

An aerial photograph showing a dense green forest in the foreground, with a city skyline visible in the distance under a cloudy sky. The text is overlaid on the sky portion of the image.

INVESTING IN ENTREPRENEURS THAT IMPROVE
HEALTHCARE

Investment Area of Interest:

Nursing Technology

May 2019

Executive Summary:

The nursing profession, along with the entire United States healthcare system, is experiencing a period of dramatic change. New technologies are transforming the way healthcare is delivered and measured, and nurses are on the front lines of this transformation. The 3.9 million nurses in the United States today do the vast majority of hands-on patient care in hospitals and are a vital piece of the healthcare system. Despite this, they have been overlooked by the technology industry. Exciting new products are typically created for and are marketed towards physicians and hospital administrators, leaving nurses to do the tedious, menial tasks most hospitals require to function.

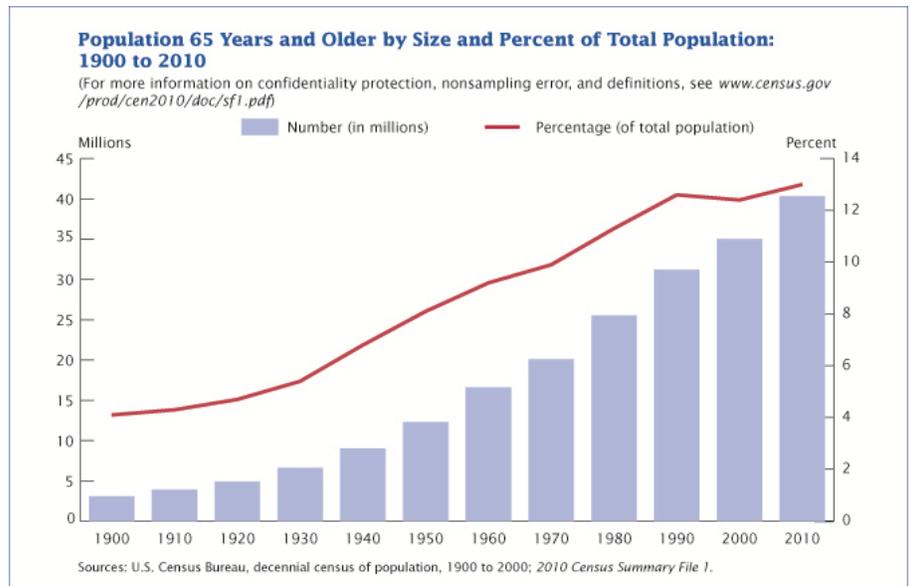
Over the past several years, companies and entrepreneurs have started to notice the opportunity in nursing technology. Nurse's salaries often compose the largest single expense item in a hospital's budget, meaning that anything that can make a nurse more efficient will save costs for the hospital. Moreover, by enabling nurses to spend more of their time on direct patient care and less on menial tasks, many technologies result in both costs savings and improved patient outcomes.

Leveraging nurses' expertise and skill will be critical for ensuring the success of the transition to value-based care. As hospitals grapple with demands to simultaneously cut costs and improve access to care, they must ensure that every healthcare worker, from janitor to physician, is operating at the top of their license to ensure maximum efficiency. By creating technology that enables nurses to get back to focusing on what is most important, providing direct patient care, companies can have a tremendous positive impact on the health outcomes of every patient.

Demographic Challenges

The demographic trends that are driving changes across the American healthcare landscape are having profound effects on the nursing profession. In particular, the aging and subsequent retirement of the baby boomer generation will challenge the way nursing is currently practiced.¹ The number of US seniors is projected to be 55% greater in 2030 than in 2015, and Medicare enrollment is projected to grow to 80 million, up from 54 million today. The aging US population will substantially increase demand for healthcare, and with it the demand for nurses of all skill levels.

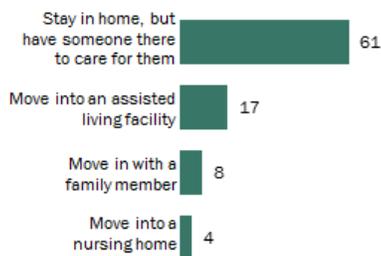
In conjunction with the overall increase in demand for healthcare due to an aging population, changes in the way care is being delivered are increasing the demand for nurses nationwide. Today, fewer and fewer senior citizens are moving into retirement



homes or assisted living communities. Instead, they are choosing to remain in their homes and communities for as long as possible. This approach has many benefits, but it also increases the demand for nurses with the ability to provide care in settings outside designated care facilities and hospitals. Over the past ten years, the home care workforce has doubled in size, from 700,000 to over 1.4 million, and this trend is predicted to continue. Currently, much of this workforce is composed not of nurses but of other health aides that do not require nearly as much specialized training. As the population ages, however, the

Most older adults want to age in place

% of adults ages 65 and older who say they would ___ if they could no longer live on their own



Note: Based on U.S. adults ages 65 and older who live in their own home and do not have someone providing care at home (n=363). "Don't know" and other volunteered responses not shown.

Source: Survey conducted Oct. 27-Nov. 24, 2014. Q57.

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need for qualified, well-trained home-care nurses will rise dramatically.²

Rural healthcare networks in particular will be challenged by these trends. Already, these areas are facing serious challenges providing healthcare to their residents. Urban areas average 80 primary care physicians per 100,000 residents, while

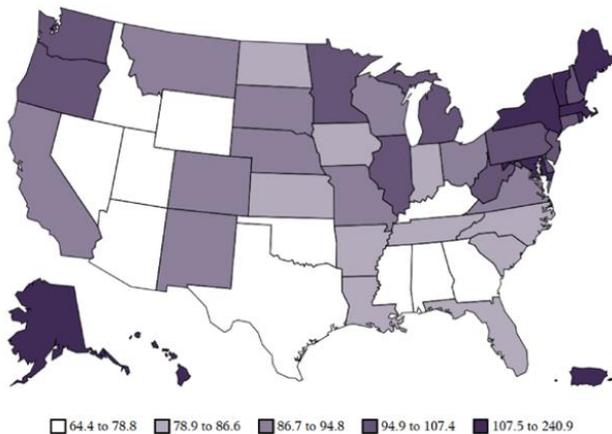
rural areas average only 68 physicians per 100,000 residents.³ Rural populations are, on average, older and poorer than urban areas, compounding the challenges in providing them adequate healthcare.⁴

Baby boomers are living longer, but they are also experiencing higher rates of chronic illnesses that require medical attention. By 2030, nearly one half of elderly Medicare

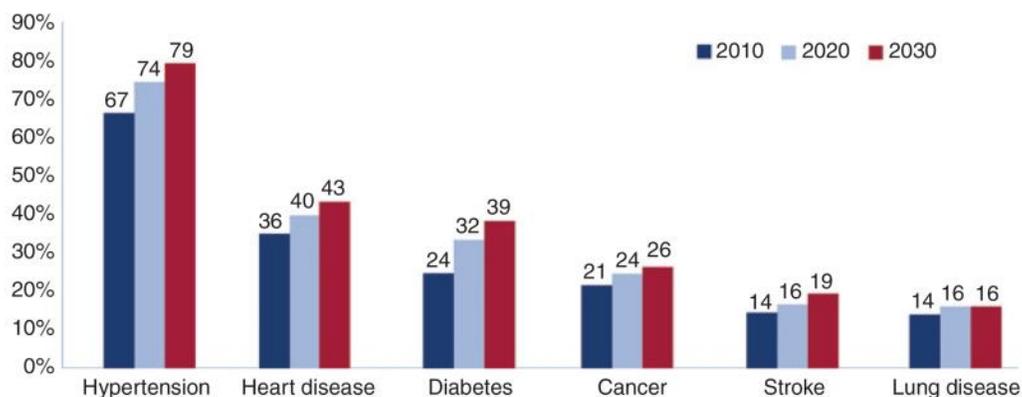
beneficiaries will be obese and nearly 40% will have diabetes. Nearly 80% will have hypertension and almost half will have some form of heart disease. Finally, nearly 40% of the elderly population will have three or more chronic conditions, further complicating the issue of providing appropriate care.⁵ The combination of longer lives and increased rates of chronic illness will further increase the demand for nurses beyond what an aging population normally would.

3. Active Primary Care Physicians per 100,000 Population by Degree Type, 2016

Map 1.3. Active primary care physicians per 100,000 population, 2016.



Sources: July 1, 2016, population estimates are from the U.S. Census Bureau (released December 2016). Physician data include MDs and DOs and are from the 2017 AMA Physician Masterfile (December 31, 2016).

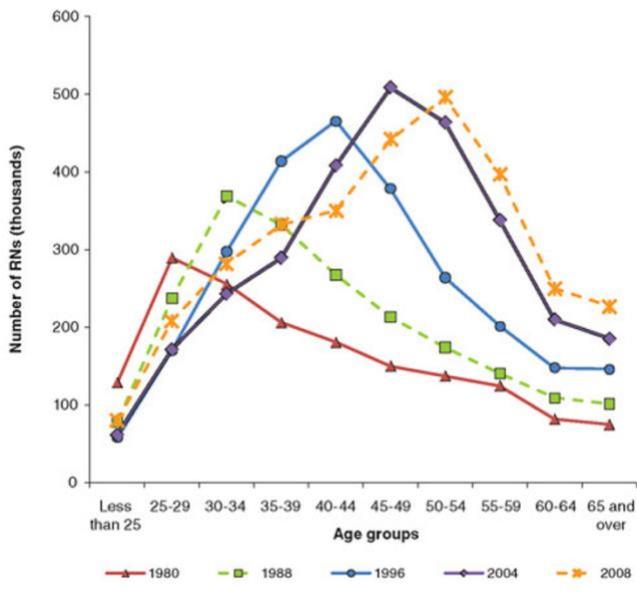


(Goldman, D., & Gaudette, É)

Nursing Schools

Given the increasing demand for nurses of all skill levels and abilities, one would expect a corresponding increase in the number of new nurses entering the workforce. However, nursing school enrollments are growing at a much slower pace than the need for new nurses. This is because many nursing schools are struggling to cope with the exact same demographic trends that are causing the increased demand for nurses.⁶

Many nursing schools today have aging faculty that are retiring at much higher rates than they were a decade ago. This lack of qualified faculty has created a barrier for prospective nurses looking to attend nursing school. A report by the American Association of Colleges of Nursing found that in 2018 alone nursing schools turned away more than 75,000 qualified applicants from baccalaureate and graduate nursing programs because they lacked adequate faculty and clinical space.⁷



Source: HRSA, 2010

Several programs have been created to meet this challenge, but the underlying demographic problems remain. Many universities are creating programs to offer fellowships and provide loan forgiveness if nursing school graduates return to teach. Other schools are partnering with local hospital systems in order to increase clinical education capacity.⁸ Nursing schools around the country are struggling to keep up with the increased demand for nurses and need to

be able to increase their capacity to meet this demand.

Changes in Nurse Populations

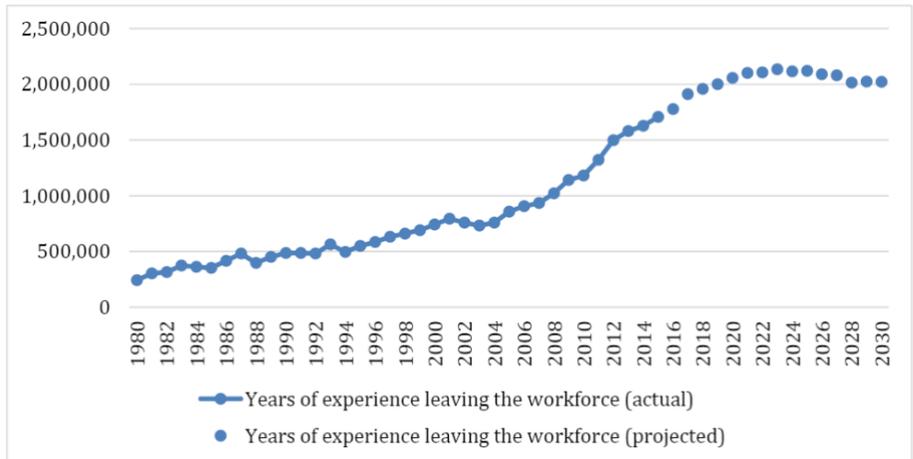
The importance of well-educated and qualified nurses to our healthcare system cannot be overstated. One recent study examined whether the education levels of the nursing staff in a series of Pennsylvania hospitals affected patient outcomes. Even accounting for differences in the quality of surgeons, staffing levels, and patient characteristics, the study showed large differences in the number and severity of mistakes made by nurses of different education levels. The study found that “a 10% increase in the proportion of nurses holding a bachelor’s degree was associated with a 5% decrease in both the likelihood of patients dying within 30 days of admission and the odds of failure to rescue”⁹ These dramatic findings underscore the importance of highly-trained nurses, but the overall workforce is trending in the opposite direction.

Large numbers of RN’s and BSN’s have started retiring across the country, resulting in a huge “brain drain” from many organizations where experienced nurses can serve as the backbone of healthcare systems. A recent article in the Journal of Nursing Regulation found that:

“Experienced RNs are likely to be more adept at identifying complications and unexpected changes in patient conditions sooner and respond appropriately. They are also more likely to know how to manipulate the organization’s culture to get things done, make clinical assignments that better match the knowledge and skills of nurses with the needs of the patient, serve as role models and mentors, and deal effectively with physicians, administrators, and others to ensure the well-being of patients and families.”¹⁰

In total, over 1 million RN's are expected to retire between now and 2030. This loss of knowledge and expertise is yet another challenge that the nursing industry must face. If healthcare is to continue to progress

Years of Experience Lost to the Registered Nurse Workforce, 1979-2030



and provide great treatments, new nursing hires must be better prepared for the

Image Source: Buerhaus, P., Auerbach, D., & Staiger, D. (2017, May 3).

<https://www.healthaffairs.org/doi/10.1377/hblog20170503.059894/full/>

challenging environments they are stepping into, and they must be equipped with better technologies in order to make them more efficient than their predecessors.

Staffing levels

One of the most contentious and divisive topics surrounding nursing today is the idea of mandated nurse staffing levels. In several states already, legislatures have passed laws that mandate a minimum nurse-patient ratio depending on the department within a hospital, but the efficacy of these programs is questionable. Inadequate nurse staffing levels and the corresponding problems associated with it are one of the most pressing issues facing the nursing profession today, but the best solution is far from clear.

The data surrounding staffing levels at hospitals is alarming. Numerous recent studies and surveys have shown just how dire the need for improvement is. In one recent Massachusetts survey, 36% of RN's surveyed said that they had experienced "patient deaths directly attributable to having too many patients to care for at one time."¹¹ Additionally, in the same survey, 64% of RN's reported injuries or harms to patients due to understaffing, and 90% agreed with the statement "I don't have the time to properly

comfort and care for patients and their families due to unsafe patient assignments.” These results are mirrored in other hospitals around the country. Nurses are consistently overworked and lack the time to appropriately care for each patient.

Several studies have also confirmed this direct link between nurse staffing ratios and patient outcomes. In a meta-analysis of the various studies concerning nurse-patient ratios and patient outcomes, the researchers found that for each additional RN per patient, the odds of hospital-related mortality were 9-16% lower per patient day. A plethora of studies have confirmed these conclusions, and all point to statistically significant correlations between nurse staffing levels and patient outcomes.

Competing interests

What, then, is holding back hospitals from increasing staffing ratios to more adequate levels? Hospitals have limited resources and thousands of competing interests. Taking resources away from other programs to hire more nurses could impact other critical programs. One study of California hospitals examined patient outcomes before and after California passed legislation requiring a minimum nurse-patient ratio. They found that “mandated nurse staffing ratios without mechanisms to help achieve ratios may force hospitals, especially safety-net hospitals, to make tradeoffs in other services or investments with unintended negative consequences for patients.”¹² For already cash-strapped hospitals, the costs imposed by mandated minimum nurse ratios were sometimes too much to bear.

Legislation imposed without any funding or mechanisms to achieve these staffing ratio goals will often leave hospitals in a trap. They must divert resources from other critical projects to meet these requirements, even if these

Nurse-Patient Ratio Model

PROS	CONS
<ul style="list-style-type: none"> • Straight forward process • Less time consuming • Less stress for nurses managers • Gives nurse managers more time to be on the floor 	<ul style="list-style-type: none"> • Often impractical because it doesn't take in patient needs or nurse skills • Federal law doesn't define minimum number of nurses to patients which leads to understaffed hospitals • Schedule is inflexible • Nurses can become easily overworked and stressed

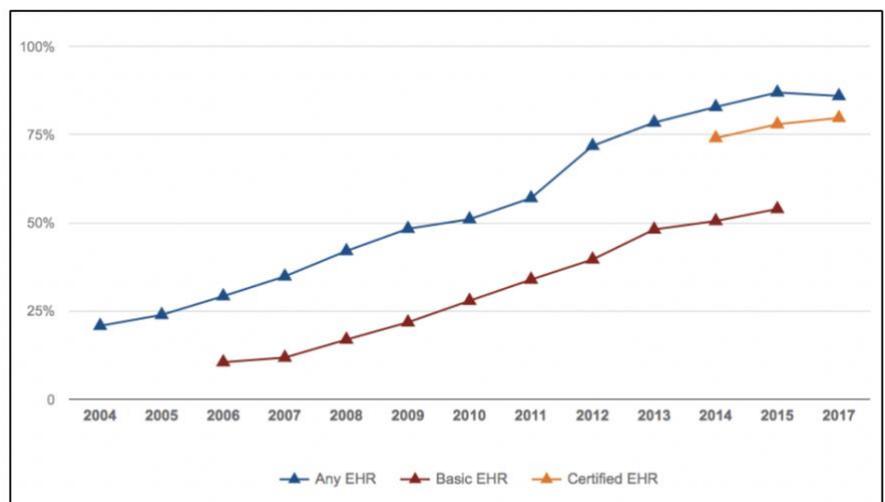
Image Source: <https://connectrn.com/blog/hospital-staffing-model/>

other needs are more pressing. This is often compounded by the fact that new nursing hires are often less experienced and may lack the advanced qualifications that existing nurses have. As stated earlier, there is a significant drop-off in performance as more experienced nurses are replaced with younger ones. Overall, mandating nurse staffing ratios is a noble but misguided fix for a challenging problem.

Menial Tasks

Over the past decade, healthcare in America has made the shift from paper records to EHR's, or electronic health records. This change was expected to yield huge savings in terms of the time nurses spend on menial tasks as opposed to bedside care, but this has not been the case. Nurses still spend an inordinate amount of time on menial tasks. One

classic study examined what nurses spend most of their time and energy on at work. Documentation occupied by far



Percentage of Office-based Physicians with Electronic Health Record System 2004 – 2017

the largest single block of time, taking up over 35% of nurses time on the job. This was followed by care coordination, at 20.6%, and medication administration, at 17%. Patient assessments and reading of vital signs occupied only 7.2% of nurses time on average.

The large proportion of time nurses spend on routine tasks presents an opportunity for the healthcare industry to transition to a value-based care system. Nursing salaries represent a large portion of hospital salary expenses, which in turn is typically the largest source of expense for hospitals.¹³ Paying nurses high salaries to do

menial, easily automated tasks offers a terrible value proposition for the healthcare system. Incredibly, healthcare is the only sector of the American



economy where productivity has actually fallen in recent memory. If the healthcare system hopes to lower costs in the future, the only way it can be done without compromising quality is through empowering each worker to be more efficient.

Solutions

Automated Nursing Aids

The healthcare industry is rapidly pushing new technologies to the market designed to reduce the amount of time nurses spend on easily automated tasks. One of the largest opportunities for improvement is also one of the simplest: documentation. The adoption of EHR's was supposed to save nurses time by eliminating physical paperwork, but a lack of interoperability among many medical devices means that nurses still spend hours doing simple data entry and patient documentation.

Companies such as Sopris Health are aiming to change this. Several prominent startups are receiving national attention for their physician-oriented documentation systems, but nurses still spend far more time on these tasks. Sopris has developed an artificial-intelligence based assistant that can streamline clinician workflow dramatically. Their speech recognition software has been shown to reduce documentation time by over 50% compared to traditional documentation systems, and its ability to integrate directly with an organization's EHR prevents nurses from having to waste even more time entering data.

Another company eliminating wasted time for nurses is One Medical Passport. This company is replacing paper or over-the-phone pre-operative assessments with an online medical history screening. It can help surgery centers screen for a huge variety of pre-op issues such as high blood pressure and cardiac history and can appropriately prepare nurses and surgeons without a labor-intensive screening process. One administrator in a California surgery center said of One Medical Passport:

“Since deploying Medical Passport, cancellations caused by day-of-surgery surprises are no longer an issue, saving us an estimated \$46,000 a year. Pre-op calls are down to five minutes per patient, from the previous 20–25 minutes, eliminating the need for a full-time nurse to manage the process. We are extremely pleased with the results.”¹⁴

By employing smarter, more efficient technologies to streamline many of the routine tasks that occupy so much of nurses' time, companies can spur a transition to more meaningful value-based care.

Data Entry

One of the most challenging problems to solve has been in automating data transfer from patient devices to EHR's. Isolated medical devices and software platforms turn what should be a seamless process into a patchwork of isolated machines, often leaving nurses to transfer data between each system. This problem is huge, involving thousands of individual medical devices, but little by little companies are managing to automate more of these menial data entry tasks. One company helping eliminate these costs is Relaymed. This software platform is designed for physician office laboratories that are too small to justify the costs of a full lab information system designed for hospitals, but still may run hundreds of tests per day. Its premise is simple. It automates the process of transcribing test results from machines in the lab and inputs the data directly into a patient's chart instead of requiring manual entry. This simple change dramatically cuts the amount of time nurses and doctors have to spend on data entry, allowing them to focus on providing better care for each patient.

Efficient Scheduling

The scheduling and staffing of nurse workforces are areas where technology and automation can quickly make significant improvements. The challenges of nurse scheduling have been present in hospitals for centuries, and the nurse scheduling problem has even given rise to its own specialized branch of computational applied

mathematics centered around finding optimal solutions to these problems. With the advent of electronic scheduling platforms, a whole new set of tools can be put to work in determining the most efficient schedules for nurses that balance all parties interests.

The key issue in nurse scheduling revolves around the most efficient allocation of nurses to fit the needs of the organization. In the past, this was a labor-intensive process requiring thousands of sheets of paper and complex charts listing which nurses were eligible and qualified to perform certain roles within the organization. Modern scheduling platforms have the capability to dramatically reshape the way scheduling is performed today.

Scheduling is one of the clearest ways to boost value and efficiency because of its direct correlation with costs. Nurses working overtime present both direct costs, in the form of increased salary obligations, and indirect costs, such as higher error rates in medication administration and increased rates of musculoskeletal injury.¹⁵ More efficient workforce management promises to lower these costs by more efficiently allocating nurses to open shifts, thereby reducing overtime requirements and creating a more equitable work environment for all nurses.

Several companies have begun tackling this challenge with impressive results. One leader in the space is Shiftboard, a cloud-based workforce management tool designed for all hourly workers. It claims a 51% reduction in paid overtime and an overall 6.2% increase in per-worker productivity. Scaled across an organization, these gains can result in savings of millions of dollars for an organization.

Another workforce optimization software tool designed specifically for nursing is producing even more impressive results. ShiftWizard is a software platform designed for nurse scheduling that also incorporates a wealth of productivity, tracking and communication tools, centralizing what is typically a haphazard process. In one application at WakeMed in North Carolina, ShiftWizard saved the organization \$2.1 million over the first two-year period it was implemented. In another application at Swedish Covenant Hospital, ShiftWizard developed a new program designed to incentivize nurses to pick up open shifts, preventing the hospital from turning to

expensive agency nurses. In the first year of the program, the hospital's spending on agency nurses decreased by 75%, saving over \$1.4 million.¹⁶

Leveraging new technologies to more efficiently deploy the nursing workforce is one way to address the challenges facing nursing today. By reducing waste and removing obstacles nurses face such as inadequate scheduling, we are allowing them the opportunity to do what they do best: care for their patients.

Nursing School

In a recent interview, Peter Buerhaus stressed the importance of technology not only in helping the nursing profession move forward, but in the way nursing schools can prepare students for their careers. In particular, he said an area ripe for innovation was the way nursing schools use simulations to enhance learning. As stated earlier, nursing schools are facing problems creating enough capacity to educate enough students to supply the healthcare system with enough nurses. Especially in clinical settings, there often simply isn't enough capacity to teach students. One effective solution is to increase the use of simulators and virtual reality tools for education. SimX is a technology startup that creates medical training simulations using virtual reality to more effectively mirror real-life scenarios. This offers additional flexibility because, unlike traditional mannequins, SimX's software platform can be configured to reproduce many more unique patient characteristics or case complications.¹⁷ As the technology matures and moves from a purely virtual reality (VR) training tool to incorporating tactile learning in an augmented reality (AR) simulation it will more effectively simulate real, clinical experience for a fraction of the cost.

Another training tool with the ability to be used both in and outside of nursing school is Tine Health. Tine is a platform that can show nurses short training clips about a particular procedure before they begin. This just-in-time training has been shown to reduce error rates and increase the reliability and consistency of their care. It even allows for the quicker detection and correction of errors, saving hospitals both wasted time and money.

Improving the way nursing schools teach their students presents an incredible opportunity to improve the profession. Increasing efficiency and improving the quality of teaching will be extremely important as demand for nurses continues to grow. Nurses in the future will have to be even more efficient and capable in delivering care, and the schools that teach them will have to prepare them for a rapidly changing workplace.

Conclusion

Harnessing the expertise and abilities of nurses will be critical to the future of the American healthcare system. The huge opportunity that lies ahead is how to best enable nurses to provide direct care in a more efficient and effective manner. New technologies promise improvements in nearly all aspects of nursing, and they all have a similar ultimate goal: to free nurses from the tedious, menial tasks they do today and allow them to spend more of their on the most important aspect of nursing, caring directly for patients. By allowing nurses the freedom to operate at the peak of their abilities, our healthcare system will provide better quality care to patients while saving time and money.



Founded: 2015

Size: 11 Employees



Sopris Health is an AI enabled, fully-automated digital assistant that enables providers to spend less time on documentation and more time on direct patient care.



It has been shown to reduce documentation time more than 50%, both improving the patient experience and reducing nurse burnout and cognitive load.



\$3.4 Million



Location: Denver, CO

Website: <https://www.soprishealth.com/>



Founded: 2007

Size: 27 Employees



ShiftWizard is a leading workforce optimization solution developed by healthcare professionals for healthcare professionals.



ShiftWizard was the first 100% web-based workforce scheduling solution on the market. It integrates workforce automation capabilities including scheduling, productivity, and forecasting.



\$5 Million



Location: Morrisville, NC

Website: <https://www.shiftwizrd.com/>



Founded: 2002

Size: 55 Employees



Shiftboard is a cloud-based scheduling platform for all hourly workers, not just nurses, and optimizes scheduling and workforce management.



Through strategic staff scheduling Shiftboard's shift management system improves operations, reduces labor costs and improves employee engagement.



\$16.9 Million



Location: Seattle, WA

Website: <https://www.shiftboard.com/>



Founded: 2013

Size: 8 Employees



Tine health produces training systems and tools to help nurses perform at their peak.



By adding QR codes to hospital equipment, Tine health allows training materials to be shown directly before a procedure, dramatically reducing error rates and reinforcing classroom training.



Location: San Francisco, CA

Website: <https://www.tinehealth.com/>



Founded: 2010

Size: 72 Employees



ProviderTrust modernizes and automates outdated compliance and screening programs for healthcare systems.



By automatically checking employee's licenses against OIG exclusion lists, ProviderTrust facilitates efficient and reliable employee screening and verification.



\$1.8 Million



Location: Nashville, TN

Website: <https://www.providertrust.com/>



Founded: 2017

Size: 6 Employees



SnapNurse is a fully tech-enabled staffing platform for nurses, allowing hospitals to book open shifts seamlessly.



Snapnurse verifies and credentials all of their nurses, decreasing agency costs for providers. This boosts efficiency, allowing hospitals more time to care for their patients.



Location: Atlanta, GA

Website: <https://www.snapnurse.com/>



Founded: 2018

Size: 6 Employees



Nurse-1-1 is an app allowing patients to quickly and efficiently get medical advice from nurses without having to take the time-consuming and expensive steps of going to the ER or an urgent care clinic.



. This telehealth platform allows both patients and nurses more flexibility in the way they improve health while simultaneously saving costs.



Location: Boston, MA

Website: <https://nurse-1-1.com/>



Founded: 2013

Size: 7 Employees



SimX produces a VR-based medical training tool to help nurses and physicians practice and improve their skills.



By using virtual reality and augmented reality environments to train healthcare personnel, providers can save huge amounts while improving the quality and the flexibility of their training.



Location: Mountain View, CA

Website: <https://www.simxar.com/>



Founded: 2014

Size: 2 Employees



NurseVersity is an online learning and study aid for nursing students.



Designed by practicing nurses and current nursing students, nurseVersity's goal is to provide the maximum amount of learning in the minimum amount of time



\$125,000



Location: Wilmington, NC

Website: <https://nurseversity.com/>



Founded: 2000

Size: 39 Employees



One Medical Passport (OMP) is a scalable, web-based software solution that streamlines the preoperative process, dramatically increasing patient convenience and staff productivity.



Instead of sitting through a lengthy phone screen, patients can use OMP to fill out a simple online questionnaire to submit their medical information, review disclosures, and prepare for their operations.



\$4.8 Million



Location: Willington, CT

Website: <https://1mp.com/>

relaymed™

Founded: 2012

Size: 11 Employees



Relaymed connects devices in physician's labs directly to their EHR's, saving physician offices thousands of hours in documentation and data entry.



Relaymed works with 48 of the most common medical devices, and their cloud-based software is fully HIPAA compliant and scalable.



Location: Edinburgh, UK

Website: <https://relaymed.com/>

SWIPE
SENSE

Founded: 2011

Size: 30 Employees



SwipeSense's platform improves hospital efficiency and hygiene by monitoring and producing data on hand hygiene compliance, medical equipment usage and labor effectiveness.



Having this critical data allows hospitals to operate more efficiently and effectively, reducing costs while improving patient outcomes.



\$27 Million



Location: Chicago, IL

Website: <https://www.swipesense.com/>



relode

Founded: 2014

Size: 222 Employees



Relode is a healthcare staffing platform that makes finding all kinds of healthcare employees, from nurses to IT specialists, easier.



Healthcare providers can post open jobs and Relode's network of agents can help find the best and most qualified employees to fit the job.



\$750,000



Location: Brentwood, TN

Website: <https://www.relode.com/>

The Future of Nursing Technology

There is an immense opportunity for new technologies to revolutionize the way nursing is currently practiced. Opportunities for growth range from improving how nurses document medical information to reshaping the way nursing schools are educating their students. As our healthcare system looks forward, very little seems certain. How will political changes affect providers? In what ways will governments incentivise the transition to value based care? No matter what happens in the future, however, the backbone of our healthcare system will be nurses who are consistently putting patients first.

Companies harnessing new technologies will allow nurses to be more effective and enable better outcomes than ever before. Our healthcare system is plagued by waste and inefficiency, and much of the burden of dealing with this inefficiency falls on nurses. By focusing on how to make nurses more effective, efficient and consistent, companies can simultaneously help boost efficiency, lower costs and improve patient outcomes. Rarely does an industry need innovation and progress as much as healthcare in America does today. Helping nurses do more for their patients is a critical part of improving the wellbeing of the entire country.



Founded in 1996, FCA Venture Partners has a long history of investing in successful healthcare entrepreneurs. We are passionate about building sustainable businesses and providing strategic value to our portfolio companies.

FCA invests \$3-6M in fast growing healthcare companies making processes in the industry faster, better, and cheaper while improving the quality of care and the patient experience.

With its location in Nashville, roots with Clayton Associates and the McWhorter Family, and deep involvement in the growth of the U.S. healthcare community, FCA Venture Partners is poised to take advantage of disruptive opportunities that help move healthcare forward.

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