WASHINGTON HEALTH ALLIANCE

Leading health system improvement


# Different Regions, Different Care

## A Report on Procedure Rate Variation in Washington State

August 2016

www.wacommunitycheckup.org

## Letter from the Executive Director

Dear community member,

A common theme in Alliance reports is the variation evidenced in the care that people in our state receive. This report is no exception. As you will see in the following pages, geography has an impact on how frequently patients get certain treatments and procedures. In other words, where you live matters when it comes to the care you get.

This report expands upon previous analyses of geographic variation that the Alliance has produced. For the first time, the Alliance is looking at rate variation for the entire state. In addition, the number of procedures and treatments covered has grown, providing greater detail about geographic variation. This report also breaks down results by age and gender, which can illuminate other differences in the volume of care patients receive.

While this report cannot explain the differences in how much care people receive, it can shine a light on those differences. In doing so, we believe that this report can inform employers and consumers who would like to reduce the risk and cost of medically unnecessary services; and hospitals and medical groups, who want to be more competitive and efficient, as we work toward our joint goal of improving care for all Washingtonians.

Nancy A. Giunto

Washington Health Alliance Executive Director

# Table of Contents

Can the amount of care you receive vary depending on where you live? As this report shows, the answer is yes. A patient's location can influence the treatment or services that he or she receives. While this report can't answer the question as to why that can be the case, it does highlight that when it comes to the kind of health care you receive, where you live matters.

## Variation is an all-too-common problem that bedevils our health care system.

While many patients believe that medicine is always driven by science, the reality is far different. Some variation is to be expected, but wide and persistent differences in the care that patients receive are a sign that the health care system is failing to function at the high level that it should.

Other reports from the Washington Health Alliance—including the annual Community Checkup report—analyze variation from the perspective of where care is delivered: at the clinic, the medical group or the hospital. This report looks at differences based upon where people live or, said another way, geography. Although not commonly known, this is not a new concept. In fact, the idea of variation originated by looking at how health care differed by location more than 40 years ago. Dr. Jack Wennberg from Dartmouth College analyzed Medicare data and to his surprise discovered that there was tremendous variation in how often procedures occurred from one community to the next, including communities a relatively short distance from one another. Wennberg's findings exploded the common belief that clinical decisions were always driven by well-established medical fact and theory.

Variation in the rates of care can be a sign of overuse. It is estimated that as much as 30 percent of the services, treatments and procedures that we buy in health care do not contribute to better health and can put patients at additional health risks, to say nothing of great financial cost to families, employers and other purchasers.

While the Community Checkup also looks at how care is delivered geographically, specifically at the county level, this report offers a more focused approach, examining and comparing the care received by people living in different local health care markets. As a result, the findings in this report are focused at the *community* level.

To produce this report, the Alliance relied upon its robust database of claims data and used public domain software developed by the federal Agency for Healthcare Research and Quality (AHRQ) to identify tests, procedures and surgeries.

This is the third time that the Alliance has published a report on utilization. Originally, we examined four high-volume hospitalizations in an area confined to the Puget Sound region. Last year, the Alliance released a

report that looked at 11 procedures, not limited to a hospital setting, but again solely for the Puget Sound region.

This report represents a significant expansion over the previous reports. For one, it covers the entire state of Washington. In addition, it now includes results for 21 tests and treatments in five categories:

- Ear/Throat
- Ortho-/Neurosurgery
- Diagnostic Tests
- Obstetrics/Gynecology
- Special Topics (e.g., bariatric surgery)

Results are further divided by age range and gender. This stratification can reveal even more degrees of variation. The service year reflected in these results is July 1, 2013 to June 30, 2014.

This report provides a window into notable or persistent variation in service. The results may be influenced by how sick people are, differences in patient preferences for particular services, or by the way providers practice. The Alliance cannot determine which of these factors or combination thereof explain the results. But by shining a light on this variation, we hope to spur a deeper look into it and engage a community dialogue about overuse of health care services.



## Geography Matters

What does variation by community mean in practical terms for patients? In Washington, it means that you may be more likely to have a specific medical test or procedure depending on where you live. Here are a few examples from this report.

Compared to their peers living elsewhere in the state:

- One-year old girls in Spokane are 120 percent more likely to have eardrum procedures.
- Young women in Everett are more than two and a half times more likely to have bariatric surgery.
- Middle-aged men in Yakima are 70 percent more likely to have spine fusion surgery; their counterparts in Seattle are 50 percent *less* likely.

This report can't answer why such variation is common across our state. But it does highlight the importance of patients—and their caregivers—being engaged in their treatment. Certain conditions have a variety of treatment options, each with its own set of tradeoffs and possible results. Depending on someone's goals and what is important to them, they may choose one option over another. That's why it is important that they understand all of their options and work with their provider and health care team to make the decision that is best for them. Each treatment option carries its own benefits and risks, many of them significant. Since they are the one who will bear them, patients need to take an active role to ensure that they make the decision that is best for them.

### WHY ARE PROCEDURES AND TREATMENTS PERFORMED MORE IN SOME REGIONS THAN OTHERS?

- Not all health care providers have experience with the full range of options for a condition, so they don't talk about each as a valid option.
- In some areas, providers may simply have developed a preference for certain treatments. When this preference extends across many or most providers in a local area this is sometimes called "practice culture." What is common in one market may be markedly different in another.
- The current fee-for-service system rewards medical providers for the volume of care given instead of quality or health outcome. Misaligned financial incentives may contribute to overuse.
- In some instances, the supply of a specific health care resource may have a major impact in driving utilization. For example, the more CT scanners are available, the more CT scans patients will receive.
- Despite evidence to the contrary, many consumers continue to believe that more treatment is better treatment, and this may result in patients asking for care they do not need. Unfortunately, most health insurance benefit designs do not incentivize consumers to make smarter health care choices.
- In some places, people might be significantly more (or less) healthy than in other places given environmental conditions or other social determinants of health.



# Powerful examples of variation

Health care services across Washington state show tremendous variation in use. There are 21 measures in this report, and all of them to one degree or another show geographical differences in the care patients receive. These services have been identified by Alliance committee members, including physician members of the Quality Improvement Committee, as worth studying because of the potential for overuse. In reviewing these results, please keep the following in mind:

- When used appropriately and when medically necessary, the benefits of each service may outweigh the risks.
- Price range estimates represent private, commercially negotiated transaction prices. You may find prices outside of these ranges.

What follows is a selection of the measures, highlighting areas where the variation is particularly noteworthy. Full results for all 21 measures are available in the Table of Results at the end of this report.

## Eardrum Procedure

Eardrum procedure, also known as Myringotomy or Tympanostomy, is a surgical treatment for relieving fluids that can build up behind the eardrum. It is most often performed on children who are having difficulty hearing or experiencing recurring ear infections. With the patient under general anesthesia, a surgeon inserts tubes through a cut made in the eardrum, and this equalizes pressure on either side, while allowing fluid to drain out. The tubes later fall out on their own and the cut in the eardrum heals.

Complications from this procedure include failure of the eardrum to heal, and general risks from anesthesia and surgery (reactions to medications, bleeding, and infections).

In 2006, over 668,000 patients under age 16 received this procedure, an increase of 35% from a decade earlier. This increase occurred despite a *decrease* in the rate of office visits for otitis media, the middle ear condition for which eardrum tubes are commonly prescribed.[1]

The Alliance found that children living in the Spokane area were more likely to receive eardrum procedures *compared to their peers elsewhere in the state*.

**Ear drum procedures for children in Spokane**

| GENDER | AGE | % MORE LIKELY TO HAVE EAR DRUM PROCEDURE |
|---|---|---|
| Girls | 1 year | 120% |
| Girls | 2–6 years | 100% |
| Boys | 1 year | 100% |
| Boys | 2–6 years | 90% |
| Boys | 7–11 years | 70% |



The Alliance estimates that current prices for an eardrum procedure in our region range from $1,100 to $4,600, with more extreme prices possible.

## Removal of Tonsils or Adenoids

The tonsils and adenoids are glands in the throat. Infected glands can be surgically removed, most typically for children suffering from persistent sore throats and sleeping difficulties. The procedure requires general anesthesia.

[1] Kerr, M. PAS 2009: Pediatric Tympanostomy Tube Use Steadily Rising; Trend Shows Significant Overuse. Medscape, May 6, 2009. Accessed July 20, 2016 at: http://www.medscape.com/viewarticle/702400

Complications from this procedure include general risks from anesthesia and surgery (reactions to medications, bleeding, damage to surrounding tissues and infections).

The debate over the appropriateness of tonsillectomy began nearly a century ago, when it was a routine childhood procedure. Over time, the clinical indications for tonsillectomy have been revisited and gradually clarified and narrowed. In this context, it is useful to examine how use rates vary today.

The Alliance found that children and adolescents living in the Puyallup and Spokane areas were more likely to have their tonsils/adenoids removed when compared to their peers elsewhere in the state.

The Alliance estimates that current prices for the removal of tonsils or adenoids in our region range from $1,200 to $4,800, with more extreme prices possible.

**Tonsils and adenoid removals for children in Puyallup and Spokane**

| PLACE OF RESIDENCE | GENDER | AGE | % MORE LIKELY TO HAVE TONSILS/ ADENOIDS REMOVED |
|---|---|---|---|
| Puyallup | Girls | 2–6 years | 50% |
| Puyallup | Girls | 12–19 years | 60% |
| Puyallup | Boys | 2–6 years | 40% |
| Puyallup | Boys | 7–11 years | 50% |
| Puyallup | Boys | 12–19 years | 60% |
| Spokane | Girls | 2–6 years | 80% |
| Spokane | Girls | 7–11 years | 50% |
| Spokane | Girls | 12–19 years | 40% |
| Spokane | Boys | 2–6 years | 100% |
| Spokane | Boys | 7–11 years | 50% |

## Sleep Apnea Testing

Sleep studies are tests, often performed in a hospital or sleep center, which measure how well a person sleeps and responds to sleep problems. During a sleep study, sensors are attached to the patient's body to measure and record detailed information during sleep, including such things as brain waves, heart rate, breathing rate and oxygen level.

Sleep tests can help doctors find out whether patients have sleep disorders and if so, how severe they are. The most common sleep disorder is obstructive sleep apnea, where breathing repeatedly stops or gets very shallow during sleep. Sleep studies are important because untreated sleep disorders can raise risks for heart disease, high blood pressure, stroke and other medical conditions.

During 2001-2009, Medicare payments to sleep testing providers quadrupled. During this time, a debate arose about potential overuse of sleep apnea testing. In 2012, the Washington State Health Care Authority reviewed sleep apnea diagnosis and treatment under its Health Technology Assessment program, clarifying the patient conditions for which coverage should apply.[2]

The Alliance found that among men and women at least 20 years old, higher rates of sleep apnea testing occur for residents of Everett, Olympia and Puyallup when compared to their peers elsewhere in the state.



**Sleep apnea testing for women in Everett, Olympia and Puyallup**

| PLACE OF RESIDENCE | AGE | % MORE LIKELY TO HAVE SLEEP APNEA TESTING |
|---|---|---|
| Everett | 20–44 years | 70% |
| Everett | 45–64 years | 30% |
| Olympia | 20–44 years | 50% |
| Olympia | 45–64 years | 40% |
| Puyallup | 20–44 years | 20% |
| Puyallup | 45–64 years | 30% |

The Alliance estimates that current prices for sleep apnea testing in our region range from $500 to $2,400, with more extreme prices possible. For some forms of sleep apnea, another option is a home sleep test, which is much less expensive. It is a modified sleep study that is self-administered in the patient's home.

[2] Washington State Health Care Authority. Health Technology Clinical Committee Findings and Decision, Sleep Apnea Diagnosis and Treatment. Meeting date, March 16, 2012. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/findings_decision_sleep_apnea.pdf.

## Spinal Injection

A spinal injection is the delivery of powerful anti-inflammatory medicine directly into the space outside of the sac of fluid around your spinal cord. Spinal injections are used in two ways: to diagnose the source of back, leg, neck or arm pain, and as a treatment to relieve pain. Most spinal injections are performed as one part of a more comprehensive treatment program. Simultaneous treatment nearly always includes an exercise program to improve or maintain spinal mobility and stability.

Clinical trials have found only modest evidence that the injections help relieve back pain. Evidence on the effectiveness of spinal injections varies by the condition being treated, the drug used and the injection technique.

Spinal injection risks include headaches resulting from the injection, and more rarely bleeding and infection. Taken over time, the steroidal drugs can result in reduced bone density, increased risk of bone fracture and a suppressed immune system. Steroids also are a common cause of adverse drug events during hospital stays.

Spinal injections for treatment of pain have come under scrutiny in recent years, as research has questioned or affirmed its efficacy in various clinical circumstances. In 2015, the Washington State Health Care Authority conducted a re-review of spinal injections under its Health Technology Assessment program, identifying certain patient conditions for which coverage should not apply.[3]

The Alliance found that women ages 20–44 living in Centralia, Olympia, Port Angeles and Shelton were much more likely to have spine injections compared to their peers elsewhere in the state. In contrast, Seattle women ages 20–44 were 40 percent *less* likely.

The Alliance estimates that current prices for a spinal injection in our region range from $260 to $1,900, with more extreme prices possible.

**Spine injection procedures for women**

| PLACE OF RESIDENCE | AGE | % MORE LIKELY TO RECEIVE SPINAL INJECTION |
|---|---|---|
| **Centralia** | **20–44 years** | **200%** |
| **Olympia** | **20–44 years** | **210%** |
| **Port Angeles** | **20–44 years** | **280%** |
| **Shelton** | **20–44 years** | **450%** |



[3] Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Spinal Injections. Meeting date, March 18, 2016. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/spinal_injections-rr_final_findings_decision_060216.pdf.

## Spine Fusion Surgery

Spinal fusion is surgery to permanently join two or more bones (vertebrae) in the spine so there is no movement between them. Spinal fusion is often done along with other surgical procedures of the spine. It is often used to treat injuries or fractures to the bones in the spine, weak or unstable spine caused by infections or tumors, spondylolisthesis (a condition in which one vertebrae slips forward on top of another), spinal stenosis (abnormal narrowing of the spinal canal) and abnormal curvatures, such as those from scoliosis and arthritis in the spine.

Spine fusion carries general risks of surgery such as infection and anesthesia reactions, but also risk of damage to a spinal nerve, causing weakness, pain, loss of sensation and problems with the bowels or bladder. Also, the vertebrae above and below the fusion are more likely to wear away, leading to more problems later and the potential need for more surgery.

Spine fusion cases and costs have been rising steadily for years. Globally, this market is estimated to be approaching $7 billion annually, with the U.S. accounting for about two-thirds. Payers such as Medicare have taken note and begun evaluating the efficacy of fusion to treat different back conditions. During 2007-2015, the Washington State Health Care Authority reviewed different types of spine fusion for treatment of degenerative disc disease under its Health Technology Assessment program, describing the clinical conditions for which coverage should and should not apply.[4]

The Alliance found that use of spine fusion surgery varies notably when comparing residents of Yakima and Seattle.

**Spine fusion surgeries in Yakima and Seattle**

| YAKIMA | | SEATTLE | |
|---|---|---|---|
| **Women, 45–64 years** | **70% *More* Likely** | **Women, 45–64 years** | **30% *Less* Likely** |
| **Men, 45–64 years** | **70% *More* Likely** | **Men, 45–64 years** | **50% *Less* Likely** |

The Alliance estimates that current prices for spine fusion surgery in our region range from $15,000 to $74,000, with more extreme prices possible.

[4] Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Lumbar Fusion for Degenerative Disc Disease. Meeting date, November 20, 2015. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/lumbar_fusion-rr_final_findings_decision_012016[1].pdf.

Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Cervical Spinal Fusion for Degenerative Disc Disease. Meeting date, March 22, 2013. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/csf_final_findings_decision_052013[1].pdf.

## Knee Replacement

Knee replacement is surgery for people with severe knee damage. Knee replacement can relieve pain and permit a more active lifestyle. Successful surgery can dramatically improve a patient's mobility and quality of life. Doctors may recommend it for knee pain when medicine and other treatments do not help. After a knee replacement, patients are typically no longer able to do certain activities, such as jogging and high-impact sports.

During a total knee replacement, the surgeon removes damaged cartilage and bone from the surface of your knee joint and replaces them with a synthetic surface of metal and plastic. In a partial knee replacement, the surgeon only replaces one part of the knee joint.

Knee replacement carries with it risk of significant side effects including pain, infection, adverse reactions to anesthesia and blood clots. In addition, there are risks of dislocation and implant failure. The variety of implants available on the market has proliferated, although data on the long-term quality or cost-effectiveness of most implants is lacking. Lured by heavy marketing as well as their own expectations for their health, patients are having joint replacement surgeries at younger ages. As a result, they are more likely to need additional surgery later when the implant itself wears out. Other less aggressive treatments are often available, and they can be tried first to see if surgery is necessary. These treatments include weight loss, anti-inflammatory medications, steroids, physical therapy and exercise.

A 2014 study in the journal *Arthritis and Rheumatology*[5] found that about 33 percent of knee replacements were inappropriate using a standardized classification system. In 2010, the Washington State Health Care Authority reviewed knee replacement under its Health Technology Assessment program, describing the clinical conditions for which coverage should and should not apply.[6]

The Alliance found that use of knee replacement surgery varies notably when comparing residents of Olympia and Bellingham. Specifically, Olympia women are 60 percent more likely to receive knee replacement surgery than women of the same age living elsewhere in the state.

**Knee replacement surgery for women ages 45–64**

| OLYMPIA | | BELLINGHAM | |
|---|---|---|---|
| **Women, 45–64 years** | **60% *More* Likely** | **Women, 45–64 years** | **30% *Less* Likely** |

[5] Riddle DL, Jiranek WA, Hayes CW. Use of a validated algorithm to judge the appropriateness of total knee arthroplasty in the United States: a multicenter longitudinal cohort study. Arthritis Rheumatol. 2014 Aug;66(8):2134-43. doi: 10.1002/art.38685.

[6] Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Total Knee Arthroplasty. Meeting date, October 22, 2010. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/findings_decision_tka_121010[1]_0.pdf.

The Alliance estimates that current prices for a knee replacement in our region range from $11,000 to $39,000, with more extreme prices possible.

## Upper GI Endoscopy

An upper GI (gastrointestinal) endoscopy is a procedure that uses a small, flexible tube with a light to see the lining of the upper GI tract. Typically, a gastroenterologist or surgeon performs the procedure. Upper GI endoscopies can help diagnose the causes of digestive symptoms, such as abnormal and prolonged nausea or vomiting, abdominal pain, difficulty swallowing and gastrointestinal bleeding.

The risks of an upper GI endoscopy include reaction to the medications used for sedation; bleeding from the biopsy site or where the health care provider removed a polyp; and perforation or small tear in the lining of the upper GI tract.

A 2015 study conducted at Massachusetts General Hospital determined that 38 percent of upper GI endoscopies were not supported by evidence-based guidelines.[7] In 2012, the Washington State Health Care Authority reviewed particular uses of this procedure under its Health Technology Assessment program, describing the clinical conditions for which coverage should apply.[8]

The Alliance found that among people under 20 years of age, higher rates of upper GI endoscopy testing occurred for residents of Olympia, Puyallup, Spokane and Tacoma. The range was from 40 to 220 percent more likely, depending on age, gender and location.



[7] Cai JX, Campbell, EJ, Richter, JM. Concordance of Outpatient Esophagogastroduodenoscopy of the Upper Gastrointestinal Tract with Evidence-Based Guidelines. JAMA Intern Med. 2015;175(9):1563-1564. doi:10.1001/jamainternmed.2015.3533.

[8] Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Upper Endoscopy for Gastroesophageal Reflux Disease (GERD) and Gastrointestinal (GI) Symptoms. Meeting date, May 18, 2012. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/ue_final_findings_decision_101212[1]_0.pdf

**Upper GI endoscopy testing for children**

| PLACE OF RESIDENCE | GENDER | AGE | % MORE LIKELY TO HAVE UPPER GI ENDOSCOPY TESTING |
|---|---|---|---|
| Olympia | Girls | 12–19 years | 90% |
| Puyallup | Girls | 12–19 years | 110% |
| Puyallup | Boys | 12–19 years | 110% |
| Spokane | Girls | 12–19 years | 40% |
| Spokane | Boys | 12–19 years | 40% |
| Tacoma | Girls | 12–19 years | 80% |
| Tacoma | Boys | 2–6 years | 220% |
| Tacoma | Boys | 7–11 years | 140% |
| Tacoma | Boys | 12–19 years | 70% |



The Alliance estimates that current prices for an upper GI endoscopy in our region range from $700 to $2,800, with more extreme prices possible.

## CT Scan

Computed tomography (CT) is a type of imaging. It uses special X-ray equipment to make cross-sectional pictures of the body. These cross-sectional images can be used to look for a number of things such as broken bones, cancers, blood clots, signs of heart disease and internal bleeding. CT scans can help diagnose a medical condition, or check the symptoms of an existing condition. They are quick and accurate, and often eliminate the need for invasive surgery.

CT scans use ionizing radiation, to which patients are exposed. This exposure may cause a small increase in a person's lifetime risk of developing cancer. Children are at greater risk from a build-up of radiation than adults are. There can also be possible reactions to the chemical agents that may be used to improve visualization. CT scans are not usually recommended for pregnant women because there is a small risk that they may harm the unborn child.

In the last several decades, the use of medical radiation in U.S. health care, particularly for imaging studies, has intensified significantly. Even within health maintenance organizations (HMOs) where the influence of fee-for-service incentives is weaker, radiation exposure is rapidly rising for millions

of patients. A recent study documented a doubling of per-patient exposure in an HMO from 1996-2000.[9]

The Alliance found that among people less than 20 years of age, higher rates of CT scanning occur for residents of Spokane in nearly all age and gender groups. Other areas with high use are Aberdeen, Anacortes, Kennewick, Port Angeles, Puyallup and Richland.

**CT scans for children and adolescents.**

| PLACE OF RESIDENCE | GENDER | AGE | % MORE LIKELY TO HAVE CT SCAN |
|---|---|---|---|
| Kennewick | Girls | 12–19 years | 80% |
| Kennewick | Boys | 7–11 years | 130% |
| Kennewick | Boys | 12–19 years | 30% |
| Puyallup | Girls | 2–6 years | 50% |
| Puyallup | Girls | 12–19 years | 20% |
| Puyallup | Boys | 12–19 years | 20% |
| Spokane | Girls | 2–6 years | 100% |
| Spokane | Girls | 7–11 years | 40% |
| Spokane | Girls | 12–19 years | 10% |
| Spokane | Boys | 1 year | 100% |
| Spokane | Boys | 2–6 years | 70% |
| Spokane | Boys | 7–11 years | 50% |
| Spokane | Boys | 12–19 years | 20% |



The Alliance estimates that current prices for a CT scan in our region range from $300 to $1,100, with more extreme prices possible.

## Chest X-ray

A chest X-ray is an X-ray of the chest, lungs, heart, large arteries, ribs and diaphragm. X-ray imaging exams are recognized as a valuable medical tool for a wide variety of examinations and procedures.

There are fewer risks associated with X-rays than other imaging tests. Chest X-rays are not particularly expensive, and the radiation dose is low. X-rays

[9] Bardi, J. Radiation Exposure From Medical Imaging Has Increased Even at HMOs.UCSF, June 12, 2012. Accessed July 20, 2016 at: https://www.ucsf.edu/news/2012/06/12146/radiation-exposure-medical-imaging-has-increased-even-hmos

are monitored to provide the minimum amount of radiation exposure needed to produce the image. Like other imaging, they can be used to noninvasively and painlessly help diagnosis disease and monitor therapy; support medical and surgical treatment planning; and guide medical personnel as they insert devices inside the body. However, pregnant women and children are more sensitive to the risks of X-rays.

## Despite their lower risk and cost, X-ray use can be indicative of a practice culture of excessive imaging that may exist in certain delivery systems.

For example, suppose we find a pattern of high chest X-ray use for all age and gender groups living in a particular locale. Moreover, suppose we see this pattern for CT scans as well. Together, these patterns could point to a local practice culture more inclined to order imaging tests.

The Alliance found that among one-year-old children, there were 11 residential areas with high use of chest X-rays. The higher use ranges from 20 to 180 percent more likely compared to one-year-olds living elsewhere in the state. The 11 areas are Aberdeen, Bellingham, Bremerton, Centralia, Kennewick, Olympia, Port Angeles, Puyallup, Renton, Tacoma and Walla Walla.

- Aberdeen one-year-olds have the highest use for both girls and boys. Girls were 180 percent more likely to get chest X-rays. Boys were 100 percent more likely.
- This contrasts with Bellevue 1-year-old girls, who were 40 percent *less* likely to get chest X-rays.

The Alliance also found ten residential areas with high use of chest X-rays for most or all of the six age groups, spanning age one through 64:

- High rates in four of six age groups: Bremerton, Centralia, Puyallup
- High rates in five of six age groups: Aberdeen, Everett, Olympia, Port Angeles, Renton, Shelton
- High rates in six of six age groups: Tacoma

The Alliance estimates that current prices for a chest X-ray in our region range from $25 to $100, with more extreme prices possible.

### Electrocardiogram

An electrocardiogram, also called an EKG or ECG, is a simple, painless test that records the heart's electrical activity. An EKG shows how fast the heart is beating, whether the heartbeat rhythm is steady or irregular, as well as the strength and timing of electrical signals as they pass through each part of the heart. Doctors use EKGs to detect and study many heart problems, such as heart attacks, arrhythmias, and heart failure. EKG results also can suggest other disorders that affect heart function.

For people without symptoms of heart disease, EKGs can produce false findings. Known as false positives, they can lead to more testing and potentially unnecessary clinical procedures, which can be both risky and expensive. This is among the reasons why unnecessary EKGs are a specific focus of the Choosing Wisely® campaign to reduce overuse of health services.

The Alliance found that residents of Olympia were more likely to receive EKGs compared to their peers elsewhere in the state. This pattern holds for every age and gender group from age 2 to 64.

**EKG procedures for people living in Olympia.**

| GENDER | AGE | % MORE LIKELY TO HAVE AN ELECTROCARDIOGRAM (EKG) |
|---|---|---|
| Girls | 2–6 years | 60% |
| Girls | 7–11 years | 30% |
| Girls | 12–19 years | 40% |
| Women | 20–44 years | 30% |
| Women | 45–64 years | 40% |
| Boys | 2–6 years | 30% |
| Boys | 7–11 years | 50% |
| Boys | 12–19 years | 50% |
| Men | 20–44 years | 20% |
| Men | 45–64 years | 20% |



The Alliance estimates that current prices for an electrocardiogram in our region range from $15 to $60, with more extreme prices possible.

## Diagnostic Cardiac Catheterization

Diagnostic cardiac catheterization is a procedure used to detect some heart conditions such as a buildup of plaque in heart arteries. A long, thin, flexible tube called a catheter is put into a blood vessel in your arm, upper thigh, or neck, and threaded to your heart. Through the catheter, your doctor can do diagnostic tests on your heart. Doctors also can use X-rays and ultrasound during cardiac catheterization to see blockages in heart arteries.

Cardiac catheterization rarely causes serious problems. However, complications can include bleeding, infection and pain at the catheter insertion site; damage to blood vessels; and allergic reactions to the dye sometimes used with this procedure. Other, less common complications

include irregular heartbeat, low blood pressure, blood clots, fluid buildup around the heart and kidney damage caused by the dye.

As with any procedure involving the heart, complications sometimes can be fatal. However, this is rare with cardiac catheterization. The risks of cardiac catheterization are higher in people who are older and in those who have certain diseases or conditions (such as chronic kidney disease and diabetes).

A 2010 study of a large national registry[10] found that 30 percent of patients receiving diagnostic cardiac catheterizations were asymptomatic. The authors suggest that the clinical threshold for using this invasive test in apparently healthy patients should be revisited and raised.

The Alliance found that use of diagnostic cardiac catheterization varies notably among men.

- Olympia men ages 45-64 were 40 percent more likely to receive a diagnostic cardiac catheterization, compared to their peers elsewhere in the state. Their peers living in Tacoma were 30 percent more likely.
- In contrast, men of this age living in Seattle and Spokane were 20 percent *less* likely to have this procedure.

The Alliance estimates that current prices for a diagnostic cardiac catheterization in our region range from $3,000 to $13,700, with more extreme prices possible.



## Hysterectomy

Hysterectomy is a surgical operation to remove all or parts of a woman's uterus. It is most often performed to treat abnormal uterine bleeding, benign tumors or pain between and/or during menstrual periods. Non-surgical options have varying success rates. Some may be quite successful in relieving symptoms and others not so.

Hysterectomy carries with it a high patient satisfaction rate when used to treat significant and prolonged abnormal bleeding and painful periods. Its use to treat other types of pelvic area pain may not always be as successful. Watchful waiting or other non-surgical options should be seriously considered before surgical management of an issue is pursued.

Hysterectomy carries the risks of bladder or bowel injury, excessive post-surgical bleeding and complications from anesthesia. The procedure also makes a woman infertile.

Evidence[11] that many of the hysterectomies performed are not necessary is ample. A recent study of almost 3,400 women receiving this surgery at 52 hospitals nationwide produced two troubling findings:

[10] Patel MR, Peterson ED, Dai D, Brennan JM, Redberg RF, Anderson HV, Brindis RG, Douglas PS. Low Diagnostic Yield of Elective Coronary Angiography. N Engl J Med 2010; 362:886-895.

[11]Corona, Lauren E., et al. Use of other treatments before hysterectomy for benign conditions in a statewide hospital collaborative. American Journal of Obstetrics & Gynecology, 40th Annual Scientific Meeting of the Society of Gynecologic Surgeons; March 23-26, 2014. Accessed July 20, 2016 at: http://www.ajog.org/article/S0002-9378(14)02355-2/abstract

1. About 38 percent had no documentation of alternative treatment before undergoing the hysterectomy.
2. About 18 percent of the women undergoing hysterectomy did not meet the pathological conditions for receiving one.

The Alliance found that women living in the Puyallup area were more likely to receive a hysterectomy compared to their peers elsewhere in the state. Puyallup women ages 20–44 were 90 percent more likely to receive the surgery. This contrasts with Seattle 20–44 year olds, who were 50 percent *less* likely to receive one.

The Alliance estimates that current prices for a hysterectomy in our region range from $5,800 to $23,000, with more extreme prices possible.

## Oophorectomy

Oophorectomy is a surgical operation to remove one or both of a woman's ovaries. Among the reasons for ovary removal is to eliminate benign tumors, treat ovarian cancer, or to decrease the possibility of cancer in certain at-risk women.

Oophorectomy carries the risks of injury to surrounding organs, post-surgical bleeding, infection, and complications from anesthesia. The procedure may make a woman infertile depending on the extent of the surgery and other considerations.



Oophorectomy often occurs during a hysterectomy. It is included in this analysis to be viewed alongside hysterectomy use patterns.

As in the case of hysterectomy, the Alliance found that women living in the Puyallup area were more likely to receive an oophorectomy compared to their peers elsewhere in the state. Puyallup women ages 20–44 were 50 percent more likely to receive the surgery. This contrasts with Seattle 20–44 year olds, who were 40 percent *less* likely to receive one.

The Alliance estimates that current prices for an oophorectomy in our region range from $1,800 to $7,500, with more extreme prices possible.

## Tubal Ligation

Tubal ligation is a surgical procedure in which a doctor cuts, ties or seals the fallopian tubes. This procedure blocks the path between the ovaries and the uterus. Tubal ligation is a permanent form of birth control that prevents a woman from getting pregnant. These procedures usually are not reversible.

Risks associated with tubal ligation include adverse reactions to anesthesia, bleeding, damage to surrounding organs and blood vessels, problems with wound healing and post-surgical infection.

Unusual rates of tubal ligation might indicate opportunities for improving the process of informing patients about treatment options. Not all contraceptive methods are appropriate for all situations, and the most appropriate method of birth control depends on a person's overall health, age, frequency of sexual activity, number of sexual partners, desire to have children in the future and family history of certain diseases. Patient should

consult their health care providers to determine which method of birth control is best for them.

The Alliance found differences in use of tubal ligation when comparing women living in the metropolitan Puget Sound region (Bellevue, Edmonds, Kirkland and Seattle) with women living elsewhere in the state.

- Metro Puget Sound area: women aged 45-64 were *less* likely to receive tubal ligation
- Elsewhere in the state: women aged 45-64 were *more* likely to receive tubal ligation
- The greatest difference exists between Port Angeles women (140 percent *more* likely) and Kirkland women (50 percent *less* likely)

The Alliance estimates that current prices for a tubal ligation in our region range from $1,500 to $5,800, with more extreme prices possible.

## Breast Biopsy

A breast biopsy procedure obtains a tissue sample on which further lab tests occur. It is typically done when a breast lump is found, or when following up on an abnormality found during a mammography screening. The lab tests strive to determine the nature of the mass, whether it is cancerous, and if so the characteristics of the cancer. These elements are important for creating a treatment plan, should one be needed.



A breast biopsy may result in bruising, bleeding and possibly infection. These can vary, in part because there are different methods for acquiring the tissue sample.

Not all anomalies in breast tissue require a biopsy. Overuse of breast biopsy can contribute to over-diagnosis of breast cancer. In over-diagnosis, women receive a cancer diagnosis and undergo cancer treatment, but the suspicious cells would not have led to symptoms or disease. Over-diagnosis occurs because researchers have not yet determined how to distinguish between suspicious cells requiring treatment and those for which monitoring would be appropriate.

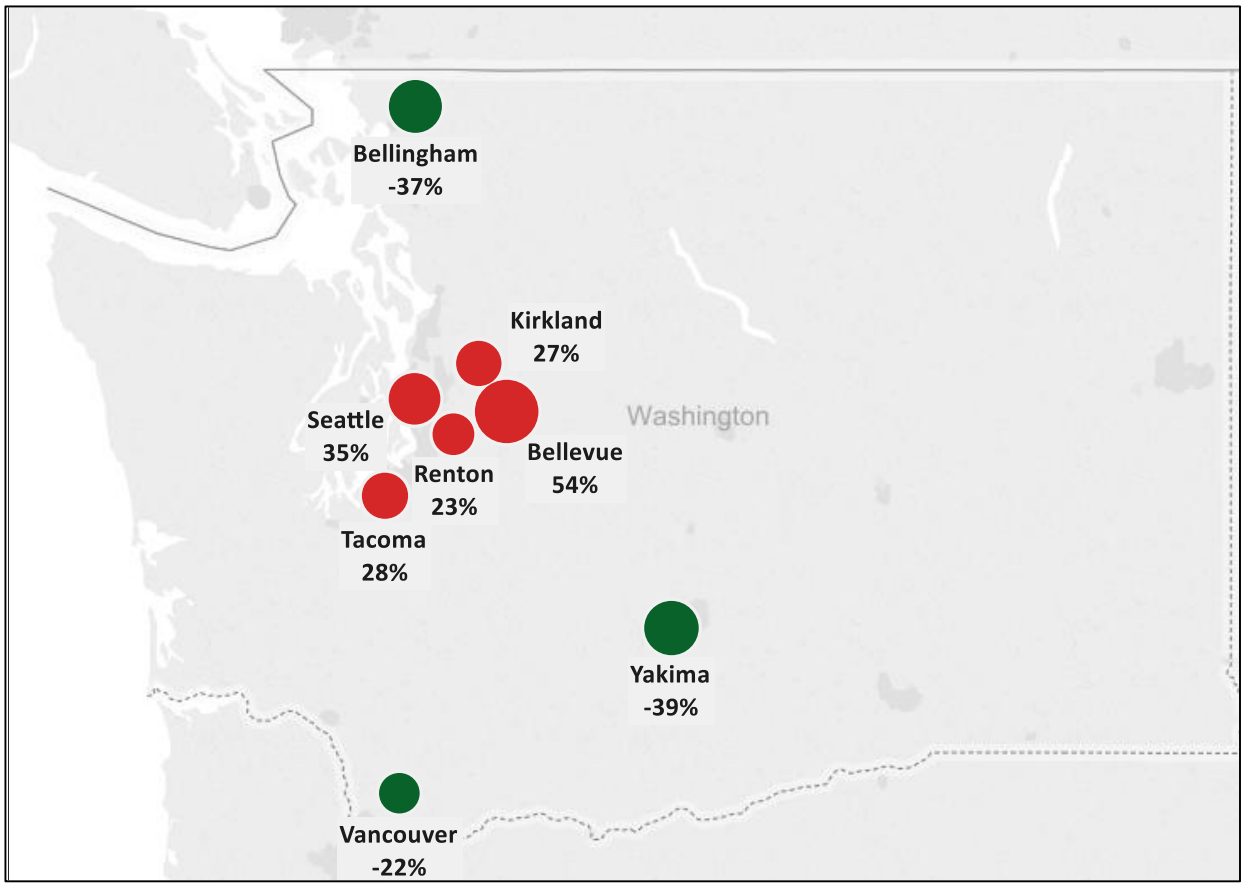
The Alliance found differences in use of breast biopsy when comparing women living in the Bellingham with those living in the Bellevue, Kirkland or Seattle areas.

- Bellingham women aged 45–64 were 40 percent *less* likely to receive breast biopsy when compared to their peers elsewhere in the state.
- The reverse pattern appears for residents of Bellevue (50 percent more likely), Kirkland (30 percent more likely), and Seattle (40 percent more likely).

**Variation of rates of breast biopsies**

*Size of bubbles indicates divergence from state average.*

Above state average  Below state average




The Alliance estimates that current prices for a breast biopsy in our region range from $1,000 to $3,800, with more extreme prices possible.

## C-Section

A Cesarean section (C-section) is surgery to deliver a baby. The baby is taken out through the mother's abdomen. In the United States, about one in four women have their babies this way. Many, but not all, C-sections are done when unexpected problems happen during delivery. However, some C-sections scheduled in advance are thought to be done solely for the convenience of the mother or provider.

When used appropriately and when medically necessary, a C-section can be lifesaving. C-sections can help women at risk for complications avoid dangerous delivery-room situations and can save the life of the mother and/or baby when emergencies occur.

A C-section carries all the risks of major surgery as well as increased bleeding, infection, bladder or bowel injury, reactions to medications,

blood clots, possible injury to the baby and very rarely death. Babies born by C-section sometimes have breathing problems after birth. Having a C-section may or may not affect future pregnancies and deliveries.

There is widespread agreement that this procedure is overused. Many initiatives in our state aim to track and reduce unnecessary C-sections. Typically, these involve comparisons of C-section rates between hospitals. This report takes a different perspective, depicting the residential areas where pregnant women are most and least likely to deliver via C-section.

The Alliance found that women giving birth aged 20–44 who live in the metropolitan Puget Sound region had C-sections more often compared to their peers living elsewhere in the state.

Percent of births delivered by C-section, by patient residential area:

- *More* likely to receive C-section: Bellevue 31 percent, Kirkland 29 percent, Renton 28 percent
- *Less* likely to receive C-section: Yakima 15 percent, Moses Lake 15 percent, Pasco 19 percent

The Alliance estimates that current prices for a C-section in our region range from $6,400 to $18,000, with more extreme prices possible.

## Bariatric Surgery (Weight Loss Surgery)



Bariatric or weight loss surgery helps people with extreme obesity to lose weight. It may be an option for people who cannot lose weight through diet and exercise or have serious health problems caused by obesity.

There are different types of weight loss surgery. They often limit the amount of food a person can take in. Patients who have bariatric surgery must commit to a lifetime of healthy eating and regular exercise. Some types of surgery also affect how you digest food and absorb nutrients. Many people who have the surgery lose weight quickly, but regain some weight later on. Bariatric patients also need medical follow-up for the rest of their lives.

All types of bariatric surgery have risks and complications, such as bleeding, infections, leaks where the intestines are sewn together, hernias, blood clots and diarrhea. Side effects that may occur later include narrowing the intestines at the surgical site, and nutrients being poorly absorbed, which can lead to damage to the nervous system. Some patients may also require emotional support to help them through the changes in body image and personal relationships that occur after the surgery.

Physicians on the Alliance's Quality Improvement Committee urged Alliance staff to be alert for increases in use of bariatric surgery, a trend they have been predicting. In 2015, the Washington State Health Care Authority reviewed bariatric surgery under its Health Technology

Assessment program, identifying certain patient conditions for which coverage should not apply.[12]

The Alliance is beginning to see differences in the use of this surgery. In particular, people living in the Everett area were more likely to receive bariatric surgery compared to their peers elsewhere in the state. This pattern emerged in particular for women.

- Women ages 20-44 were 260 percent more likely to receive the surgery.
- Women ages 45-64 were 160 percent more likely to receive the surgery; in contrast, Seattle women of this age were 40 percent *less* likely.

The Alliance estimates that current prices for bariatric surgery in our region range from $7,000 to $30,000, with more extreme prices possible.



[12] Washington State Health Care Authority. Health Technology Clinical Committee Draft Findings and Decision, Bariatric Surgery. Meeting date, May 15, 2015. Accessed July 20, 2016 at: https://www.hca.wa.gov/assets/program/bariatric_final_findings_decision_071015.pdf

# Tables of Detailed Results

These tables provide information for all 21 procedures in this report. Beginning with the second table, each table shows the percentage of people receiving at least one instance of a particular service during the year.

- Red-shaded cells indicate local rates are statistically higher than the adjusted state rates.
- Green-shaded cells indicate local rates are statistically lower than the adjusted state rates.
- Gray-shaded cells indicate local rates are statistically similar to the adjusted state rates.
- Blank cells point out where numerator minimums (30) were not met.

Because each cell's calculation and result is independent of every other cell, patterns that span multiple age and/or gender cohorts within a Health Service Area (HSA) are particularly noteworthy. These could point to residential areas with substantially higher illness burdens, and/or communities serviced by organizations with variant practice cultures.

- Eardrum procedure
- Removal of tonsils or adenoids
- Sleep apnea testing
- Spinal injection
- Spine surgery
- Spine fusion surgery
- Knee replacement
- Upper GI endoscopy
- CT scan
- Chest X-ray
- Electrocardiogram (EKG)
- Diagnostic Cardiac Catheterization
- Hysterectomy
- Oophorectomy
- Tubal ligation
- Breast biopsy
- C-section
- Bariatric surgery
- Lumpectomy
- Mastectomy
- Fetal monitoring

This claims-based analysis cannot distinguish which of these factors could be at work. Therefore, a practical use for these results is to identify specific procedures and communities for further, focused inquiry by providers, purchasers and other interested parties.

## Eardrum procedure

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | 0.4% | 0.4% | | | | | | | 0.1% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | 1.0% | | | | | | | | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | | | | |
| | Bellingham | | | | 0.7% | | | | | | | | |
| | Bremerton | | | | 0.7% | | | | | | | | |
| | Edmonds | | | | | | | | | | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | 0.4% | | | | | | | | |
| | Seattle | | 1.0% | 0.2% | 0.4% | | | | | | 0.0% | 0.1% | 0.0% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | 2.1% | 2.8% | 0.6% | 1.0% | | 0.2% | | | | | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | 0.5% | 0.8% | | | | | | | | |
| | Tacoma | | 1.6% | 0.4% | 0.5% | | | | | | | | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | 0.6% | | | | | | | | |

## Removal of tonsils or adenoids

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | 0.5% | 0.5% | 0.3% | 0.3% | 0.3% | 0.1% | 0.1% | | | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | 0.8% | | | | | | | | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | 0.5% | 0.8% | 0.4% | 0.4% | 0.3% | | | | | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | 0.6% | 0.5% | | | | | | | | |
| | Bellingham | | | | 0.7% | | 0.4% | | | | | | |
| | Bremerton | | | | 0.6% | | | | | | | | |
| | Edmonds | | | | | | | | | | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | 0.5% | 0.6% | 0.3% | 0.5% | 0.2% | 0.2% | | | | |
| | Seattle | | | 0.4% | 0.5% | 0.2% | 0.2% | 0.2% | 0.1% | 0.0% | 0.0% | | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | 0.9% | 1.2% | 0.5% | 0.4% | 0.3% | 0.1% | 0.1% | 0.0% | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | 0.7% | 1.0% | | | | | | | | |
| Tacoma | Puyallup | | | 0.8% | 0.9% | 0.3% | 0.4% | 0.4% | 0.2% | 0.1% | | | |
| | Tacoma | | | 0.6% | 0.6% | 0.3% | 0.3% | 0.2% | 0.1% | 0.1% | | | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | 0.5% | 0.7% | | | | | | | | |

## Sleep apnea testing

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | 0.5% | 0.8% | 1.1% |
| | Coupeville | | | | | | | | | | | 0.6% | 1.0% |
| | Everett | | | | | | 0.4% | 0.3% | 0.2% | 0.4% | 0.5% | 0.9% | 1.1% |
| | Monroe | | | | | | | | | 0.4% | 0.4% | 0.7% | 0.9% |
| | Mount Vernon | | | | | | | | | 0.2% | 0.4% | 0.8% | 0.9% |
| Olympia | Centralia | | | | | | | | | | 0.3% | 0.8% | 0.7% |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | 0.2% | 0.2% | 0.3% | 0.4% | 0.9% | 1.2% |
| | Shelton | | | | | | | | | | | 0.8% | 0.8% |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | 0.6% | 0.7% |
| | Vancouver | | | | | | | | | 0.1% | 0.2% | 0.5% | 0.6% |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | 0.8% | 0.9% |
| | Auburn | | | | | | | | | 0.3% | 0.3% | 0.8% | 0.9% |
| | Bellevue | | | | | | | 0.3% | | 0.2% | 0.4% | 0.6% | 1.0% |
| | Bellingham | | | | | | | | | 0.2% | 0.2% | 0.4% | 0.7% |
| | Bremerton | | | | | | | | | 0.2% | 0.3% | 0.8% | 0.9% |
| | Edmonds | | | | | | | | | 0.3% | 0.4% | 1.0% | 1.0% |
| | Enumclaw | | | | | | | | | | | 0.7% | 1.2% |
| | Federal Way | | | | | | | | | | 0.2% | 0.8% | 0.9% |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 0.2% | 0.4% | 0.6% | 1.0% |
| | Port Angeles | | | | | | | | | | | 1.0% | 1.0% |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | 0.3% | 0.3% | 0.2% | 0.2% | 0.4% | 0.6% | 0.9% |
| | Seattle | | | 0.1% | 0.1% | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% | 0.3% | 0.7% | 0.8% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 0.2% | 0.4% | 0.7% | 0.8% |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | 0.3% | 0.7% | 0.7% |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 0.3% | 0.4% | 0.7% | 0.9% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | 0.2% | 0.1% | 0.1% | 0.2% | 0.2% | 0.4% | 0.4% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | 0.4% | 0.5% | 0.6% |
| | Wenatchee | | | | | | | | | 0.1% | 0.2% | 0.5% | 0.6% |
| Tacoma | Puyallup | | | | | | | 0.3% | 0.2% | 0.3% | 0.4% | 0.9% | 1.2% |
| | Tacoma | | | | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.3% | 0.3% | 0.8% | 0.8% |
| Yakima | Ellensburg | | | | | | | | | | | 0.6% | 0.8% |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 0.2% | 0.2% | 0.5% | 0.8% |

## Spinal injection

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | 0.7% | |
| | Arlington | | | | | | | | | | | 0.7% | 0.6% |
| | Coupeville | | | | | | | | | | | 0.7% | 0.8% |
| | Everett | | | | | | | | | 0.2% | 0.1% | 0.7% | 0.7% |
| | Monroe | | | | | | | | | | | 0.7% | 0.9% |
| | Mount Vernon | | | | | | | | | 0.2% | | 0.7% | 0.6% |
| Olympia | Centralia | | | | | | | | | 0.5% | | 0.7% | 0.6% |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.5% | 0.2% | 0.8% | 0.8% |
| | Shelton | | | | | | | | | 0.9% | | 0.7% | 0.8% |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | 0.6% | |
| | Vancouver | | | | | | | | | | | 0.5% | 0.4% |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | 0.6% |
| | Auburn | | | | | | | | | | | 0.8% | 0.6% |
| | Bellevue | | | | | | | | | 0.1% | 0.1% | 0.6% | 0.6% |
| | Bellingham | | | | | | | | | 0.1% | 0.1% | 0.5% | 0.4% |
| | Bremerton | | | | | | | | | 0.1% | 0.1% | 0.8% | 0.8% |
| | Edmonds | | | | | | | | | 0.2% | 0.2% | 0.7% | 0.7% |
| | Enumclaw | | | | | | | | | | | 1.0% | 1.0% |
| | Federal Way | | | | | | | | | | | 0.7% | 0.4% |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 0.1% | 0.2% | 0.8% | 0.6% |
| | Port Angeles | | | | | | | | | 0.7% | | 0.5% | 0.5% |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.1% | 0.1% | 0.7% | 0.6% |
| | Seattle | | 0.7% | | | | | | | 0.1% | 0.1% | 0.6% | 0.5% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 0.2% | | 0.7% | 0.5% |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | 0.8% | 0.6% |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 0.2% | | 0.9% | 0.6% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.2% | 0.1% | 0.6% | 0.6% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | 0.6% |
| | Wenatchee | | | | | | | | | | | 0.3% | 0.3% |
| Tacoma | Puyallup | | | | | | | | | 0.2% | 0.2% | 0.9% | 0.8% |
| | Tacoma | | | | | | | | | 0.2% | 0.1% | 0.6% | 0.5% |
| Yakima | Ellensburg | | | | | | | | | | | | 0.7% |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 0.2% | 0.1% | 0.7% | 0.5% |

## Spine surgery

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.1% | 0.1% | 0.3% | 0.3% |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | 0.2% | 0.2% |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | 0.3% | 0.3% |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | 0.2% | 0.3% |
| | Bellevue | | | | | | | | | | | 0.2% | 0.2% |
| | Bellingham | | | | | | | | | | | 0.2% | 0.2% |
| | Bremerton | | | | | | | | | | | 0.2% | 0.3% |
| | Edmonds | | | | | | | | | | | 0.2% | 0.2% |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | 0.2% | 0.2% |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.1% | 0.1% | 0.3% | 0.3% |
| | Seattle | | | | | | | | | 0.0% | 0.0% | 0.2% | 0.1% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.0% | 0.0% | 0.2% | 0.2% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | 0.1% | 0.1% | 0.3% | 0.3% |
| | Tacoma | | | | | | | | | 0.1% | 0.0% | 0.2% | 0.2% |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | 0.3% | 0.3% |

## Spine fusion surgery

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | | | 0.1% | 0.1% |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | 0.2% | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | 0.2% | 0.2% |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | | | 0.1% | 0.1% |
| | Bellingham | | | | | | | | | | | | |
| | Bremerton | | | | | | | | | | | 0.1% | 0.1% |
| | Edmonds | | | | | | | | | | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | 0.1% | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | 0.2% | 0.1% |
| | Seattle | | | | | | | | | | | 0.1% | 0.1% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | | | 0.1% | 0.1% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | 0.2% | 0.1% |
| | Tacoma | | | | | | | | | | | 0.1% | 0.1% |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | 0.2% | 0.2% |

## Knee replacement

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | | | 0.2% | 0.1% |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | 0.3% | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | 0.3% | 0.2% |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | | | 0.2% | 0.1% |
| | Bellingham | | | | | | | | | | | 0.1% | 0.1% |
| | Bremerton | | | | | | | | | | | 0.2% | 0.2% |
| | Edmonds | | | | | | | | | | | 0.2% | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | 0.2% | 0.1% |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | 0.2% | 0.2% |
| | Seattle | | | | | | | | | | | 0.2% | 0.1% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | | | 0.2% | 0.1% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | 0.2% | 0.2% |
| | Tacoma | | | | | | | | | | | 0.1% | 0.1% |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | 0.2% | 0.2% |

## Upper GI endoscopy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | 0.9% | |
| | Arlington | | | | | | | | | 0.6% | | 1.8% | 1.1% |
| | Coupeville | | | | | | | | | 0.4% | | 1.0% | 1.1% |
| | Everett | | | | | | | 0.2% | | 0.5% | 0.3% | 1.4% | 1.2% |
| | Monroe | | | | | | | | | | | 1.1% | 0.7% |
| | Mount Vernon | | | | | | | | | 0.3% | 0.2% | 1.3% | 0.8% |
| Olympia | Centralia | | | | | | | | | 0.3% | | 1.3% | 0.7% |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | 0.4% | 0.2% | 0.4% | 0.3% | 1.4% | 1.1% |
| | Shelton | | | | | | | | | 0.5% | | 0.8% | 1.0% |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | 0.7% | 0.6% |
| | Vancouver | | | | | | | | | 0.1% | 0.1% | 0.6% | 0.5% |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | 0.3% | | 0.9% | 0.7% |
| | Auburn | | | | | | | | | 0.4% | 0.2% | 1.5% | 1.2% |
| | Bellevue | | | | | | | | | 0.3% | 0.2% | 1.1% | 0.8% |
| | Bellingham | | | | | | | | | 0.3% | 0.3% | 1.1% | 0.9% |
| | Bremerton | | | | | | | | | 0.3% | 0.2% | 1.3% | 0.8% |
| | Edmonds | | | | | | | | | 0.4% | 0.3% | 1.3% | 1.3% |
| | Enumclaw | | | | | | | | | | | 1.7% | 2.2% |
| | Federal Way | | | | | | | | | 0.3% | | 1.4% | 0.8% |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 0.3% | 0.3% | 1.2% | 0.8% |
| | Port Angeles | | | | | | | | | 0.4% | | 0.8% | 0.6% |
| | Port Townsend | | | | | | | | | | | 0.8% | |
| | Renton | | | | | | | 0.2% | | 0.4% | 0.3% | 1.5% | 1.0% |
| | Seattle | | | | | | | 0.1% | 0.1% | 0.3% | 0.3% | 1.2% | 0.9% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 0.5% | 0.3% | 1.6% | 1.3% |
| | Moses Lake | | | | | | | | | | | 0.8% | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | 0.4% | 0.3% | 2.0% | 1.6% |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 0.5% | 0.4% | 1.6% | 1.6% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | 0.3% | 0.2% | 0.4% | 0.2% | 1.1% | 0.8% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | 0.4% | 0.4% | 1.6% | 1.1% |
| | Wenatchee | | | | | | | | | 0.3% | 0.2% | 0.6% | 0.6% |
| Tacoma | Puyallup | | | | | | | 0.4% | 0.3% | 0.6% | 0.3% | 1.7% | 1.2% |
| | Tacoma | | | | 0.2% | | 0.2% | 0.3% | 0.2% | 0.5% | 0.3% | 1.4% | 0.9% |
| Yakima | Ellensburg | | | | | | | | | | | 1.2% | 0.7% |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | 1.0% | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 0.3% | 0.2% | 0.9% | 0.6% |

## CT scan

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | 1.0% | 0.7% | 3.0% | 2.6% |
| | Arlington | | | | | | | | 1.5% | 1.5% | 1.5% | 3.9% | 3.6% |
| | Coupeville | | | | | | | | | 1.2% | 0.9% | 3.4% | 3.0% |
| | Everett | | | 0.4% | 0.5% | 0.4% | 0.4% | 1.0% | 1.2% | 1.5% | 1.3% | 3.7% | 3.3% |
| | Monroe | | | | | | | | | 1.7% | 1.1% | 3.0% | 2.5% |
| | Mount Vernon | | | | | | | 1.1% | 1.1% | 1.2% | 0.9% | 3.2% | 2.6% |
| Olympia | Centralia | | | | | | | 1.1% | 1.1% | 1.4% | 0.6% | 2.9% | 2.4% |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | 0.4% | | 0.3% | 1.0% | 1.2% | 1.5% | 1.0% | 3.9% | 3.2% |
| | Shelton | | | | | | | | 1.5% | 1.4% | 0.7% | 2.9% | 2.6% |
| | South Bend | | | | | | | | | | | 2.8% | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | 0.6% | 0.7% | 0.6% | 2.2% | 1.6% |
| | Vancouver | | | | | | | 0.4% | 0.5% | 0.6% | 0.5% | 1.7% | 1.3% |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | 1.3% | 1.8% | 1.2% | 0.8% | 2.8% | 2.6% |
| | Auburn | | | | | | | 1.1% | 1.3% | 1.4% | 0.8% | 3.7% | 3.0% |
| | Bellevue | | | | | | 0.4% | 0.8% | 1.1% | 1.0% | 0.9% | 2.7% | 2.4% |
| | Bellingham | | | | | 0.5% | 0.5% | 0.8% | 1.0% | 1.0% | 0.8% | 2.2% | 1.9% |
| | Bremerton | | | | | | | 0.8% | 0.9% | 1.1% | 0.8% | 3.2% | 2.8% |
| | Edmonds | | | | | | | 0.8% | 1.1% | 1.1% | 0.9% | 3.1% | 2.7% |
| | Enumclaw | | | | | | | | | 1.1% | 1.0% | 4.1% | 3.4% |
| | Federal Way | | | | | | | 0.9% | 0.7% | 1.1% | 0.8% | 3.7% | 2.8% |
| | Forks | | | | | | | | | 2.5% | | | |
| | Kirkland | | | | | | | 1.0% | 0.9% | 1.1% | 0.8% | 3.2% | 2.4% |
| | Port Angeles | | | | | | | | 1.4% | 1.5% | 0.8% | 2.5% | 2.5% |
| | Port Townsend | | | | | | | | | | | 1.9% | 1.7% |
| | Renton | | | | 0.5% | 0.3% | 0.4% | 1.1% | 1.0% | 1.3% | 0.9% | 3.5% | 3.0% |
| | Seattle | | | 0.2% | 0.3% | 0.2% | 0.3% | 0.8% | 0.9% | 1.0% | 0.9% | 2.9% | 2.5% |
| Spokane | Brewster | | | | | | | | | | | 2.1% | 1.9% |
| | Chelan | | | | | | | | | | | | 2.0% |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | 1.7% | | 2.6% | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | 2.0% | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | 0.9% | 1.7% | 1.4% | 1.5% | 0.8% | 2.8% | 2.4% |
| | Moses Lake | | | | | | | | | 0.8% | 0.5% | 2.0% | 1.6% |
| | Omak | | | | | | | | | 1.4% | | 2.0% | 2.0% |
| | Othello | | | | | | | | | | | 2.2% | 2.3% |
| | Pasco | | | | | | | 0.7% | 1.3% | 1.3% | 0.8% | 3.4% | 2.6% |
| | Pullman | | | | | | | | | 0.9% | 0.7% | 2.8% | 2.4% |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | 1.6% | 1.3% | 1.7% | 1.1% | 3.1% | 2.9% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | 1.5% | 0.6% | 0.7% | 0.4% | 0.6% | 1.0% | 1.2% | 1.1% | 0.7% | 2.4% | 1.9% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | 1.2% | 1.0% | 1.2% | 0.8% | 2.5% | 2.1% |
| | Wenatchee | | | | | | | 0.7% | 0.9% | 0.6% | 0.5% | 2.1% | 1.7% |
| Tacoma | Puyallup | | | 0.5% | 0.6% | 0.4% | 0.5% | 1.1% | 1.3% | 1.7% | 1.2% | 3.8% | 3.4% |
| | Tacoma | | | 0.3% | 0.3% | 0.2% | 0.4% | 0.9% | 1.0% | 1.7% | 1.0% | 3.7% | 2.8% |
| Yakima | Ellensburg | | | | | | | | 1.4% | 1.2% | 0.8% | 3.3% | 3.0% |
| | Prosser | | | | | | | | | | | 3.0% | 2.6% |
| | Sunnyside | | | | | | | 0.9% | 0.9% | 1.1% | 0.7% | 3.0% | 2.2% |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | 0.4% | 0.9% | 1.0% | 1.0% | 0.7% | 2.6% | 2.1% |

## Chest X-ray

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | 1.2% | 1.2% | 3.8% | 3.3% |
| | Arlington | | | 3.2% | | | | 1.5% | 1.6% | 2.3% | 1.7% | 6.5% | 5.3% |
| | Coupeville | | | | | | | | | 1.5% | 1.6% | 4.8% | 4.4% |
| | Everett | 6.5% | 8.0% | 3.1% | 3.2% | 1.4% | 1.6% | 1.9% | 1.7% | 2.5% | 2.2% | 5.6% | 5.5% |
| | Monroe | | | 3.5% | 3.3% | | | 1.8% | 1.3% | 2.5% | 1.9% | 5.2% | 4.7% |
| | Mount Vernon | 6.4% | 7.9% | 2.6% | 3.0% | 1.3% | 1.6% | 1.6% | 1.7% | 1.9% | 1.5% | 4.4% | 4.5% |
| Olympia | Centralia | | 12.2% | 2.4% | 3.0% | | 1.4% | 2.3% | 1.8% | 2.4% | 1.5% | 5.2% | 4.3% |
| | Morton | | | | | | | | | | | | |
| | Olympia | 8.7% | 8.9% | 3.0% | 3.2% | 1.3% | 1.6% | 2.1% | 1.8% | 2.7% | 2.0% | 6.7% | 5.7% |
| | Shelton | | | 4.8% | 4.5% | | 2.1% | 2.7% | 2.1% | 2.9% | 1.7% | 5.8% | 5.9% |
| | South Bend | | | | | | | | | 2.4% | | 3.5% | 4.5% |
| Portland | Goldendale | | | | | | | | | 3.1% | | | |
| | Ilwaco | | | | | | | | | | | 3.1% | |
| | Longview | | 5.8% | 2.1% | 2.3% | 1.1% | | 1.0% | 1.4% | 1.4% | 1.0% | 2.9% | 2.8% |
| | Vancouver | 4.0% | 4.8% | 1.4% | 1.6% | 0.6% | 0.7% | 0.9% | 0.9% | 1.1% | 1.1% | 2.7% | 2.4% |
| | White Salmon | | | | | | | | | 2.0% | | 3.0% | |
| Seattle | Aberdeen | 18.9% | 17.2% | 5.5% | 5.0% | 2.2% | 1.8% | 2.7% | 2.1% | 2.4% | 1.4% | 4.5% | 4.2% |
| | Auburn | 9.0% | 9.5% | 3.2% | 3.0% | 1.1% | 1.4% | 1.9% | 1.6% | 2.2% | 1.5% | 5.6% | 4.5% |
| | Bellevue | 4.2% | 6.0% | 2.3% | 3.0% | 1.0% | 1.2% | 1.4% | 1.5% | 1.6% | 1.5% | 3.7% | 3.6% |
| | Bellingham | 7.7% | 12.3% | 3.1% | 4.0% | 1.2% | 1.2% | 1.7% | 1.5% | 1.7% | 1.3% | 3.3% | 3.1% |
| | Bremerton | 9.8% | 9.7% | 3.1% | 3.1% | 1.6% | 1.5% | 1.6% | 1.7% | 2.2% | 1.7% | 5.5% | 5.3% |
| | Edmonds | 5.5% | 6.7% | 2.2% | 3.1% | 1.2% | 1.4% | 1.5% | 1.3% | 2.0% | 2.0% | 4.8% | 4.7% |
| | Enumclaw | | | | 4.4% | | | 2.8% | 1.9% | 2.0% | 1.2% | 5.2% | 5.5% |
| | Federal Way | 9.1% | 10.0% | 2.6% | 3.3% | 1.1% | 1.3% | 1.4% | 1.5% | 1.8% | 1.4% | 5.4% | 4.2% |
| | Forks | | | | | | | | | 3.2% | | 4.1% | 6.0% |
| | Kirkland | 5.4% | 7.2% | 2.1% | 1.8% | 1.2% | 1.2% | 1.4% | 1.4% | 1.8% | 1.5% | 4.0% | 3.7% |
| | Port Angeles | | 13.1% | 4.8% | 4.7% | 2.3% | 2.2% | 3.1% | 2.3% | 2.6% | 1.9% | 4.0% | 4.4% |
| | Port Townsend | | | | | | | | | 1.1% | 1.3% | 3.2% | 2.9% |
| | Renton | 8.4% | 10.0% | 3.4% | 3.8% | 1.3% | 1.5% | 1.6% | 1.7% | 2.2% | 1.7% | 4.9% | 4.6% |
| | Seattle | 4.8% | 6.1% | 2.4% | 2.5% | 1.0% | 1.0% | 1.3% | 1.3% | 1.6% | 1.5% | 4.3% | 4.0% |
| Spokane | Brewster | | | | | | | | | 1.3% | | 2.7% | 2.8% |
| | Chelan | | | | | | | | | | | 2.5% | 2.5% |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | 2.5% | | 3.7% | 2.9% |
| | Colfax | | | | | | | | | 2.2% | | 4.6% | 5.2% |
| | Colville | | | | | | | | | | | 2.8% | 2.9% |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | 7.7% | 12.4% | 2.9% | 2.9% | 1.1% | 1.3% | 1.8% | 1.8% | 2.0% | 1.3% | 4.5% | 4.1% |
| | Moses Lake | 9.0% | 10.4% | 2.7% | 2.8% | | 1.3% | 1.6% | 1.1% | 1.5% | 0.9% | 3.5% | 2.9% |
| | Omak | | | | | | | | | 1.9% | | 3.4% | 3.2% |
| | Othello | | | | | | | | | 0.8% | 1.3% | 3.3% | 3.4% |
| | Pasco | 7.5% | 8.0% | 2.1% | 3.0% | 0.9% | 1.1% | 1.2% | 1.6% | 1.5% | 1.2% | 4.9% | 3.7% |
| | Pullman | | | | | | | | | 1.3% | 1.4% | 4.2% | 3.4% |
| | Republic | | | | | | | | | | | | |
| | Richland | | 9.2% | 2.7% | 2.7% | 1.0% | 1.3% | 1.6% | 1.5% | 2.0% | 1.6% | 4.5% | 4.1% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | 7.5% | 9.2% | 3.2% | 3.4% | 1.3% | 1.4% | 1.6% | 1.5% | 1.8% | 1.2% | 3.8% | 3.3% |
| | Tonasket | | | | | | | | | | | 3.1% | |
| | Walla Walla | | 12.8% | 3.4% | 3.7% | 1.3% | 1.2% | 1.9% | 1.5% | 1.7% | 1.2% | 4.6% | 3.8% |
| | Wenatchee | 6.5% | 6.2% | 2.4% | 3.0% | 1.1% | 1.4% | 1.6% | 1.5% | 1.3% | 1.2% | 3.2% | 3.0% |
| Tacoma | Puyallup | 7.8% | 10.4% | 2.9% | 3.6% | 1.4% | 1.3% | 1.7% | 1.5% | 2.3% | 1.8% | 5.4% | 5.1% |
| | Tacoma | 8.6% | 10.5% | 3.3% | 3.3% | 1.4% | 1.5% | 2.0% | 1.6% | 2.8% | 1.8% | 6.0% | 4.8% |
| Yakima | Ellensburg | | | 3.4% | 3.9% | | | | 1.9% | 1.8% | 1.7% | 4.8% | 4.1% |
| | Prosser | | | | | | | | | 1.2% | | 3.4% | 3.3% |
| | Sunnyside | | 10.0% | 1.3% | 1.9% | | | 1.4% | 1.3% | 1.4% | 1.1% | 4.5% | 4.0% |
| | Toppenish | | | | | | | | | 2.3% | | 6.0% | |
| | Yakima | 6.2% | 10.0% | 2.0% | 2.9% | 1.0% | 1.2% | 1.5% | 1.4% | 1.7% | 1.3% | 4.4% | 4.0% |

## Electrocardiogram (EKG)

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | 1.3% | 1.2% | 4.8% | 4.8% |
| | Arlington | | | | | | | 2.3% | 2.2% | 2.7% | 1.9% | 8.4% | 8.0% |
| | Coupeville | | | | | | | | | 1.6% | 1.4% | 5.9% | 6.8% |
| | Everett | | | 0.6% | 0.5% | 0.5% | 0.5% | 1.9% | 1.4% | 2.6% | 2.1% | 7.3% | 7.6% |
| | Monroe | | | | | | | 1.5% | 1.1% | 2.2% | 1.7% | 7.3% | 6.2% |
| | Mount Vernon | | | | | 0.6% | | 1.4% | 1.3% | 2.0% | 1.5% | 5.7% | 6.1% |
| Olympia | Centralia | | | | | | 1.2% | 2.5% | 1.9% | 2.3% | 1.3% | 7.0% | 5.6% |
| | Morton | | | | | | | | | | | 4.9% | |
| | Olympia | | | 0.8% | 0.7% | 0.7% | 0.9% | 2.2% | 1.9% | 2.4% | 1.9% | 8.3% | 7.8% |
| | Shelton | | | | | | | 2.2% | | 2.4% | 1.2% | 6.1% | 6.4% |
| | South Bend | | | | | | | | | 2.0% | | 5.1% | 5.9% |
| Portland | Goldendale | | | | | | | | | | | 3.9% | |
| | Ilwaco | | | | | | | | | | | 3.6% | 4.3% |
| | Longview | | | | | | | 1.1% | 1.0% | 1.1% | 0.8% | 4.8% | 4.4% |
| | Vancouver | | | | | | 0.3% | 0.9% | 0.8% | 1.1% | 0.8% | 3.7% | 3.2% |
| | White Salmon | | | | | | | | | | | 2.8% | 3.1% |
| Seattle | Aberdeen | | | | | | | 1.8% | 1.3% | 1.6% | 1.1% | 5.2% | 5.7% |
| | Auburn | | | | | | | 1.6% | 1.2% | 2.2% | 1.4% | 7.1% | 7.2% |
| | Bellevue | | | | | 0.4% | 0.7% | 1.4% | 1.5% | 1.8% | 1.7% | 5.9% | 6.8% |
| | Bellingham | | | | | 0.5% | 0.4% | 1.5% | 0.9% | 1.6% | 1.4% | 3.9% | 4.6% |
| | Bremerton | | | | 0.7% | 0.7% | 0.8% | 1.7% | 1.3% | 2.0% | 1.6% | 6.5% | 7.0% |
| | Edmonds | | | | | 0.6% | 0.7% | 1.8% | 1.6% | 1.9% | 1.9% | 7.0% | 7.7% |
| | Enumclaw | | | | | | | 2.0% | | 2.0% | 1.4% | 6.9% | 7.3% |
| | Federal Way | | | | | | | 1.4% | 1.2% | 1.8% | 1.3% | 6.6% | 6.1% |
| | Forks | | | | | | | | | | | 7.5% | 9.8% |
| | Kirkland | | | | | | 0.9% | 2.0% | 1.2% | 1.9% | 1.7% | 6.4% | 6.8% |
| | Port Angeles | | | | | | | 1.9% | 1.1% | 1.9% | 1.2% | 5.2% | 5.9% |
| | Port Townsend | | | | | | | | | | 1.1% | 4.0% | 4.1% |
| | Renton | | | 0.5% | 0.7% | 0.6% | 0.6% | 1.7% | 1.4% | 2.0% | 1.6% | 6.9% | 7.4% |
| | Seattle | 0.8% | 1.0% | 0.5% | 0.5% | 0.5% | 0.6% | 1.6% | 1.2% | 1.7% | 1.5% | 5.8% | 6.0% |
| Spokane | Brewster | | | | | | | | | | | 3.6% | 3.3% |
| | Chelan | | | | | | | | | | | 3.5% | 3.5% |
| | Chewelah | | | | | | | | | | | 4.1% | 5.4% |
| | Clarkston | | | | | | | | | 1.9% | | 4.6% | 5.2% |
| | Colfax | | | | | | | | | | | 5.9% | 7.4% |
| | Colville | | | | | | | | | | | 3.2% | 3.4% |
| | Davenport | | | | | | | | | | | 5.0% | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | 0.9% | 1.8% | 1.3% | 2.1% | 1.4% | 6.3% | 6.2% |
| | Moses Lake | | | | | | | 1.2% | 0.8% | 1.1% | 1.0% | 3.8% | 4.1% |
| | Omak | | | | | | | | | 1.6% | | 3.6% | 4.3% |
| | Othello | | | | | | | | | 1.1% | 1.0% | 5.6% | 5.7% |
| | Pasco | | | | | 0.6% | | 1.3% | 1.5% | 1.7% | 1.3% | 7.5% | 6.7% |
| | Pullman | | | | | | | | | 1.2% | 1.4% | 8.1% | 8.0% |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | 1.1% | 1.8% | 1.6% | 2.2% | 1.6% | 7.2% | 7.4% |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | 1.2% | 0.6% | 0.6% | 0.6% | 0.7% | 1.5% | 1.2% | 1.7% | 1.2% | 5.2% | 5.3% |
| | Tonasket | | | | | | | | | | | 5.3% | 5.1% |
| | Walla Walla | | | | | | | 1.6% | 0.9% | 1.5% | 0.9% | 5.2% | 5.2% |
| | Wenatchee | | | | | 0.6% | 0.7% | 1.7% | 1.1% | 1.1% | 0.9% | 3.3% | 3.7% |
| Tacoma | Puyallup | | | 0.7% | 0.8% | 0.6% | 0.9% | 1.9% | 1.5% | 2.6% | 2.0% | 7.7% | 8.3% |
| | Tacoma | 1.3% | 1.1% | 0.6% | 0.7% | 0.6% | 0.7% | 2.0% | 1.5% | 2.7% | 1.8% | 7.8% | 7.7% |
| Yakima | Ellensburg | | | | | | | 1.7% | | 1.6% | 1.5% | 5.8% | 5.6% |
| | Prosser | | | | | | | | | 1.7% | | 5.7% | 6.8% |
| | Sunnyside | | | | | | | 1.2% | 0.9% | 1.6% | 0.9% | 6.4% | 5.4% |
| | Toppenish | | | | | | | | | 1.8% | | 6.4% | 4.0% |
| | Yakima | | | | 0.5% | 0.6% | 0.7% | 1.2% | 1.0% | 1.8% | 1.3% | 6.4% | 5.6% |

## Diagnostic cardiac catheterization

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | | | 0.1% | 0.2% |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | | 0.2% |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | 0.1% | 0.3% |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | 0.3% |
| | Bellevue | | | | | | | | | | | | 0.2% |
| | Bellingham | | | | | | | | | | | | 0.2% |
| | Bremerton | | | | | | | | | | | | 0.2% |
| | Edmonds | | | | | | | | | | | | 0.2% |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | 0.2% |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | | 0.2% |
| | Seattle | | | | | | | | | | | 0.1% | 0.2% |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | | | 0.1% | 0.2% |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | 0.1% | 0.2% |
| | Tacoma | | | | | | | | | | | 0.1% | 0.2% |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | | |

## Hysterectomy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.1% | | 0.3% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | 0.1% | | 0.2% | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.2% | | 0.4% | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | 0.2% | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | 0.2% | | 0.3% | |
| | Bellevue | | | | | | | | | | | 0.3% | |
| | Bellingham | | | | | | | | | 0.1% | | 0.3% | |
| | Bremerton | | | | | | | | | 0.2% | | 0.4% | |
| | Edmonds | | | | | | | | | | | 0.2% | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | 0.3% | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.1% | | 0.3% | |
| | Seattle | | | | | | | | | 0.1% | | 0.3% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 0.2% | | 0.4% | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | 0.3% | | 0.5% | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 0.4% | | 0.5% | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.2% | | 0.3% | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | 0.3% | |
| Tacoma | Puyallup | | | | | | | | | 0.3% | | 0.4% | |
| | Tacoma | | | | | | | | | 0.1% | | 0.3% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 0.2% | | 0.3% | |

## Oophorectomy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.1% | | 0.1% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.1% | | 0.2% | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | 0.1% | | 0.1% | |
| | Bellingham | | | | | | | | | | | 0.2% | |
| | Bremerton | | | | | | | | | 0.1% | | 0.1% | |
| | Edmonds | | | | | | | | | | | 0.2% | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.1% | | 0.1% | |
| | Seattle | | | | | | | | | 0.0% | | 0.1% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.1% | | 0.1% | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | 0.1% | | 0.1% | |
| | Tacoma | | | | | | | | | 0.1% | | 0.1% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | | |

## Tubal ligation

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.2% | | | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | 0.2% | | | |
| Olympia | Centralia | | | | | | | | | 0.3% | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.2% | | | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | 0.1% | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | 0.3% | | | |
| | Bellevue | | | | | | | | | 0.1% | | | |
| | Bellingham | | | | | | | | | 0.2% | | | |
| | Bremerton | | | | | | | | | 0.2% | | | |
| | Edmonds | | | | | | | | | 0.1% | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 0.1% | | | |
| | Port Angeles | | | | | | | | | 0.5% | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.2% | | | |
| | Seattle | | | | | | | | | 0.1% | | | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 0.3% | | | |
| | Moses Lake | | | | | | | | | 0.3% | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | 0.3% | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 0.2% | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.2% | | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | 0.3% | | | |
| | Wenatchee | | | | | | | | | 0.3% | | | |
| Tacoma | Puyallup | | | | | | | | | 0.3% | | | |
| | Tacoma | | | | | | | | | 0.2% | | | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 0.3% | | | |

## Breast biopsy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.1% | | 0.3% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | 0.3% | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.1% | | 0.3% | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | 0.3% | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | 0.4% | |
| | Bellevue | | | | | | | | | 0.1% | | 0.5% | |
| | Bellingham | | | | | | | | | | | 0.2% | |
| | Bremerton | | | | | | | | | | | 0.3% | |
| | Edmonds | | | | | | | | | | | 0.4% | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | 0.4% | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 0.1% | | 0.5% | |
| | Port Angeles | | | | | | | | | | | 0.4% | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 0.1% | | 0.4% | |
| | Seattle | | | | | | | | | 0.1% | | 0.5% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.1% | | 0.4% | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | 0.1% | | 0.3% | |
| | Tacoma | | | | | | | | | 0.1% | | 0.4% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | 0.2% | |

## C-section

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | 20.4% | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 23.8% | | | |
| | Monroe | | | | | | | | | 26.9% | | | |
| | Mount Vernon | | | | | | | | | 26.1% | | | |
| Olympia | Centralia | | | | | | | | | 21.6% | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 23.0% | | | |
| | Shelton | | | | | | | | | 24.9% | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | 13.1% | | | |
| | Vancouver | | | | | | | | | 19.2% | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | 26.2% | | | |
| | Auburn | | | | | | | | | 24.3% | | | |
| | Bellevue | | | | | | | | | 31.1% | | | |
| | Bellingham | | | | | | | | | 24.4% | | | |
| | Bremerton | | | | | | | | | 22.0% | | | |
| | Edmonds | | | | | | | | | 24.7% | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | 24.2% | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | 29.3% | | | |
| | Port Angeles | | | | | | | | | 27.3% | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | 27.9% | | | |
| | Seattle | | | | | | | | | 25.0% | | | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | 23.4% | | | |
| | Moses Lake | | | | | | | | | 15.4% | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | 20.1% | | | |
| | Pasco | | | | | | | | | 19.4% | | | |
| | Pullman | | | | | | | | | 29.8% | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 24.1% | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 22.5% | | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | 20.2% | | | |
| | Wenatchee | | | | | | | | | 23.3% | | | |
| Tacoma | Puyallup | | | | | | | | | 23.7% | | | |
| | Tacoma | | | | | | | 16.3% | | 24.2% | | | |
| Yakima | Ellensburg | | | | | | | | | 21.9% | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | 19.3% | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | 15.0% | | | |

## Bariatric surgery

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.1% | | 0.1% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | | | | |
| | Bellingham | | | | | | | | | | | | |
| | Bremerton | | | | | | | | | | | | |
| | Edmonds | | | | | | | | | | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | | |
| | Seattle | | | | | | | | | | | 0.0% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | | | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | | |
| | Tacoma | | | | | | | | | | | 0.1% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | | |

## Lumpectomy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | 0.0% | | 0.2% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | 0.2% | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | 0.1% | | 0.2% | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | 0.2% | |
| | Bellevue | | | | | | | | | | | 0.2% | |
| | Bellingham | | | | | | | | | | | 0.1% | |
| | Bremerton | | | | | | | | | | | | |
| | Edmonds | | | | | | | | | | | 0.2% | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | 0.2% | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | 0.2% | |
| | Seattle | | | | | | | | | 0.0% | | 0.2% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | 0.0% | | 0.1% | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | 0.2% | |
| | Tacoma | | | | | | | | | 0.0% | | 0.2% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | 0.2% | |

## Mastectomy

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | | | | |
| | Arlington | | | | | | | | | | | | |
| | Coupeville | | | | | | | | | | | | |
| | Everett | | | | | | | | | | | 0.1% | |
| | Monroe | | | | | | | | | | | | |
| | Mount Vernon | | | | | | | | | | | | |
| Olympia | Centralia | | | | | | | | | | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | | | | | | |
| | Shelton | | | | | | | | | | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | | | | |
| | Vancouver | | | | | | | | | | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | | | | |
| | Auburn | | | | | | | | | | | | |
| | Bellevue | | | | | | | | | | | 0.1% | |
| | Bellingham | | | | | | | | | | | | |
| | Bremerton | | | | | | | | | | | | |
| | Edmonds | | | | | | | | | | | | |
| | Enumclaw | | | | | | | | | | | | |
| | Federal Way | | | | | | | | | | | | |
| | Forks | | | | | | | | | | | | |
| | Kirkland | | | | | | | | | | | | |
| | Port Angeles | | | | | | | | | | | | |
| | Port Townsend | | | | | | | | | | | | |
| | Renton | | | | | | | | | | | | |
| | Seattle | | | | | | | | | 0.0% | | 0.1% | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | | | | | | |
| | Moses Lake | | | | | | | | | | | | |
| | Omak | | | | | | | | | | | | |
| | Othello | | | | | | | | | | | | |
| | Pasco | | | | | | | | | | | | |
| | Pullman | | | | | | | | | | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | | | | | 0.1% | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | | | | |
| | Wenatchee | | | | | | | | | | | | |
| Tacoma | Puyallup | | | | | | | | | | | 0.1% | |
| | Tacoma | | | | | | | | | | | 0.1% | |
| Yakima | Ellensburg | | | | | | | | | | | | |
| | Prosser | | | | | | | | | | | | |
| | Sunnyside | | | | | | | | | | | | |
| | Toppenish | | | | | | | | | | | | |
| | Yakima | | | | | | | | | | | | |

## Fetal monitoring

| | | 1 year | | 2 - 6 years | | 7 - 11 years | | 12 - 19 years | | 20 - 44 years | | 45 - 64 years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | M | F | M | F | M | F | M | F | M | F | M |
| Everett | Anacortes | | | | | | | | | 56.3% | | | |
| | Arlington | | | | | | | | | 44.2% | | | |
| | Coupeville | | | | | | | | | 43.4% | | | |
| | Everett | | | | | | | 62.9% | | 56.4% | | | |
| | Monroe | | | | | | | | | 54.3% | | | |
| | Mount Vernon | | | | | | | | | 35.6% | | | |
| Olympia | Centralia | | | | | | | 72.7% | | 76.8% | | | |
| | Morton | | | | | | | | | | | | |
| | Olympia | | | | | | | 71.6% | | 65.4% | | | |
| | Shelton | | | | | | | | | 60.7% | | | |
| | South Bend | | | | | | | | | | | | |
| Portland | Goldendale | | | | | | | | | | | | |
| | Ilwaco | | | | | | | | | | | | |
| | Longview | | | | | | | | | 35.5% | | | |
| | Vancouver | | | | | | | 44.4% | | 41.2% | | | |
| | White Salmon | | | | | | | | | | | | |
| Seattle | Aberdeen | | | | | | | | | 71.8% | | | |
| | Auburn | | | | | | | | | 56.1% | | | |
| | Bellevue | | | | | | | | | 55.2% | | | |
| | Bellingham | | | | | | | 65.0% | | 60.2% | | | |
| | Bremerton | | | | | | | | | 44.5% | | | |
| | Edmonds | | | | | | | | | 56.8% | | | |
| | Enumclaw | | | | | | | | | 37.2% | | | |
| | Federal Way | | | | | | | | | 50.6% | | | |
| | Forks | | | | | | | | | 73.5% | | | |
| | Kirkland | | | | | | | | | 60.7% | | | |
| | Port Angeles | | | | | | | | | 59.4% | | | |
| | Port Townsend | | | | | | | | | 61.2% | | | |
| | Renton | | | | | | | 64.4% | | 59.7% | | | |
| | Seattle | | | | | | | 56.3% | | 57.4% | | | |
| Spokane | Brewster | | | | | | | | | | | | |
| | Chelan | | | | | | | | | | | | |
| | Chewelah | | | | | | | | | | | | |
| | Clarkston | | | | | | | | | 30.0% | | | |
| | Colfax | | | | | | | | | | | | |
| | Colville | | | | | | | | | | | | |
| | Davenport | | | | | | | | | | | | |
| | Dayton | | | | | | | | | | | | |
| | Grand Coulee | | | | | | | | | | | | |
| | Kennewick | | | | | | | 47.8% | | 44.5% | | | |
| | Moses Lake | | | | | | | | | 32.9% | | | |
| | Omak | | | | | | | | | 34.1% | | | |
| | Othello | | | | | | | | | 56.0% | | | |
| | Pasco | | | | | | | | | 41.9% | | | |
| | Pullman | | | | | | | | | 62.5% | | | |
| | Republic | | | | | | | | | | | | |
| | Richland | | | | | | | | | 40.7% | | | |
| | Ritzville | | | | | | | | | | | | |
| | Spokane | | | | | | | 29.2% | | 30.5% | | | |
| | Tonasket | | | | | | | | | | | | |
| | Walla Walla | | | | | | | | | 50.5% | | | |
| | Wenatchee | | | | | | | 50.7% | | 41.8% | | | |
| Tacoma | Puyallup | | | | | | | 66.1% | | 55.1% | | | |
| | Tacoma | | | | | | | 63.2% | | 48.9% | | | |
| Yakima | Ellensburg | | | | | | | | | 57.8% | | | |
| | Prosser | | | | | | | | | 41.6% | | | |
| | Sunnyside | | | | | | | | | 33.5% | | | |
| | Toppenish | | | | | | | | | 62.9% | | | |
| | Yakima | | | | | | | 72.5% | | 86.7% | | | |

# Methodology

## Data sources

This analysis is based on claims and encounter data for submitted to the Washington Health Alliance by participating self-insured employers, union trusts and health plans. The analysis is based upon health care provided between July 2013 and June 2014. In addition to claims and encounter data, the analysis relies on corresponding eligibility and enrollment files to ascertain member age, gender and approximate residential zone. Data submissions without consistently populated diagnosis codes, procedure codes and claim line service description codes were excluded from the analysis.

## Selection of procedures

The Clinical Classifications Software (CCS) grouper identifies approximately 250 distinct treatments, all generally referred to as *procedures*. Rather than examine each procedure for variations in geographic use rates, the Alliance's Health Economics Committee (HEC) recommended assembling a panel of regional medical officers to pre-specify procedures of interest. Their reasoning was that medical experts at provider organizations and health plans already have a good sense of procedures prone to overuse, and their collective insights would help to focus both project scope and relevance.

The Alliance's Quality Improvement Committee (QIC) proposed nearly all the procedures to be considered for the analysis. Although studying use rate variation can apply to questions of underuse as well as overuse, the QIC emphasized overuse in their suggestions, with special considerations for avoidable cost and risk, as well as interventions felt to be in need of improved clinical use standards. Most were among the procedures in the CCS grouper output; a few required adopting other specifications, such as definitions from the Health Care Authority's Health Technology Assessment efforts. See: https://www.hca.wa.gov/about-hca/health-technology-assessment.

## Data analysis

Unless otherwise stated, the population use rates in the analysis are fractions calculated separately for each combination of age cohort, gender and residential zone (Health Service Area or HSA). The numerator is the number of unique people (commercial and Medicaid insured members) receiving *at least one* of the targeted services during the year, and the denominator is the total of all unique members.

To determine if the procedural use rate for a particular age-gender-HSA cohort is significantly higher or lower than expected, we compare it to an adjusted rate for the same age-gender cohort statewide. The adjustment to the state rate removes the influence of the compared sub-region (the age-gender-HSA cohort) from the all-inclusive state rate.

When making rate comparisons between the sub-region and the adjusted state, we estimate 90% confidence intervals about each observed rate.

Overlapping confidence ranges result in a 'similar' rating; non-overlapping ranges result in 'higher' and 'lower' ratings, as appropriate.

Any rate with a numerator less than 30 is not displayed in results and exhibits. Of course, all rates in this analysis are observational and not normative.

Note: As the analysis plan for this project was originally being developed, the HEC was interested in bringing additional clinical parameters, particularly diagnosis code requirements, to bear on each procedural use rate measure, as appropriate. The QIC considered this idea and strongly recommended that the analysis remain at a higher level (i.e., only adjusted for age and gender), and not feature any diagnostic criteria for denominator inclusion.

## Measure specifications

Below are brief descriptions for each of the 21 measures in this report. Each measure is a fraction. The denominator comes from eligibility data supplied to the Alliance by insurance carriers. For most measures, the numerator comes from definitions of specific tests and procedures developed by the Agency for Healthcare Research and Quality (AHRQ). AHRQ has made these definitions publicly available in grouping software called Clinical Classification System (CCS). For two measures, the numerator definition comes from work published by the state Health Care Authority's Health Technology Assessment initiative.



- Eardrum procedure – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received an eardrum procedure, as defined by AHRQ CCS group #23 (Myringotomy).
- Removal of Tonsils or Adenoids – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a tonsillectomy or adenoidectomy procedure, as defined by AHRQ CCS group #30.
- Sleep apnea testing – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one sleep test, as defined in HCA's Health Technology Assessment for Sleep Apnea diagnosis.
- Spinal injection – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one spine injection, as defined by AHRQ CCS group #5.
- Spine surgery – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one spine surgery procedure, as defined by AHRQ CCS groups #3 or 158.
- Spine fusion surgery – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a

specified gender and age band, who received at least one spine fusion procedure, as defined by AHRQ CCS group #158.

- Knee replacement – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a knee replacement procedure, as defined by AHRQ CCS group #152.
- Upper GI endoscopy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one upper GI endoscopy procedure, as defined in HCA's Health Technology Assessment for GERD treatment.
- CT scan – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one CT scan, as defined by AHRQ CCS groups #177-180.
- Chest X-ray – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at least one chest X-ray, as defined by AHRQ CCS group #183.
- Electrocardiogram (EKG) – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received an electrocardiogram procedure, as defined by AHRQ CCS group #202
- Diagnostic Cardiac Catheterization – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a diagnostic cardiac catheterization procedure, as defined by AHRQ CCS group #47.
- Hysterectomy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received at a hysterectomy procedure, as defined by AHRQ CCS group #124.
- Oophorectomy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a oophorectomy procedure, as defined by AHRQ CCS group #119,
- Tubal ligation – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a tubal ligation procedure, as defined by AHRQ CCS group #121,
- Breast biopsy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a breast biopsy procedure, as defined by AHRQ CCS group #165,
- C-section – The percentage of deliveries to mothers with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, occurring via Cesarean section, defined

by AHRQ CCS group #134 (note: additional logic exists to handle the possibility of one mother having two C-sections within the measurement year).

- Bariatric surgery – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a bariatric surgery procedure, as defined by AHRQ CCS group #244,
- Lumpectomy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a lumpectomy procedure, as defined by AHRQ CCS group #166.
- Mastectomy – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a mastectomy procedure, as defined by AHRQ CCS group #167.
- Fetal Monitoring – The percentage of people with Medicaid or commercial insurance between July, 2013 through June 2014, of a specified gender and age band, who received a fetal monitoring procedure, as defined by AHRQ CCS group #139.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ABOUT THE ALLIANCE

The Washington Health Alliance is a place where stakeholders work collaboratively to transform Washington state's health care system for the better. The Alliance brings together organizations that share a commitment to drive change in our health care system by offering a forum for critical conversation and aligned efforts by stakeholders: purchasers, providers, health plans, consumers and other health care partners. The Alliance believes strongly in transparency and offers trusted and credible reporting of progress on measures of health care quality and value. The Alliance is a nonpartisan 501(c)(3) nonprofit with more than 185 member organizations. A cornerstone of the Alliance's work is the Community Checkup, a report to the public comparing the performance of medical groups, hospitals and health plans and offering a community-level view on important measures of health

**For more about the Alliance:**
**www.WashingtonHealthAlliance.org**

**For the Community Checkup report:**
**www.WACommunityCheckup.org**