Reviews* 2012 17 Oct; 10:ED000047
112. Bloomfield HE, Wilt TJ. Evidence Brief: Role of the Annual Comprehensive Physical Examination in the Asymptomatic Adult. 2011 Oct. In: VA Evidence Synthesis Program Evidence Briefs [Internet]. Washington (DC): Department of Veterans Affairs (US); 2011-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK82767/>
113. 2021 Preventive Health Guidelines for Member 65 years of Age and Older. Available from:<https://content.highmarkprc.com/Files/Region/hwvbcbs/EducationManuals/ClinicalGuidelines/guideline-over-65.pdf>
114. Brenner DJ, Hall EJ. Computed tomography – an increasing risk of radiation exposure. *N Engl J Med* [Internet]. 2007 Nov 29; 357:2277–2284.
115. The Agency for Healthcare Research and Quality Effective Healthcare Program. Diagnosis of Right Lower Quadrant Pain and Suspected Acute Appendicitis. Comparative Effectiveness Review Number 157.

116. Burr A, Renaud EJ, Manno M, Makris J, Cooley E, DeRoss A, Hirsh M. Glowing in the dark: Time of day as a determinant of radiographic imaging in the evaluation of abdominal pain in children. *J Pediatr Surg* [Internet]. 2011 Jan; 46(1):188–191.
117. Shah NB, Platt SL, ALARA: is there a cause for alarm? Reducing radiation risks from computed tomography scanning in children. *Current Opinion in Pediatrics*. June 2008; 20(3): 243-7.
118. Pearce, M. S., Salotti, J. A., Little, M. P., McHugh, K., Lee, C., Kim, K. P., Howe, N. L., Ronckers, C. M., Rajaraman, P., Sir Craft, A. W., Parker, L., & Berrington de González, A. (2012). Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. *Lancet (London, England)*, 380(9840), 499–505. [https://doi.org/10.1016/S0140-6736\(12\)60815-0](https://doi.org/10.1016/S0140-6736(12)60815-0)
119. How CT Scans Have Raised Kids' Risk For Future Cancer. Available from: <https://www.npr.org/sections/health-shots/2013/06/10/190449001/how-ct-scans-have-raised-kids-risk-for-future-cancer>
120. Robert D. Baker. Acute Abdominal Pain. *Pediatrics in Review* March 2018, 39 (3) 130-139; DOI: <https://doi.org/10.1542/pir.2017-0089>
121. Wan MJ, Krahn M, Ungar WJ, Caku E, Sung L, Medina LS, Doria AS. Acute appendicitis in young children: cost-effectiveness of US versus CT in diagnosis—a Markov decision analytic model. *Radiology*. 2009; 250: 378-86.
122. Doria AS, Moineddin R, Kellenberger CJ, Epelman M, Beyene J, Schuh S, Babyn PS, Dick PT. US or CT for diagnosis of appendicitis in children? A meta-analysis. *Radiology*. 2006; 241: 83-94.
123. DeVries A, Young PC, Wall E, et al. CT Scan Utilization Patterns in Pediatric Patients with Recurrent Headache. *Pediatrics*. 2013 Jun 24; 132(1): e1–e8
124. Kuppermann N, Holmes JF, Dayan PS, Hoyle JD Jr, Atabaki SM, Holubkov R, Nadel FM, Monroe D, Stanley RM, Borgialli DA, Badawy MK, Schunk JE, Quayle KS, Mahajan P, Lichenstein R, Lillis KA, Tunik MG, Jacobs ES, Callahan JM, Gorelick MH, Glass TF, Lee LK, Bachman MC, Cooper A, Powell EC, Gerardi MJ, Melville KA, Muizelaar JP, Wisner DH, Zuspan SJ, Dean JM, WoottonGorges SL. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*. 2009 Oct 3; 374(9696):1160–70.
125. Dunning J, Batchelor J, Stratford-Smith P, Teece S, Browne J, Sharpin C, Mackway-Jones K. A meta-analysis of variables that predict significant intracranial injury in minor head trauma. *Arch Dis Child* [Internet]. 2004 Jul; 89(7):653–9.
126. Nigrovic LE, Schunk JE, Foerster A, Cooper A, Miskin M, Atabaki SM, Hoyle J, Dayan PS, Holmes JF, Kuppermann N, Traumatic Brain Injury Group for the Pediatric Emergency Care Applied Research Network. The effect of observation on cranial computed tomography utilization for children after blunt head trauma. *Pediatrics* [Internet]. 2011 Jun; 127(6):1067–1073.
127. Ryan ME, Palasis S, Saigal G, Singer AD, Karmazyn B, Dempsey ME, Dillman JR, Dory CE, Garber M, Hayes LL, Iyer RS, Mazzola CA, Raske ME, Rice HE, Rigsby CK, Sierzenski PR, Strouse PJ, Westra SJ, Wooten-Gorges SL, Coley BD. Appropriateness criteria head trauma— child. *J Am Coll of Radiol*. Oct 2014; 11(10):939-47.

128. American Academy of Pediatrics Subcommittee on Febrile Seizures. Guideline for the neurodiagnostic evaluation of the child with a simple febrile seizure. *Pediatrics*. 2011;127(2):389-94.
129. American College of Radiology. ACR Appropriateness Criteria. Headache - Child. Last review date: 2012. Accessed at: <https://acsearch.acr.org/docs/69439/Narrative/> [Accessed November 28, 2016]
130. Miglioretti DL, Johnson E et al. The Use of Computed Tomography in Pediatrics and the Associated Radiation Exposure and Estimated cancer Risk. *JAMA Pediatrics*. 2013 Aug 1; 167(8):700-7.
131. Calculated Decisions. PECARN Pediatric Head Injury/Trauma Algorithm. Available from: https://www.ebmedicine.net/media_library/files/Calculated%20Decisions%20P1111%20PECARN.pdf
132. American College of Radiology. ACR Appropriateness Criteria. Head Trauma - Child. Last review date: 2014. Accessed at: <https://acsearch.acr.org/docs/3083021/Narrative/> [Accessed November 28, 2016]
133. American College of Radiology. ACR Appropriateness Criteria. Seizures-Child. Last review date: 2012. Accessed at: <https://acsearch.acr.org/docs/69441/Narrative/> [Accessed November 28, 2016]
134. American Academy of Ophthalmology Preferred Practice Patterns Committee. Preferred Practice Pattern® Guidelines. Comprehensive Adult Medical Eye Evaluation [Internet]. San Francisco, CA: American Academy of Ophthalmology; 2010 [cited 2012 28 Sep]. Available from: one.aao.org/CE/PracticeGuidelines/PPP_Content.aspx?cid=64e9df91-dd10-4317-8142-6a87eee7f517.
135. American Academy of Ophthalmology Retina Panel. Preferred Practice Pattern® Guidelines. Idiopathic Macular Hole [Internet]. San Francisco, CA: American Academy of Ophthalmology; 2008 [cited 2012 28 Sep]. Available from: one.aao.org/CE/PracticeGuidelines/PPP_Content.aspx?cid=6f2be59d-6481-4c64-9a3e8d1dabec9ffa.
136. American Academy of Ophthalmology Retina Panel. Preferred Practice Pattern® Guidelines. Age-Related Macular Degeneration [Internet]. San Francisco, CA: American Academy of Ophthalmology; 2008 [cited 2012 28 Sep]. Available from: one.aao.org/CE/PracticeGuidelines/PPP_Content.aspx?cid=f413917a-8623-4746-b441-f817265eafb4.
137. American Academy of Ophthalmology Retina Panel. Preferred Practice Pattern® Guidelines. Diabetic Retinopathy [Internet]. San Francisco, CA: American Academy of Ophthalmology; 2008 [cited 2012 28 Sep]. Available from: one.aao.org/CE/PracticeGuidelines/PPP_Content.aspx?cid=d0c853d3-219f-487b-a524-326ab3cecd9a.
138. American Academy of Ophthalmology Preferred Practice Patterns Committee. Preferred Practice Pattern Guidelines. Comprehensive Adult Medical Eye Evaluation. *Ophthalmology*. January, 2016. Volume 123, Issue 1, Pages P209–P236.

139. Williams GA, Scott IU, Haller JA, Maguire AM, Marcus D, McDonald HR. Single-field fundus photography for diabetic retinopathy screening: A report by the American Academy of Ophthalmology. *Ophthalmology*. 2004 May; 111(5):1055–62.
140. Moyer VA. Screening for Prostate Cancer: U.S. Preventive Services Task Force Recommendation Statement. *Annals of Internal Medicine*. 2012; 157:120-134.
141. Lim LS, Sherin K; ACPM Prevention Practice Committee. Screening for prostate cancer in U.S. men ACPM position statement on preventive practice. *Am J Prev Med*. 2008 Feb;34(2):164-70.
142. Moyer; U.S Preventive Services Task Force. Screening for prostate cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2012 Jul 17;157(2):120-34.
143. Qaseem A, Barry MJ, Denberg TD, Owens DK, Shekelle P; Clinical Guidelines Committee of the American College of Physicians. Screening for prostate cancer: a guidance statement from the Clinical Guidelines Committee of the American College of Physicians. *Ann Intern Med*. 2013 May 21;158(10):761-9
144. Hayes JH and Barry MJ. Screening for Prostate Cancer with the Prostate-Specific Antigen Test: A Review of Current Evidence. *The Journal of the American Medical Association*. 2014; 311(11):1143-1149.
145. Carter HB, Albertsen PC, Barry MJ et al. Early detection of prostate cancer: American Urological Association (AUA) Guideline. 2013. Accessed at: <http://www.auanet.org/common/pdf/education/clinical-guidance/Prostate-CancerDetection.pdf> [Accessed on: September 07, 2021]
146. Agency for Health Care Research and Policy (AHCPR), Cochrane Reviews
147. Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, Owens DK. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med*. 2007 Oct 2; 147(7):478–91
148. American College of Radiology ACR Appropriateness Criteria®. Low Back Pain, Reviewed 2015. Accessed at: <https://acsearch.acr.org/docs/69483/Narrative/> Accessed Sep 07, 2021]
149. Chou, Qaseem A, Owens DK, Shekelle P; Clinical Guidelines Committee of the American College of Physicians. Diagnostic imaging for low back pain: advice for high-value health care from the American College of Physicians. *Ann Intern Med*. 2011 Feb 1; 154(3):181–9
150. 2009 NICE low back pain guideline; 2008 ACR Appropriateness Criteria® low back pain guideline; 2007 ACP/APS low back pain guideline; 2007 ACOM low back disorders guideline
151. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet*. 2009; 373(9662):463–72.
152. Chou R, Qaseem A, Snow V, Casey D, Cross JT, Shekelle P, Owens DK; Clinical Efficacy Assessment Subcommittee of the American College of Physicians; American College of Physicians; American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American

- College of Physicians and the American Pain Society. *Ann Intern Med.* 2007; 147(7):478–91.
153. Davis PC, Wippold FJ, Brunberg JA, Cornelius RS, De La Paz RL, Dormont PD, Gray L, Jordan JE, Mukherji SK, Seidenwurm DJ, Turski PA, Zimmerman RD, Sloan MA. ACR appropriateness criteria on low back pain. *J Am Coll Radiol.* 2009; 6(6):401–7.
 154. Kendrick D, Fielding K, Bentley E, Miller P, Kerslake R, Pringle M. The role of radiography in primary care patients with low back pain of at least 6 weeks duration: a randomized (unblinded) controlled trial. *Health Technol Assess.* 2001; 5(30):1–69.
 155. Miller P, Kendrick D, Bentley E, Fielding K. Cost-effectiveness of lumbar spine radiography in primary care patients with low back pain. *Spine.* 2002; 27(20):2291–7
 156. American Academy of Family Physicians. Cervical Cancer [Internet]. 2012 [cited 2012 Oct 10] U.S. Preventive Services Task Force. Screening for Cervical Cancer. 2012 Mar. [cited 2012 Oct 10].
 157. Vesco KK, Whitlock EP, Eder M, et al. Screening for Cervical Cancer: A Systematic Evidence Review for the U.S. Preventive Services Task Force [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2011 May. (Evidence Syntheses, No. 86.)
 158. The American College of Obstetricians and Gynecologists. Cervical Cancer Screening and Prevention. *Obstetrics & Gynecology.* Vol. 127, No. 1, January 2016.
 159. U.S. Preventive Services Task Force. Final Recommendation Statement: Cervical Cancer: Screening, April 2017. Accessed at: <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/cervical-cancer-screening1> [Accessed December 6, 2017].
 160. U.S. Preventive Services Task Force. Final Recommendation Statement: Cervical Cancer: Screening, April 2017. Accessed at: <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/cervical-cancer-screening1> [Accessed September 07, 2021].
 161. Sawaya GF, Kulasingam S, Denberg TD, Qaseem A, Cervical Cancer Screening in Average-Risk Women: Best Practice Advice from the Clinical Guidelines Committee of the American College of Physicians. *Ann Intern Med.* 2015; 162(12):851-859.
 162. Saslow D, and et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *Am J Clin Pathol* 2012; 137: 516 – 542.
 163. Systematic review: The value of the periodic health evaluation. Boulware LE, Marinopoulos S, Phillips KA, Hwang CW, Maynor K, Merenstein D. *Ann Intern Med* [Internet]. 2007 Feb 20; 146(4):289-300.
 164. American Academy of Family Physicians. Cervical Cancer [Internet]. 2012 [cited 2012 Oct 10]. www.aafp.org/online/en/home/clinical/exam/cervicalcancer.html
 165. U.S. Preventive Services Task Force. Screening for Cervical Cancer. 2012 Mar. [cited 2012 Oct 10]. Available from: www.uspreventiveservicestaskforce.org/uspstf/uspstfscerv.htm
 166. Vesco KK, Whitlock EP, Eder M, et al. Screening for Cervical Cancer: A Systematic Evidence Review for the U.S. Preventive Services Task Force [Internet]. Rockville (MD):

- Agency for Healthcare Research and Quality (US); 2011 May. (Evidence Syntheses, No. 86.) Available from: preview.ncbi.nlm.nih.gov/bookshelf/booktest/br.fcgi?book=es86
167. Lee JW, Berkowitz Z, Saraiya M. Low-risk human papillomavirus testing and other non-recommended human papillomavirus testing practices among U.S. health care providers. *Obstet Gynecol.* 2011 Jul; 118(1):4-13.
 168. Saslow D, Solomon D, Lawson HW, Killackey M, Kulasingam SL, Cain J, Garcia FA, Moriarty AT, Waxman AG, Wilbur DC, Wentzensen N, Downs LS Jr, Spitzer M, Moscicki AB, Franco EL, Stoler MH, Schiffman M, Castle PE, Myers ER; ACS-ASCCP-ASCP Cervical Cancer Guideline Committee. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology Screening Guidelines for the Prevention and early Detection of Cervical Cancer. *Am J Clin Pathol* [Internet]. 2012 May-Jun [cited 2012 Oct 12]; 137:516-542.
 169. Ripollés T, Agramunt M, Errando J, Martínez MJ, Coronel B, Morales M. Suspected ureteral colic: plain film and sonography versus unenhanced helical CT. A prospective study in 66 patients. *Eur Radiol.* 2004 Jan; 14(1):129-36.
 170. Pfister SA, Deckart A, Laschke S, Dellas S, Otto U, Buitrago C, Roth J, Wiesner W, Bongartz G, Gasser TC. Unenhanced helical computed tomography vs intravenous urography in patients with acute flank pain: accuracy and economic impact in a randomized prospective trial. *Eur Radiol.* 2003 Nov; 13(11):2513-20.
 171. Katz SI, Saluja S, Brink JA, Forman HP. Radiation dose associated with unenhanced CT for suspected renal colic: impact of repetitive studies. *AJR Am J Roentgenol.* 2006 Apr. 186(4):1120-4
 172. American College of Emergency Physicians, Choosing wisely. Five things physicians and patients should question. Released October 27, 2014. Accessed at: <http://www.choosingwisely.org/clinician-lists/acep-ct-of-abdomen-and-pelvis-for-edpatients-under-50/> [Accessed September 06, 2021].
 173. Fulgham P, Assimos D, Pearle M, and Preminger G; Clinical Effectiveness Protocols For Imaging in the Management of Ureteral Calculous Disease; American Urological Association Guideline; *Journal of Urology*; 2013; Volume 189, Issue 4; 1203-1213.
 174. Coursey CA, Casalino DD, Remer EM, Expert Panel on Urologic Imaging. Acute onset flank pain -- suspicion of stone disease. Reston (VA): American College of Radiology (ACR); March 2015. Accessed at: [Accessed September 07, 2021].
 175. Fwu C, Eggers P, Kimmel P, Kusek J, Kirkali Z. Emergency department visits, use of imaging, and drugs for urolithiasis have increased in the United States. *Kidney International.* 2013; 83, 479–486.
 176. Sterling M, Ziemba J, Mucksavage P. Initial Management for Renal Colic: Expel, Decompress or Shocks. *Austin Journal of Urology.* 2014;1 (1): 4.
 177. Stewart, B. A., Fernandes, S., Rodriguez-Huertas, E., & Landzberg, M. (2010). A preliminary look at duplicate testing associated with lack of electronic health record interoperability for transferred patients. *Journal of the American Medical Informatics Association : JAMIA*, 17(3), 341–344. <https://doi.org/10.1136/jamia.2009.001750>
 178. Bibbins-Domingo, Kirsten, Grossman, David C, Curry, Susan J, Davidson, Karina W, Epling, John W, García, Francisco A. R, Gillman, Matthew W, Harper, Diane M, Kemper, Alex R, Krist, Alex H, Kurth, Ann E, Landefeld, C. Seth, Mangione, Carol M, Owens,

- Douglas K, Phillips, William R, Phipps, Maureen G, Pignone, Michael P, & Siu, Albert L. (2016). Screening for Colorectal Cancer: US Preventive Services Task Force Recommendation Statement. *JAMA : the Journal of the American Medical Association*, 315(23), 2564–2575. <https://doi.org/10.1001/jama.2016.5989>
179. Calonge, Ned, Bibbins-Domingo, Kirsten, Cantu, Adelita Gonzales, Curry, Susan, Dietrich, Allen J, Flores, Glenn, Grossman, David, Isham, George, LeFevre, Michael L, Leipzig, Rosanne M, Melnikow, Joy, Melnyk, Bernadette, Nicholson, Wanda, Reyes, Carolina, Schwartz, J. Sanford, & Wilt, Timothy. (2011). Screening for osteoporosis: U.S. preventive services task force recommendation statement. *Annals of Internal Medicine*, 154(5), 356–365. <https://doi.org/10.7326/0003-4819-154-5-201103010-00307>
180. Mendu, Mallika L, McAvay, Gail, Lampert, Rachel, Stoehr, Jonathan, & Tinetti, Mary E. (2009). Yield of Diagnostic Tests in Evaluating Syncopal Episodes in Older Patients. *Archives of Internal Medicine (1960)*, 169(14), 1299–1305. <https://doi.org/10.1001/archinternmed.2009.204>
181. Cox, Linda, MD, Williams, Brock, PhD, Sicherer, Scott, MD, Oppenheimer, John, MD, Sher, Larry, MD, Hamilton, Robert, PhD, & Golden, David, MD. (2008). Pearls and pitfalls of allergy diagnostic testing: report from the American College of Allergy, Asthma and Immunology/American Academy of Allergy, Asthma and Immunology Specific IgE Test Task Force. *Annals of Allergy, Asthma, & Immunology*, 101(6), 580–592. [https://doi.org/10.1016/S1081-1206\(10\)60220-7](https://doi.org/10.1016/S1081-1206(10)60220-7)
182. Tarbox, James A., MD, Gutta, Ravi C., MD, Radojicic, Cristine, MD, & Lang, David M., MD. (2011). Utility of routine laboratory testing in management of chronic urticaria/angioedema. *Annals of Allergy, Asthma, & Immunology*, 107(3), 239–243. <https://doi.org/10.1016/j.anai.2011.06.008>
183. Whelton, Paul K, Carey, Robert M, Aronow, Wilbert S, Casey, Donald E, Collins, Karen J, Dennison Himmelfarb, Cheryl, DePalma, Sondra M, Gidding, Samuel, Jamerson, Kenneth A, Jones, Daniel W, MacLaughlin, Eric J, Muntner, Paul, Ovbiagele, Bruce, Smith, Sidney C, Spencer, Crystal C, Stafford, Randall S, Taler, Sandra J, Thomas, Randal J, Williams, Kim A, ... Wright, Jackson T. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology*, 71(19), e127–e248. <https://doi.org/10.1016/j.jacc.2017.11.006>
184. Gronseth, G.S, & Greenberg, M.K. (1995). The utility of the electroencephalogram in the evaluation of patients presenting with headache: A review of the literature. *Neurology*, 45(7), 1263–1267. <https://doi.org/10.1212/WNL.45.7.1263>
185. Strickberger, S, Adam, Benson, D, Woodrow, Biaggioni, Italo, Callans, David J, Cohen, Mitchell I, Ellenbogen, Kenneth A, Epstein, Andrew E, Friedman, Paul, Goldberger, Jeffrey, Heidenreich, Paul A, Klein, George J, Knight, Bradley P, Morillo, Carlos A, Myerburg, Robert J, & Sila, Cathy A. (2006). AHA/ACCF scientific statement on the evaluation of syncope: From the American Heart Association Councils on Clinical Cardiology, Cardiovascular Nursing, Cardiovascular Disease in the Young, and Stroke, and the Quality of Care and Outcomes Research Interdisciplinary Working Group; and the

- American College of Cardiology Foundation in Collaboration with the Heart Rhythm Society. *Journal of the American College of Cardiology*, 47(2), 473–484.
<https://doi.org/10.1016/j.jacc.2005.12.019>
186. (AAO) American Academy of Ophthalmology. (2013, February). *Choosing Wisely: Five Things Ophthalmologists and Patients Should Question*. <https://www.aaopt.org/choosing-wisely>
 187. Stachler, Robert J, Chandrasekhar, Sujana S, Archer, Sanford M, Rosenfeld, Richard M, Schwartz, Seth R, Barrs, David M, Brown, Steven R, Fife, Terry D, Ford, Peg, Ganiats, Theodore G, Hollingsworth, Deena B, Lewandowski, Christopher A, Montano, Joseph J, Saunders, James E, Tucci, Debara L, Valente, Michael, Warren, Barbara E, Yaremchuk, Kathleen L, & Robertson, Peter J. (2012). Clinical practice guideline: Sudden hearing loss. *Otolaryngology-Head and Neck Surgery*, 146(3), S1–S35.
<https://doi.org/10.1177/0194599812436449>
 188. Rosenfeld, Richard M, Andes, David, Bhattacharyya, Neil, Cheung, Dickson, Eisenberg, Steven, Ganiats, Theodore G, Gelzer, Andrea, Hamilos, Daniel, Haydon, Richard C, Hudgins, Patricia A, Jones, Stacie, Krouse, Helene J, Lee, Lawrence H, Mahoney, Martin C, Marple, Bradley F, Mitchell, Col. John P, Nathan, Robert, Shiffman, Richard N, Smith, Timothy L, & Witsell, David L. (2007). *Otolaryngology-Head and Neck Surgery*, 137(3), S1–S31. <https://doi.org/10.1016/j.otohns.2007.06.726>
 189. Budoff, Matthew J, Achenbach, Stephan, Blumenthal, Roger S, Carr, J. Jeffrey, Goldin, Jonathan G, Greenland, Philip, Guerci, Alan D, Lima, Joao A.C, Rader, Daniel J, Rubin, Geoffrey D, Shaw, Leslee J, & Wiegers, Susan E. (2006). Assessment of coronary artery disease by cardiac computed tomography: A scientific statement from the American Heart Association Committee on Cardiovascular Imaging and Intervention, Council on Cardiovascular Radiology and Intervention, and Committee on Cardiac Imaging, Council on Clinical Cardiology. *Circulation (New York, N.Y.)*, 114(16), 1761–1791.
<https://doi.org/10.1161/CIRCULATIONAHA.106.178458>
 190. Saber Tehrani, A. S., Coughlan, D., Hsieh, Y. H., Mantokoudis, G., Korley, F. K., Kerber, K. A., Frick, K. D., Newman-Toker, D. E., & Schneider, S. (2013). Rising Annual Costs of Dizziness Presentations to U.S. Emergency Departments. *Academic Emergency Medicine*, 20(7), 689–696. <https://doi.org/10.1111/acem.12168>
 191. (ACOG) The American College of Obstetricians and Gynecologists. Avoidance of Nonmedically Indicated Early-Term Deliveries and Associated Neonatal Morbidities. (2019). *Obstetrics and Gynecology (New York, 1953)*, 133(2), E156–E163.
<https://doi.org/10.1097/AOG.0000000000003076>
 192. Rosenfeld, Richard M, Schwartz, Seth R, Pynnonen, Melissa A, Tunkel, David E, Hussey, Heather M, Fichera, Jeffrey S, Grimes, Alison M, Hackell, Jesse M, Harrison, Melody F, Haskell, Helen, Haynes, David S, Kim, Tae W, Lafreniere, Denis C, LeBlanc, Katie, Mackey, Wendy L, Nettekville, James L, Pipan, Mary E, Raol, Nikhila P, & Schellhase, Kenneth G. (2013). Clinical practice guideline: Tympanostomy tubes in children. *Otolaryngology-Head and Neck Surgery*, 149(1), S1–S35.
<https://doi.org/10.1177/0194599813487302>

193. Isbister, G. K., Prior, F., & Kilham, H. A. (2012). Restricting cough and cold medicines in children. *Journal of Paediatrics and Child Health*, 48(2), 91–98. <https://doi.org/10.1111/j.1440-1754.2010.01780.x>
194. Combe, B., Landewe, R., Lukas, C., Bolosiu, H. D., Breedveld, F., Dougados, M., Emery, P., Ferraccioli, G., Hazes, J. M. W., Klareskog, L., Machold, K., Martin-Mola, E., Nielsen, H., Silman, A., Smolen, J., & Yazici, H. (2007). EULAR recommendations for the management of early arthritis: report of a task force of the European Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). *Annals of the Rheumatic Diseases*, 66(1), 34–45. <https://doi.org/10.1136/ard.2005.044354>
195. Kirkley, Alexandra, Birmingham, Trevor B, Litchfield, Robert B, Giffin, J. Robert, Willits, Kevin R, Wong, Cindy J, Feagan, Brian G, Donner, Allan, Griffin, Sharon H, D'Ascanio, Linda M, Pope, Janet E, & Fowler, Peter J. (2008). A Randomized Trial of Arthroscopic Surgery for Osteoarthritis of the Knee. *The New England Journal of Medicine*, 359(11), 1097–1107. <https://doi.org/10.1056/NEJMoa0708333>
196. Fleisher, L. A., Beckman, J. A., Brown, K. A., Calkins, H., Chaikof, E. L., Fleischmann, K.E.Freeman, W. K., Froehlich, J. B., Kasper, E. K., Kersten, J. R., Riegel, B., & Robb, J. F. (2007). ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery. *Circulation (New York, N.Y.)*, 116(17). <https://doi.org/10.1161/CIRCULATIONAHA.107.185699>
197. (AUA) American Urological Association. Report on optimal evaluation of the infertile male. (2004). *Fertility and Sterility*, 82, 123–130. <https://doi.org/10.1016/j.fertnstert.2004.05.058>
198. Kumar, A., & Srivastava, U. (2011). Role of routine laboratory investigations in preoperative evaluation. *Journal of Anaesthesiology, Clinical Pharmacology*, 27(2), 174–179. <https://doi.org/10.4103/0970-9185.81824>
199. Wolk, Michael J., MD, MACC, Bailey, Steven R., MD, FACC, FSCAI, FAHA, Doherty, John U., MD, FACC, FAHA, Douglas, Pamela S., MD, MACC, FAHA, FASE, Hendel, Robert C., MD, FACC, FAHA, FASNC, Kramer, Christopher M., MD, FACC, FAHA, Min, James K., MD, FACC, Patel, Manesh R., MD, FACC, Rosenbaum, Lisa, MD, Shaw, Leslee J., PhD, FACC, FASNC, FAHA, Stainback, Raymond F., MD, FACC, FASE, & Allen, Joseph M., MA. (2014). 187. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Stable Ischemic Heart Disease. *Journal of the American College of Cardiology*, 63(4), 380–406. <https://doi.org/10.1016/j.jacc.2013.11.009>
200. Jenks, S., Yeoh, S. E., & Conway, B. R. (2014). Balloon angioplasty, with and without stenting, versus medical therapy for hypertensive patients with renal artery stenosis. *Cochrane Library*. <https://doi.org/10.1002/14651858.CD002944.pub2>
201. Buchbinder, R., Johnston, R. V., Rischin, K. J., Homik, J., Jones, C. A., Golmohammadi, K., Kallmes, D. F., & Buchbinder, R. (2018). Percutaneous vertebroplasty for osteoporotic vertebral compression fracture. *Cochrane Library*, 2018(11), CD006349. <https://doi.org/10.1002/14651858.CD006349.pub4>
202. Hoggard J, Saad T, Schon D, Vesely TM, Royer T; American Society of Diagnostic and Interventional Nephrology, Clinical Practice Committee; Association for Vascular Access.

- Guidelines for venous access in patients with chronic kidney disease. A Position Statement from the American Society of Diagnostic and Interventional Nephrology, Clinical Practice Committee and the Association for Vascular Access. *Semin Dial.* 2008 Mar-Apr;21(2):186-91. doi: 10.1111/j.1525-139X.2008.00421.x. Erratum in: *Semin Dial.* 2009 Mar-Apr;22(2):221-2. PMID: 18364015.
203. Roberts, K. B. (2011). Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months. *Pediatrics (Evanston)*, 128(3), 595–610. <https://doi.org/10.1542/peds.2011-1330>
204. Lutz, Stephen, M.D, Berk, Lawrence, M.D., Chang, Eric, M.D, Chow, Edward, M.B.B.S, Hahn, Carol, M.D, Hoskin, Peter, M.D, Howell, David, M.D, Konski, Andre, M.D, Kachnic, Lisa, M.D, Lo, Simon, M.B., Ch.B, Sahgal, Arjun, M.D, Silverman, Larry, M.D, von Gunten, Charles, M.D., Ph.D., F.A.C.P, Mendel, Ehud, M.D., F.A.C.S, Vassil, Andrew, M.D, Bruner, Deborah Watkins, R.N., & Hartsell, William, M.D. (2011). Palliative Radiotherapy for Bone Metastases: An ASTRO Evidence-Based Guideline. *International Journal of Radiation Oncology, Biology, Physics*, 79(4), 965–976. <https://doi.org/10.1016/j.ijrobp.2010.11.026>
205. Wolk, Michael J., MD, MACC, Bailey, Steven R., MD, FACC, FSCAI, FAHA, Doherty, John U., MD, FACC, FAHA, Douglas, Pamela S., MD, MACC, FAHA, FASE, Hendel, Robert 194. C., MD, FACC, FAHA, FASNC, Kramer, Christopher M., MD, FACC, FAHA, Min, James K., MD, FACC, Patel, Manesh R., MD, FACC, Rosenbaum, Lisa, MD, Shaw, Leslee J., PhD, FACC, FASNC, FAHA, Stainback, Raymond F., MD, FACC, FASE, & Allen, Joseph M., MA. (2014). ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Stable Ischemic Heart Disease. *Journal of the American College of Cardiology*, 63(4), 380–406. <https://doi.org/10.1016/j.jacc.2013.11.009>
206. (ASCP) American Society for Clinical Pathology. (2014, February 21). *Thirty Five Things Physicians and Patients Should Question*. Choosing Wisely. <https://www.choosingwisely.org/wp-content/uploads/2015/02/ASCP-Choosing-Wisely-List.pdf>
207. (STS) Society of Thoracic Surgeons. (2013, February). *Five Things Physicians and Patients Should Question*. <https://www.choosingwisely.org/wp-content/uploads/2015/02/STS-Choosing-Wisely-List.pdf>
208. Handler, S. M., Fierson, W. M., Ruben, J. B., Granet, D. B., Blocker, R. J., Bradford, G. E., Karr, D. J., Lueder, G. T., Lehman, S. S., Troia, S. J., Murphy, N. A., Adams, R. C., Burke, R. T., Friedman, S. L., Kalichman, M. A., Levy, S. E., Liptak, G. S., McNeal, D., Norwood Jr, K. W., Turchi, R.M., Wiley, S. E. (2011). Joint technical report - Learning disabilities, dyslexia, and vision. *Pediatrics (Evanston)*, 127(3), e818–e856. <https://doi.org/10.1542/peds.2010-3670>