TECH'S IMPACT ON washington

TechAlliance | *The Economic Effect of Technology on Jobs and Communities*

Health

SEPTEMBER 2017

STAFF | CARE PROVIDERS | MEDICAL SERVICES | MEDICAL PRODUCTS

INTRODUCTION

Washington's healthcare industry attracts patients from across the state and neighboring states for some of the world's greatest patient care. Healthcare touches every community across the state, and increasingly technology and innovation are transforming the experience for both patients and providers.

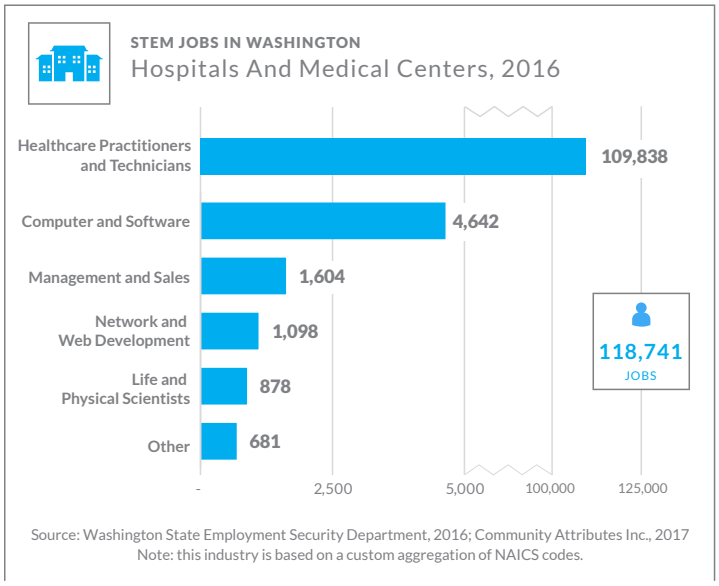
The healthcare industry includes healthcare activity from research and development, to patient care, to services and products for hospitals. Hospitals and insurance providers are some of the state's largest employers, so the impact of technology affects a huge swath of the state's workforce.

Rapidity and quality of care, advances in medicine and treatments, and systems to connect patients with doctors and their own medical records all rely to some degree on technology and tech workers. Tech exists within healthcare institutions, companies, non-profits, and the workers who serve these industries. High tech jobs in healthcare include hospital staff trained in STEM fields; technicians operating advanced equipment; and companies providing software, mobile, and hardware solutions for many of the complex set of issues faced by the healthcare industry.

TECHNOLOGY AND STEM JOBS IN HEALTHCARE

Technology and STEM jobs can be found across nearly all aspects of the healthcare sector. In 2016, an estimated 30% of all jobs in healthcare in Washington state were those defined as STEM. Some of the most common STEM occupations included Registered Nurses and Dental Hygienists. Computer User Support Specialists and Computer Systems Analysts are the top information & communications technology (ICT) occupations in the healthcare industry.

HOSPITALS & MEDICAL CENTERS



Source: Washington State Employment Security Department, 2016; Community Attributes Inc., 2017
Note: this industry is based on a custom aggregation of NAICS codes.

Washington's healthcare workers (more than 47% working in hospitals and medical centers are STEM workers) increasingly rely on technology for their daily work. Doctors now use technology to communicate with patients, improve the efficiency of patient care and record-keeping and implement more effective medical treatments.

University of Washington Medical Center, in partnership with the Seattle Cancer Care Alliance, offers one of the most expansive robotic-assisted surgery programs in the state. Robotic-assisted surgery has many potential benefits for patients including, reducing post-operative pain, reducing the risk of infection, reducing the length of hospitalization, reducing recovery time, and reducing scarring.

Another example of technology in hospitals and medical centers are electronic medical records (EMRs) or electronic health records (EHRs) which allow for sharing of information with other healthcare providers, such as laboratories and specialists. Companies that develop and support EMRs in Washington state include Epic Systems Corporation, Cerner Corporation, Allscripts, Digital Seattle, GE Healthcare and others.

Although hospitals have been using EHRs for some time, Washington innovators are still finding ways to improve the use of EHRs through technology. TransformativeMed, a Seattle-based company founded by a UW surgical resident, develops apps and software to help streamline the use of EHRs by providers. Adverse events can occur during hand-offs due to an inadequate or incomplete information exchange. TransformativeMed's apps, CORES and GlycemiCare, **provide tools for improved coordination of patient data**. CORES integrates with Cerner EHR products and allows providers to enter patient notes, and develop work flows. The app also allows multi-disciplinary teams to see and coordinate their individual work plans for patients.

Big data is providing healthcare providers and patients with more information to improve care. The Washington Immunization Information System allows parents, schools and providers that administer immunizations to access records. Schools use this data to help with immunization verification, while providers use the data to coordinate care with a better understanding of patient history and risk.

Mobile is also making significant inroads into healthcare. Circle, an app offered by Providence and Swedish, for new and expecting moms, provides health information for both mom and baby from early pregnancy through the baby's first year. The **app tracks pregnancy measures like weight gain, as well as newborns' feeding habits**. It then **shares this information with a patient's healthcare provider**. Circle also provides information on local classes and groups as well as video chat capabilities with physicians.

Virtual Medicine

Swedish Medical Center in Seattle, WA has utilized virtual medicine technologies since 2004, with the inception of its TeleICU program, followed by TeleStroke in 2007, and the TeleHospitalist program, initiated in 2012. These **telehealth programs assure greater access, improve efficiency of care, broaden partnerships and reduce both doctor and patient travel**. Lincoln Hospital in Davenport employs virtual medicine technologies to reach their rural population through an innovative partnership with Providence Sacred Heart Medical Center.

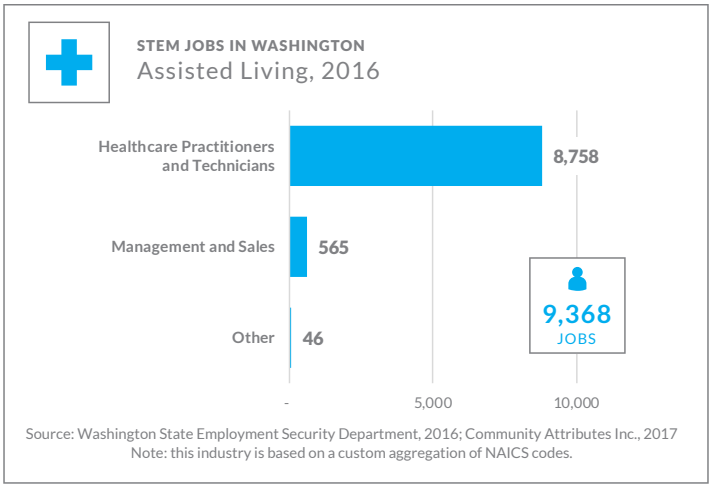
CHI Franciscan Health, headquartered in Tacoma, has helped pioneer telemedicine in Washington state, offering virtual healthcare since October 2013. The results have been promising—the number of times patients page Franciscan Health's on-call providers has decreased dramatically and there has been a 50% reduction in the number of times Franciscan doctors are awakened by calls in the middle of the night. Based on the positive results achieved so far, Franciscan aims to expand its program by looking at ways to integrate virtual urgent care into longer-term chronic care.

OTHER HEALTHCARE PROVIDERS

Technology products and services are also interwoven into many of the services rendered by other healthcare providers in the industry.

Assisted Living & Extended Care Facilities

STEM jobs at Washington's assisted living centers are primarily in healthcare occupations. However, today's assisted living centers emphasize technology more than they ever have in the past, and employ network and web developers, computer and mathematical workers, and several thousand other STEM workers in other occupations.



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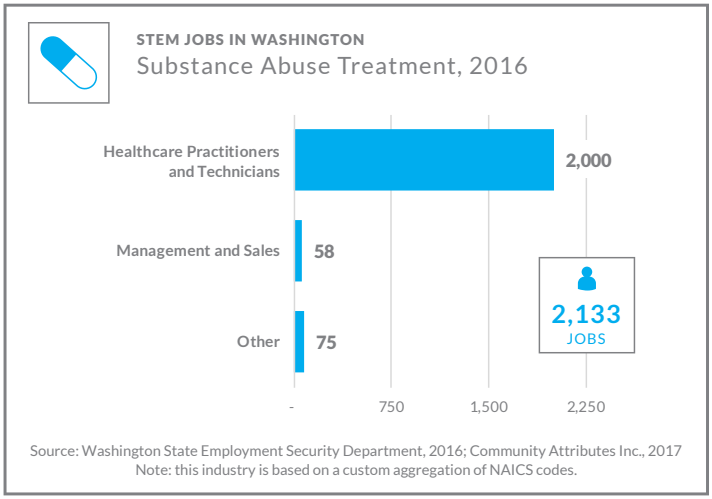
Technologies in support of health and wellness programs also help improve residents' mind, body and spirit. The Bellettini, an independent and assisted living community in Bellevue, is among the communities using a machine that, with the help of a personal trainer, can test and improve a resident's ability to balance, and thus help avoid falls.

Lynwood-based **GenCare Lifestyle at Scriber Gardens uses computer programs created by Pop Cap Games and Big Fish Games to help its residents improve brain function and cognitive abilities**. The facility employs different technologies to keep its residents healthy physically, mentally, emotionally and socially. GenCare Lifestyle monitors residents' fitness through computerized fitness equipment offered by Technogym. By collaborating with MindRAMP Consulting, GenCare Lifestyle has deployed some of the latest technology to promote brain health and wellness.



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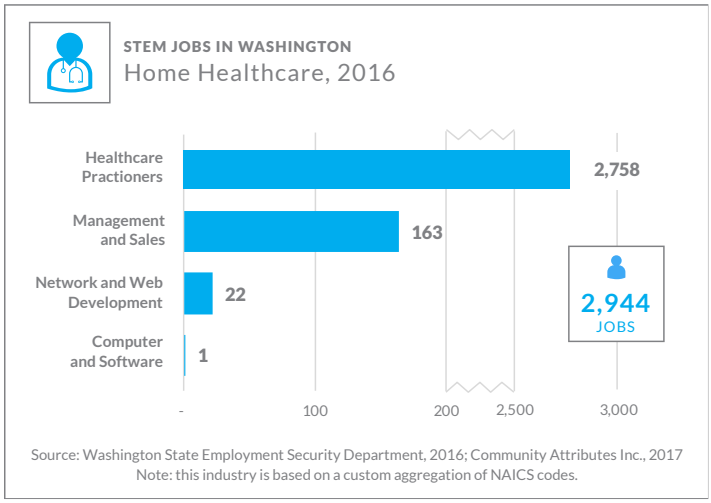
Substance Abuse Treatment Centers

Technology-assisted treatments for substance abuse are demonstrating great promise and they have been used to complement traditional forms of treatment. Seattle-based company WEconnect has created a recovery app that provides accountability for an individual's recovery activities by closing the gap in communication with their support network. **The support platform includes notifications to encourage timely communication with support groups and continuous tracking of personal progress** at attending recovery program meetings. The app makes use of GPS technology to ensure the user has really attended meetings and tracks how long they spent there. The SOS button allows the individual to request support in moments of weakness. The WEconnect team also provides data to treatment providers helping them measure the effectiveness of program approach.



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Home Healthcare

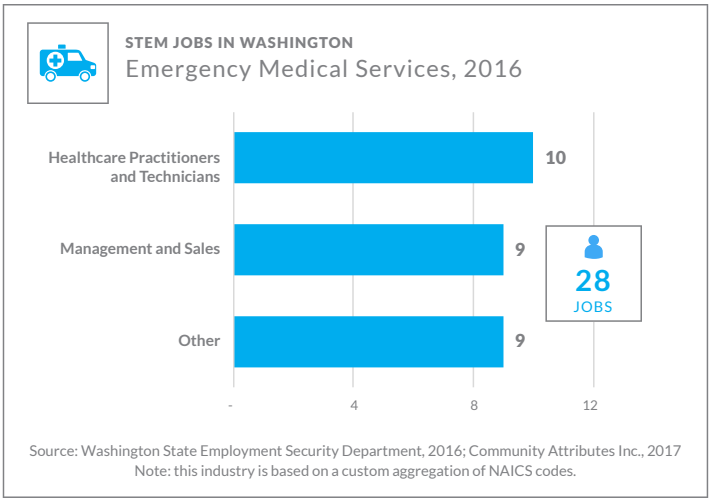
The University of Washington has partnered with other research teams at the University of Colorado at Denver, Indiana University, University of Virginia and Clemson University to establish **HomeSHARE, the first networked system of smart homes designed to advance research on older adults**. The project aims to improve the quality of life of older adults and could have implications for seniors remaining in their homes as they age.

MEDICAL SERVICES

Surrounding healthcare providers are companies that offer a range of support services such as management, administration and information technology, emergency medical services (EMS) or pathology services.

Emergency Medical Services

Over time, technology has led to improvements in the delivery of EMS. For example, Automated External Defibrillators from Physio Control, based in Redmond,



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are lightweight, portable devices that deliver an electric shock through the chest to help resuscitate victims of sudden cardiac arrest. Washington's emergency medical services rely heavily on tech-oriented workers in healthcare occupations as well as STEM workers in management occupations.

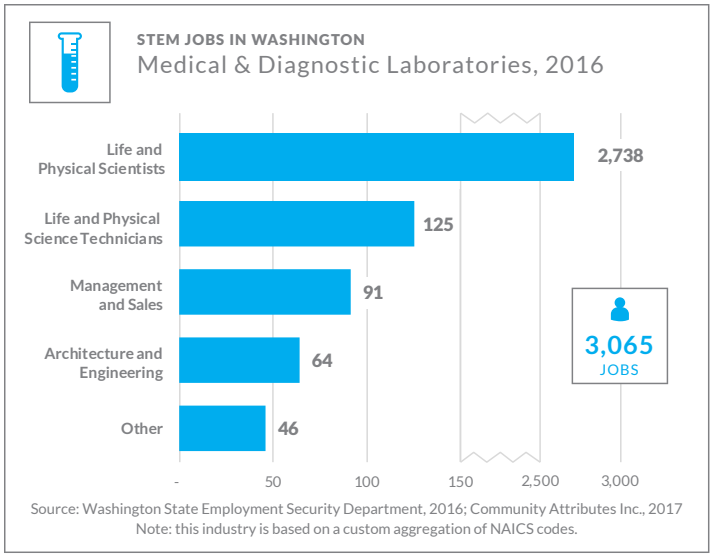
Medical & Diagnostic Laboratories

The state's medical and diagnostic laboratories rely heavily on tech occupations: in 2015, more than half of the 5,600 workers in this industry were employed in STEM occupations. In addition to technical and science-focused occupations, medical and diagnostic laboratories also rely on computer and software occupations, engineering occupations, and tech-oriented management occupations.

Medical laboratories have been practicing personalized medicine, a new field that emphasizes the way in which a person's disease risks are unique and different. The Swedish Cancer Institute and its partner CellNetix, a medical laboratory headquartered in Seattle, use **gene sequencing technology to personalize cancer treatment for their patients**. Gene sequencing helps avoid potentially ineffective treatments and can help establish the patient on the correct treatment pathway from the start.

MEDICAL PRODUCTS

Medical product companies play an important role in the healthcare industry and are highly regarded for their innovations and high tech products such as neuro-stimulators, stent technologies, biomarkers, robotic assistance and implantable electronic devices.



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Medical Supplies & Devices

Medical supplies and devices include durable goods like x-ray machines and hospital beds as well as nondurable or disposable supplies like surgical masks and sanitary dressings. These tools are essential for the healthcare industry, and researchers are constantly seeking new ways to improve medical supplies and devices to drive better healthcare outcomes.

Washington state has long been a global leader in medical devices. Ultrasound was invented in Washington, and a thriving industry cluster exists in Bothell and Redmond, led by firms such as Phillips, Sonosite, and Physio Control. In 2016, statewide the medical supplies and devices subsector employed 7,500 workers. Many of these jobs require intensive use of STEM and ICT skills, such as programming, bioengineering, and mechanics.

Cascade Prosthetics & Orthotics in Mt Vernon has provided prosthetic devices to Washington state companies since 1982. One device, the **Rheo Knee, is a smart knee that uses artificial intelligence and automatically adapts to an individual's walking style and environment**, learning continuously and optimizing control over time.

Medicinal Drugs

Medicinal drugs are used to treat, prevent or alleviate the symptoms of disease. Pharmaceutical companies are engaged in researching, developing, manufacturing and distributing drugs. The use of data and technologies derived from biotechnology, genomics, molecular modeling and computational chemistry has been crucial to driving innovation in drug development.

Juno Therapeutics, a clinical-stage research company in Seattle is developing **new technologies to direct the human immune system to recognize cancer cells as foreign biology and attack them**. It's a revolutionary approach for the treatment of cancer and other serious diseases.

RESEARCH & DEVELOPMENT

Washington is home to premiere research institutions in healthcare. Researchers across departments at the University of Washington work to find ways to use technology to improve health outcomes, Fred Hutchinson Cancer Research Center, Seattle Children's Research Institute, the Seattle Cancer Care Alliance and others use technology to conduct research that is transforming healthcare.

The Ubiquitous Computing Lab, or Ubicomp Lab at the UW is working on research that uses native technologies in cellphones for diagnostics and improve health outcomes. The Ubicomp lab developed the **Bilicam app which uses the camera and flash of the cellphone to detect newborn jaundice** by measuring and analyzing the light wavelengths absorbed by the skin. Other apps developed can measure hemoglobin, detect lung function, measure blood pressure, and monitor coughing in individuals and across populations.

Tech and STEM workers are essential in making advances in treatments. Juno Therapeutics, Seattle Cancer Care Alliance and Fred Hutchinson Cancer Research Center are working together to provide a Clinical Trials Unit (CTU) focused on immuno-oncology. The new CTU will consolidate patients participating in trials, providing them with a team of dedicated caregivers. Additionally, researchers will have a research space to collect and handle trial data. Immuno-oncology is an area of research that focuses on encouraging the body's own immune system to treat cancer.

TechAlliance

The Technology Alliance is a statewide, non-profit organization of leaders from Washington's technology-based businesses and research institutions. These stories were created in conjunction with an interactive website: technology-alliance.com/tech-impact-wa

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Community Attributes Inc. produced the research, the reports, and the interactive website for *Tech's Impact on Washington*. CAI is based in Seattle, with practice leaders in Denver and San Francisco. CAI provides research and tools to increase awareness, inform decisions, and improve results for our clients and the communities they serve.