Solution Brief

Health and Life Sciences
Assisted Intelligence

Reduce Nursing Workloads with Assisted Intelligence
from Intel and Dell Technologies

intel.

Advanced technologies like computer vision, smart sensors, generative AI and intelligent analytics help automate nurses' administrative tasks and significantly enhance their efficiency, allowing them to focus more on patient care.

Solution benefits

Assisted intelligence solutions powered by Intel and Dell Technologies can help nurses:

- Allocate more time to direct patient care and minimize time spent on administrative duties

- Enhance clinical decision support, which can reduce occurrences of hospital acquired infections or injuries, lower hospital readmission rates, and improve the accessibility of comprehensive patient documentation

- Reduce nursing burnout and stress and improve patient satisfaction.

Executive summary

Nurses are an essential part of caring for patients in a hospital or clinical setting. They perform a staggering number of tasks, including gathering vital signs, assessing and documenting patient condition, administering medications, caring for wounds, conducting diagnostic tests, educating patients and families, and collaborating with other healthcare professionals. Managing a high level of administrative tasks, though, can reduce bedside time and can contribute to the mental, physical, and emotional exhaustion known as burnout.

Technology solutions have immense potential for reducing nurses' administrative burden, but care delivery teams may have concerns about the reliability and accuracy of data interpreted by artificial intelligence (AI). Dell Technologies and Intel encourage nurses to see "AI" in a different light—as **assisted intelligence** that can augment the nursing staff, automate repetitive administrative tasks, and free time for patient care productivity. Far from replacing nurses, seen in this light AI can decrease nursing burnout, get nurses back to the bedside, and improve patient outcomes.

This solution brief describes several use cases for this type of AI and explains how industry collaboration is accelerating the transformation of hospital workflows.

Challenge: Nurses are unable operate at top-of-license due to operational inefficiencies

Nurses face a number of challenges. Recent research uncovered a concerning trend: As of March 2023, 45% of inpatient nurses said they are likely to leave their nursing job in the next six months—and one of the major contributing factors in that decision, they added, was an unmanageable workload.[1] Much of that workload is not direct patient care. Instead, it consists of documentation, searching (for various things, like people, equipment, supplies, medications, and information), and administrative and support tasks.

Healthcare organizations like hospitals and clinics need to find ways to alleviate the added burden on nursing workflows and help nurses focus on what they do best—providing care and improving patient well-being. Technology solutions can enable assisted intelligence to augment healthcare teams through technologies that support automation and advanced analytics.

Refocus nurses to clinical problem solving while delivering better outcomes for patients

Many opportunities exist to use intelligent technology to help nurses get back to the bedside and lower their job stress. The three examples below illustrate potential starting points for hospitals interested in pursuing AI. These types of solutions can help optimize the allocation of personnel resources while at the same time giving nurses the peace of mind that their patients are getting high-quality care at all times.

Lower patient risk with smart computer vision

Nurses work hard to keep their patients safe. Yet, staffing shortages and increased patient numbers make it difficult to always be bedside with each patient. One-third of patients fall more than once during hospitalization, and about 25 to 50% of fallers suffer injuries.[2] Falls aren't the only risk to patients. For example, up to 15% of hospitalized patients develop pressure injuries[3], which are estimated to cost hospitals between USD 9.1 to 11.9 billion per year in the United States.[4] Other risks include secondary infections, sepsis, blood clots, and medication errors. In fact, the World Health Organization estimates that one in 10 patients obtains hospital-acquired conditions during a hospital stay in high-income countries.[5]

The healthcare technology ecosystem is creating AI solutions using computer vision and video analytics that can help prevent patient injuries, reduce nurses' worry and stress, and reduce hospital costs associated with injuries. A smart camera combined with AI and analytics capabilities can alert nurses before a fall occurs by detecting patient movement and predicting actions that may lead to a patient fall. Cameras can also be trained to monitor patient position

and alert nurses if a patient needs to be turned to prevent pressure sores. Far from replacing nurses, computer vision and video analytics can act as a nurses' assistant to enable nurses to focus on the patients that need them most.

From Scalable Patient Monitoring to Predictive Analytics

Medical Informatics Corporation's (MIC) Sickbay platform is an all-in-one FDA-cleared real-time clinical surveillance-as-a-service (RTCS) platform. It receives patient physiologic data, including vitals and waveforms, across all connected devices and systems. It then processes data into web-based clinical applications that can be accessed from various mobile devices. Sickbay enables the development and deployment of real-time, predictive analytics to help providers get ahead of patient condition deterioration.

Data that can be incorporated into the Sickbay application include cardiac monitors, ventilators, and other bedside devices; lab results and International Classification of Diseases (ICD) information; the electronic health record (EHR); and staff assignments. Using Sickbay, healthcare organizations can create a complete longitudinal record from admission to discharge across units, facilities, and devices. In addition, Sickbay supports the ability to use the same data to develop and deploy predictive analytics to help get ahead of deterioration and risk. Here are some examples of the positive impact of the Sickbay platform:

- An eight-hospital system created a virtual care center to monitor all patients across all units. In less than a year, the hospital was able to demonstrate a 37% reduction in code blue events and a 25% reduction in ICU transfers.[7]

- In just 18 months, Guthrie Clinic's remote-patient monitoring hub bolstered patient safety and engagement, while nurse turnover rates decreased from 25% to 13%.[8]

- The University of Alabama at Birmingham (UAB) conducted a pilot project using Sickbay that demonstrated that machine learning allows the capture of high-resolution signals in near-real-time to help doctors take a step closer to precision medicine.

MIC works closely with Dell Technologies and Intel. This strategic three-way collaboration powers smart, connected patient care for better outcomes.

Streamline hospital processes with smart sensors

It is common for hospital nurses to gather vital signs every four hours, hourly, or even more often for high-risk patients. Metrics gathered may include temperature, heart rate (speed and rhythm), blood pressure, oxygen saturation, respiratory rate, and fluid intake and output. Manually collecting and recording vital signs can take 6 to 10 minutes[6] per patient. Patient weight is generally measured daily, which can be physically arduous for both nurse and patient.

Smart sensors are sensors that do more than just record the data—they can measure and process data from the physical environment, and then transmit that data, such as to a central nursing dashboard. For example, smart sensors can gather, analyze, and transmit blood pressure and heart rate, or measure a patient's weight right from the bed. These devices can automate vital sign monitoring at specific intervals at an accuracy that enables nurses to triage and prioritize those patients whose vital signs need immediate attention or are showing a trend of patient decline. Smart sensors can significantly reduce nurses' rounding burden, enabling them to perform other direct care tasks that can boost patient well-being. Programmable thresholds for each patient can alert staff to critical changes in a patient's condition, which can lead to early intervention. Leveraging real-time, up-to-date patient data, nurses can make informed, actionable healthcare decisions without the inefficiency of constantly moving from bed to bed. Each patient interaction is enriched with the latest information, allowing for more impactful and timely interventions that significantly benefit patient outcomes.

Sensors can also help nurses in other ways, such as helping them find the equipment they need. Instead of spending valuable time looking for a wheelchair or oxygen pump, sensors installed on the equipment can send real-time location information to the nursing station. Less searching means more time available at bedside.

Integrated, intelligent sensors throughout the hospital or clinic provide valuable insights, save time and costs, and deliver the data and insights nurses and other care providers need to provide top-quality care without stress and burnout. See the sidebar "From Scalable Patient Monitoring to Predictive Analytics" for information on one sensor-based offering.

Optimize healthcare workflows with generative AI (GenAI)

Nurses can spend 25% to 40% of their shift time on documentation—either generating it or looking for it.[9,10] While documentation is an important aspect of providing care, a more efficient and simple process can help alleviate the frustration and burden that nurses are faced with. Technologies like GenAI and decision support systems have become mainstream, real-world options. Autoscribes enable nurses to dictate Subjective, Objective, Assessment, and Plan (SOAP) notes and transform nurse-patient conversations into documentation. Chatbots can scan hundreds of sources of healthcare information to help nurses quickly find the data they need to address patient issues.

Solution value: Technology stacks for AI-augmented healthcare

Assisted intelligence solutions from companies that have a depth of industry expertise and an understanding of key nursing challenges can deliver strong business and clinical value to nurses. The benefits, addressing the challenges stated earlier, include:

- Improved patient outcomes, such as fewer falls and pressure injuries, lower readmission rates, and more readily accessible whole-patient documentation

- The ability to spend more time on patient care and less time on administrative tasks

- Reduced workload and stress.

Additional advantages include high performance and productivity, hardened cybersecurity, and power efficiency and sustainability, and scalability.

High performance and productivity

Nurses need answers quickly when a patient's life may be at risk. Dell client devices powered by Intel® processors can help nurses complete administrative tasks more efficiently. For example, a new Dell PC can deliver up to 59% better application performance compared to a three-year-old PC[11], and can deliver up to 73% faster GenAI[11]. A recent innovation from Intel—the Intel® AI PC—provides new features that can drive higher productivity through workload acceleration and power efficiency.

Up to
59%
BETTER
application performance[11]

Dell devices with Intel vPro®, built on Intel® Core™ Ultra, give you everything you need.

- AI-Ready Performance
- Security
- Sustainability
- Manageability
- Power Efficiency
- Stability

Figure 1. The collaboration between Intel and Dell Technologies helps bring transformative healthcare solutions to life.

AI PCs can take many form factors, including laptops, companion compute edge devices, embedded form factors, and even desktops and workstations. AI PCs are unique among client devices because they are powered by the Intel® Core™ Ultra processor, which includes three "AI acceleration engines" that together help optimize power consumption while accelerating AI-powered applications directly on the device.

- **CPU:** a high-performance Intel® central processor for fast response and low-latency, lightweight AI tasks

- **GPU:** a built-in Intel® graphics processing unit for high throughput and performance parallelism

- **NPU:** a built-in, power-efficient Intel® neural processing unit for sustained AI workloads and AI offload.

For more information on Intel AI PCs, read the solution brief.

Nursing command centers and healthcare IT data centers can use Dell servers powered by Intel® Xeon® Scalable processors to aggregate and store information from various smart sensors, client devices, and EHR data. These servers provide quick data retrieval and can be used for on-premises processing, adding metadata to collected data for more accurate decision making.

Power efficiency and sustainability

Intel AI PCs offer up to 2.5x more power efficiency for AI inference.[12] They also have low power consumption that can help increase battery life, which can enable enhanced collaboration across healthcare teams. Intel Core Ultra processors provide up to 36% processor power reduction gen-over-gen for video conferencing and up to 21% lower processor power vs. AMD on video conferencing applications.[13]

Up to
2.5x
MORE power efficiency[12]

Up to
36%
PROCESSOR power reduction[13]

From increasing the use of renewable electricity and reducing landfill waste to using recycled or renewable materials for packaging, Intel and Dell Technologies deliver end-to-end solutions to help customers reach their goal of investing in sustainable technology. Both companies are committed to delivering end-to-end, sustainable practices across manufacturing, product design, packaging, and supply chain.

Hardened cybersecurity

Nurses want to know that their patients' data is safe and complies with national and regional privacy and data protection regulations. However, healthcare data is a prime target for cybercriminals. In 2023, the healthcare industry suffered the highest average breach costs at USD 10.93 million.[14] This high cost of data breaches is clearly why 88% of corporate boards see cybersecurity as a business risk, not just a technical IT problem.[15]

Dell AI PCs feature a holistic suite of hardware, firmware, and software-based protections that minimize the attack surface and improve cyber resilience. Nurses can rest assured that their patients' data is highly secure from unauthorized access or exposure. The Intel® vPro platform includes Intel® Hardware Shield and Intel® Threat Detection Technology (Intel® TDT). Dell SafeBIOS uses Intel Hardware Shield to mitigate potential cyber threats below the OS. The Intel vPro platform also offers root of trust, SMM protections, memory encryption, and OS kernel protection. For certain AI PCs, Intel® Active Management Technology (Intel® AMT) provides even more security features along with remote manageability. The Dell Trusted Workspace and Secured Component Verification further bolster device security and integrate device telemetry with industry-leading software to improve fleet-wide security.

Scalability

As the previous three example use cases show, AI has the power to evolve nurses' jobs and positively impact patients' lives. The good news is that these types of solutions are eminently scalable. For example, an investment in computer vision for fall prevention can be easily extended to other important patient conditions and risks. An investment in GenAI to help with patient intake can be adapted to assist with plans of care and discharge. A sensor-based solution for gathering and monitoring vital signs can also expand to include other sensors. This scalability increases the return on investment and enables healthcare organizations to continue transforming patient care for better outcomes.

Backend infrastructure is key to running AI solutions

Nurses use edge devices like laptops, tablets, phones, and smart bedside devices to interact with technologies like computer vision, smart sensors, natural language processing (NLP), and generative AI (GenAI). However, these technologies also rely on backend infrastructure in the data center to train large language models (LLMs), perform Retrieval Augmented Generation (RAG) using speech, text, or image inputs, and meet the performance demands of AI applications.

Intel® Xeon® Scalable processors and Intel® Gaudi architecture are excellent, high-performance hardware building blocks for RAG. Intel Xeon Scalable processors feature Intel® Advanced Matrix Extensions (Intel® AMX), which is a built-in accelerator that improves the performance of deep-learning training and inference on the CPU and is ideal for workloads like natural-language processing, recommendation systems and image recognition. Intel Gaudi 3 AI accelerator-based systems are built for scale and expandability with all-Ethernet-based fabrics and support for a wide range of industry AI models and frameworks.

Several Dell servers powered by Intel Xeon Scalable processors and Intel Gaudi accelerators are available. Solution vendors can use software tools from Intel, such as the Intel® Geti platform for computer vision solutions and the Intel® Distribution of OpenVINO™ toolkit to optimize application performance, such as LLMs for RAG applications.

Learn more about Intel® technology:

- Optimizing Large Language Models with the OpenVINO™ Toolkit

- Large Language Model Inference Guide

- Building Blocks of RAG with Intel

- Implement Retrieval-Augmented Generation (RAG) to Accelerate LLM Application Development

Dell compute devices range from thin clients to power-house workstations—and everything in between. The portfolio includes Latitude, OptiPlex, and Precision devices with Intel vPro technology, running the latest version of Intel Core processors. In the data center, Dell servers and storage solutions provide a data-centric, intelligent, and adaptable infrastructure that supports both new and emerging edge workloads such as Sickbay, and traditional workloads. Their modern, innovative devices can accelerate many nursing tasks, including patient registration and documentation. Dell devices are highly secure and easy to manage so care providers can focus on their patient's needs.

Conclusion

Every hospital and clinic's infrastructure needs are unique, so a one-size-fits-all recommendation for AI hardware and software is impossible. However, working with us, healthcare organizations can access an end-to-end ecosystem of solution vendors that can tailor a best-fit AI solution that can automate mundane tasks and let nurses use their expertise and experience to provide direct, bedside care to their patients. Deploying automated remote monitoring, autoscribes, computer vision, smart sensors, and advanced analytics throughout a hospital can improve patient safety and conserve nurses' valuable time. Intel and

Dell Technologies experts can provide best practices and recommended solution configurations based on the size, scale, and complexity of a healthcare organization's workload.

Learn more

You may find the following resources helpful:

- Healthcare and Life Sciences technology solutions from Intel

- Healthcare & Life Sciences solutions from Dell Technologies

- Solve Healthcare Business Challenges with Intel® AI PCs solution brief

- Intel® AI PCs

- Intel® Core™ Ultra Processors Family

Find the solution that is right for your organization. Contact your Dell Technologies or Intel sales representative.

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[1] McKinsey, May 2023, "Reimagining the nursing workload: Finding time to close the workforce gap."

[2] Journal of Patient Safety, August 2024, "Consequences of Inpatient Falls in Acute Care: A Retrospective Register Study."

[3] National Library of Medicine, February 2024, "Pressure Injury."

[4] The Hospital and Healthsystem Association of Pennsylvania, "The Problem of Pressure Injuries."

[5] Berxi, July 2024, "Can You Name the Top 10 Patient Safety Risks in Your Hospital?"

[6] Ably Medical, July 2024, "Maximizing time for patients: How much time do healthcare professionals spend on vital signs monitoring?"

[7] IntelCapital.com, January 2023, "Investing in a New Standard of Care Delivery."

[8] American Hospital Association, 2023, "How Guthrie Clinic resolved its nursing shortage, boosted patient satisfaction and netted savings."

[9] Nursing Times, February 2023, "How digital can stop nurses drowning in documentation'."

[10] American Association of Critical-Care Nurses, November 2023, "Nursing Documentation Burden: A Critical Problem to Solve."

[11] Source: https://www.dell.com/en-us/lp/intel-vpro-platform. As measured by text-to-image generative AI workload using A1111 plug-in Intel Core Ultra 7 165H vs. Intel Core i7-1370P.

[12] Intel Corporation. "Benchmarks Overview." As measured by UL Procyon AI Inference Benchmark (int8 model) Intel Core Ultra 7 165H NPU vs. Intel Core i7-1370P GPU.

[13] Source: https://edc.intel.com/content/www/us/en/products/performance/benchmarks/mobile/

[14] Security Intelligence, August 2024, "Cost of a data breach: The healthcare industry."

[15] Gartner, January 2022, "Gartner Predicts 2022: Cybersecurity Leaders Are Losing Control in a Distributed Ecosystem."