CEI WORKING GROUP PRESENTS

Evidence-based Practices of Capacity Enhancing Health Innovations

Capacity-Enhancing Innovation Working Group



A booklet showcasing real-life examples of health innovations and emerging technologies, highlighting their impact in supporting Europe's healthcare workforce and safeguarding patient safety.

PART ONE
Following the Patient Pathway

PART TWO
Supporting Health Professionals Beyond Direct Patient Care

CONCLUSION
Conclusion and Recommendations

Setting the Scene

1.2 million
Current estimated shortage of doctors, nurses and midwives in the EU

4 million
Projected shortage by 2030 if no effective interventions are implemented

1 in 4
People who may need to work in healthcare by 2040 to meet demand

The EU's healthcare workforce is under increasing pressure. Current estimates suggest a shortage of approximately 1.2 million doctors, nurses, and midwives, a figure projected to rise to 4 million by 2030 if no effective interventions are implemented.[1] By 2040, meeting healthcare demand may require one in four people to work in the sector. These shortages are driven by factors including an ageing population, budgetary constraints, and the lasting effects of the COVID-19 pandemic.[2]

While improving working conditions, remuneration, and mental health support remains essential, evidence suggests that thoughtfully implemented innovations can play a complementary role in addressing workforce challenges. For instance, digital tools that streamline administrative tasks or support clinical decision-making have been shown in studies to reduce time spent on non-clinical work, improve workflow efficiency, and decrease burnout among healthcare professionals. In some cases, these gains have contributed to higher staff retention rates, indirectly mitigating workforce shortages.[3][4] Conversely, innovations introduced without professional involvement or adequate training often add complexity, increase workload, and fail to deliver intended benefits.

This document therefore presents examples of such health innovations and technologies across the patient care pathway, from prevention and diagnosis to treatment, monitoring, and follow-up, while highlighting evidence of measurable impacts on professional well-being, efficiency, and patient safety.

Beyond direct patient care, we also explore innovations targeting critical system-level functions, such as training and skills development, recruitment and onboarding, workflow optimisation, digital literacy, and interprofessional collaboration. These examples include both high-tech solutions and low-tech or no-tech interventions, which often create the conditions for successful adoption of more advanced tools. Our approach emphasises the importance of active healthcare professional engagement in the design, selection, and implementation of innovations, supported by adequate time, resources, and training.

By examining both patient-facing and system-level innovations through an evidence-based lens, this document provides a nuanced understanding of how innovations, appropriately implemented, can support healthcare professionals, improve efficiency, and contribute to safer, more sustainable healthcare systems.

Disclaimer
The Evidence-based Practices featured in this Booklet were submitted by Working Group Members, both past and present. Their inclusion reflects contributions made at the time of submission and does not imply ongoing membership or sponsorship.

[1] OECD/European Commission (2024), Health at a Glance: Europe 2024: State of Health in the EU Cycle, OECD Publishing, Paris, https://www.oecd.org/en/publications/health-at-a-glance-europe-2024_b3704e14-en/full-report.htm.l.
[2] Zapata, T., Muscat, N., Falkenbach, M., & Wissmar, M. (2023). FROM GREAT ATTRITION TO GREAT ATTRACTION: COUNTERING THE GREAT RESIGNATION OF HEALTH AND CARE WORKERS. Eurohealth, 29(1), 6–10. https://iris.who.int/server/api/core/bitstreams/488b01ab-a066-4558-a345-476570fe2802/content

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SPOTLIGHT

Spotlight: The Use of AI in Healthcare

132 hrs
saved per year by close to half of surveyed professionals

+8
additional patients per week (global median)

71%
of clinicians report improved workflow efficiency

57%
experience faster, consolidated access to patient data

Source: Philips, 2026

Artificial intelligence (AI) is transitioning into everyday care delivery. Rather than replacing clinical staff, AI acts as a cognitive partner, streamlining routine documentation, consolidating disparate records, flagging safety risks, and assisting diagnostic reasoning. When integrated into routine workflows, AI frees up clinical time and cognitive headspace, enabling healthcare professionals to operate at the top of their license and focus on high-value, direct patient care.

Evidence demonstrates that AI is already delivering measurable dividends across clinical and operational settings. The deployment of AI tools significantly **reduces administrative workload**, with close to half of surveyed healthcare professionals reporting annual time savings of at least 132 hours, the equivalent of more than three full working weeks. These efficiencies translate into expanded system capacity: half of clinicians state that AI has increased their ability to see more patients, delivering a global median increase of eight additional patients per week. Crucially, 71% of clinicians report marked improvements in workflow efficiency, while 57% experience faster, consolidated access to patient data across disparate care teams (Philips, 2026).

By streamlining repetitive administrative duties and acting as a cognitive support layer, AI directly **mitigates occupational strain** and **fosters a more sustainable work environment**. Half of healthcare professionals report that AI has improved their work-life balance and led to reduced stress. Rather than marginalising staff, these technologies facilitate practice: 70% of clinicians state that AI enables them to work at the peak of their professional competencies, and 80% indicate that their daily responsibilities are becoming more focused on complex, higher-value clinical tasks (Philips, 2026).

However, to successfully translate early gains into sustainable, system-wide practice, healthcare organisations must address **critical readiness gaps** across three core areas:

- While adoption is progressing rapidly, 70% of healthcare professionals state that **training** for AI-enabled tools is unavailable, limited, or inconsistent within their organisation. Establishing structured, role-specific curricula is vital to ensure clinicians are equipped to critically appraise and audit AI recommendations, develop technical navigation skills, and navigate legal liability considerations (Philips, 2026).

- **Clinical safety depends on maintaining human accountability**. Nine in ten clinicians affirm that keeping a human in the loop is essential as AI advances, with 86% emphasising that all AI-generated outputs require clinician oversight. Healthcare professionals express strong comfort when AI acts as an assistive partner, yet fewer than 10% are comfortable with autonomous, independent AI decision-making in clinical contexts.

- Nearly two-thirds of clinicians currently resort to personal AI tools because institutional offerings fail to meet their practical needs. To mitigate clinical risk, protect sensitive patient data, and maintain high standards of patient safety, health systems must move away from fragmented pilot projects and establish robust, interoperable enterprise platforms supported by clear auditing protocols, transparent algorithmic models, and coordinated institutional governance (Philips, 2026).

Ultimately, AI represents **not a replacement for clinical expertise, but a vital catalyst** for workforce resilience and patient safety across Europe's health systems. When embedded thoughtfully into routine care delivery, AI can relieve acute administrative pressures, return critical time and cognitive headspace to frontline staff, and empower multidisciplinary teams to operate at the top of their licence.

However, unlocking these dividends at scale cannot rely on informal adoption or fragmented technology pilots. For Europe to capitalise on the promise of the hybrid care team, policymakers and health system leaders must actively address the readiness gap, investing in structured workforce training, establishing clear clinical governance, and ensuring that human judgment remains indisputably at the centre of every care decision.

The readiness gap at a glance

70%
say AI training is unavailable, limited or inconsistent

9 in 10
say keeping a human in the loop is essential

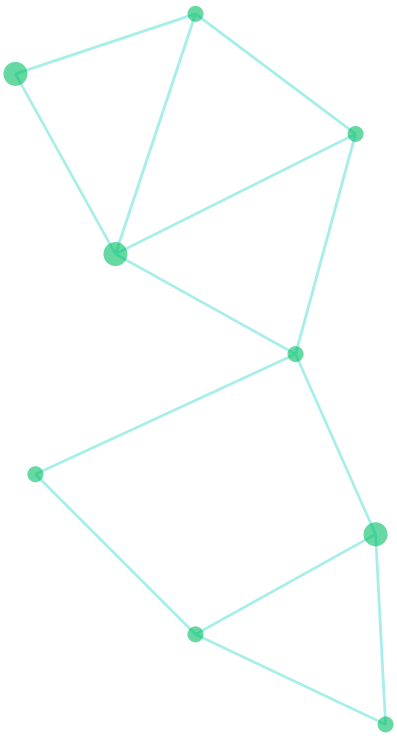
86%
say all AI-generated outputs require clinician oversight

<10%
are comfortable with autonomous AI decision-making

Source: Philips, 2026

KEY MESSAGE

AI represents not a replacement for clinical expertise, but a vital catalyst for workforce resilience and patient safety across Europe's health systems.



PART ONE

Following the Patient Pathway

The patient pathway represents the complete journey an individual takes through the healthcare system, from the earliest stages of prevention and health promotion to diagnosis, treatment, recovery, and long-term follow-up. By breaking this journey into clear categories, healthcare providers, policymakers, and innovators can better identify needs, streamline care, and improve outcomes. Understanding each stage of the pathway is essential for ensuring that patients receive timely, effective, and coordinated care.

THE EIGHT STAGES OF THE PATHWAY

01 **Prevention & Health Promotion** – activities to maintain health and prevent disease (screening, vaccinations, lifestyle interventions).

02 **Awareness & Early Detection** – recognising symptoms or identifying risks through screening and early warning systems.

03 **Referral & Access** – entering the healthcare system (primary care, referral to specialists, emergency admission).

04 **Diagnosis & Assessment** – clinical evaluation, tests, imaging, lab work, and determining the patient's condition.

05 **Treatment & Intervention** – medical, surgical, therapeutic, or pharmacological interventions.

06 **Monitoring & Ongoing Management** – continuous observation of vital signs, disease progression, or treatment response.

07 **Rehabilitation & Recovery** – physical, psychological, or occupational rehabilitation to restore function and independence.

08 **Follow-up & Long-term Care** – routine check-ups, chronic disease management, and secondary prevention.

01

1. Prevention & Health Promotion

Prevention and health promotion are two bedrocks of global health management, serving as foundational pillars that underpin efforts to maintain health and prevent diseases. Through screening, vaccinations, and lifestyle interventions, these activities aim to reduce the incidence of illnesses and enhance the overall quality of life. By embracing innovations in this stage, healthcare systems can alleviate the burdens on medical professionals, allowing them to focus on more complex health issues and emergencies that occur in later stages of the patient pathway. Modernising these principles is crucial for creating resilient health systems, ensuring a reliable healthcare workforce, and fostering a healthier global population.



COMING SOON

Evidence-based practices for this stage will soon be available.

STAGE 1 OF 8 ON THE PATIENT PATHWAY

2. Awareness & Early Detection

Whereas prevention and health promotion may not be the final solution for every person, awareness and early detection can step up as another crucial aspect of public health management. This stage is aimed at recognising symptoms and identifying risks at the earliest possible stage. Through systemic screening efforts and early warning systems, these practices enable timely intervention and treatment, significantly improving patient outcomes and reducing the severity of diseases. By fostering a culture of awareness and vigilance, healthcare systems can empower individuals with adequate knowledge to monitor their health and seek medical advice promptly, while also educating those who may be unaware of risk factors and symptoms.

BEST PRACTICE · 2.1

HPV Self-Collection With Extended Genotyping

HPV self-collection allows women to collect a vaginal sample at home using validated self-collection tools and send it to the lab. When combined with extended genotyping (XGT), the test identifies HPV 16/18 plus additional high-risk types (31, 45, 51, 52) and grouped categories, enabling more precise risk stratification.

TYPE OF SOLUTION

Self-sampling Technology

WHERE IS IT APPLIED?

EU

Why does it matter?

Self-collection increases participation by offering a more convenient, less-embarrassing option, especially for women who avoid clinic visits. It represents a major innovation for reaching under-screened populations. XGT enhances clinical decision-making by distinguishing high-risk from lower-risk infections, reducing unnecessary referrals and enabling more efficient follow-up.

Outcomes at a glance

36%

lower programme costs with self-sampling, at similar effectiveness

Ostensson et al., 2025

A Swedish study has shown that transitioning from clinician-collected sampling to self-sampling can **cut programme costs by 36% while maintaining similar effectiveness** (Ostensson et al., 2025). Extended genotyping further improves efficiency by reducing unnecessary colposcopy referrals and enabling targeted follow-up for women who truly need it. Together, self-collection and XGT **expand access, increase participation, save time for patients, support earlier detection of high-risk HPV types**.

CONSIDERATION

The integration of such tools into organised call–recall systems remains inconsistent, and in many lower- and middle-income European countries self-collection is still limited to pilot projects (Winterflood et al., 2025).

03

3. Referral & Access

Once the patient enters the healthcare system to treat a symptom, the practice of referring patients to the right health professional becomes a vital step in the pathway cycle. Effective referral and access to medical aid are essential to ensure that individuals receive appropriate and timely care. This process involves directing patients to primary care providers, referring them to specialists, or admitting them to emergency services as needed. By streamlining referral pathways and enhancing access to healthcare services, systems can further optimise patient outcomes and ensure the efficient use of available and, in most cases, scarce resources. Innovating these referral pathways and access to the healthcare system holds the potential to optimise the efficient use of resources within healthcare systems.



COMING SOON

Evidence-based practices for this stage will soon be available.

STAGE 3 OF 8 ON THE PATIENT PATHWAY

4. Diagnosis & Assessment

Once an individual is referred to the appropriate professional, the next phase of care commences with a thorough assessment and diagnosis. This step is essential as it builds a clear understanding of an individual's health needs and establishes the foundation for an effective treatment plan. By employing structured evaluation tools, evidence-based diagnostic methods, and collaborative input across disciplines, this stage ensures that care is tailored to the unique circumstances of each patient. Early and accurate assessment not only facilitates the delivery of timely interventions but also prevents unnecessary duplication of effort, reducing inefficiencies within the healthcare system. Moreover, innovations such as digital triage platforms, remote consultations, and data-driven diagnostic support can streamline the process, helping professionals to reach decisions more efficiently while maintaining accuracy and quality.

BEST PRACTICE · 4.1

Improving Laboratory Processes in the Emergency Department (ED)

Optimising lab processes in the ED means faster, safer care for patients, greater efficiency for hospitals, and more time for staff to do what matters most: care for people.

TYPE OF SOLUTION

Medical Technology • Process Innovation

WHERE IS IT APPLIED?

EU · UK

Why does it matter?

Emergency departments face increasing patient demand, greater case complexity, and rising operational strain. Laboratory testing plays a crucial role in patient care, but delays or errors in this process can directly affect diagnosis, treatment, and patient outcomes.

This best practice focuses on

01 **Improving sample quality**

02 **Streamlining pre-analytical practices**

03 **Enhancing staff training**

04 **Introducing point-of-care testing (POCT)**

05 **Supporting processes with digital solutions**

Outcomes at a glance

Reduced length of stay
by minimising preanalytical errors and delays (Phelan et al., 2020)

Decreased patient mortality and complications
due to timely results (De Luca et al., 2004)

Improved staff satisfaction and patient experience
(McCall et al., 2016)

Reduced risk of misdiagnosis and associated adverse events
(Newman-Toker et al., 2022)

The initiative also supports broader health system challenges. Standardising sample collection and result processing **saves valuable staff time**, allowing professionals to focus more on direct patient care. **Improved patient flow** helps reduce bed blockages, increasing system capacity and making service delivery more effective.

Key enablers for success include strong clinical guidelines, integrated training with clear quality indicators (QIs), the use of POCT in combination with rapid triage, and the automation and digitalisation of laboratory services.

BEST PRACTICE · 4.2

Remote Radiology Collaboration through Radiology Operations Command Center

A remote radiology command center enables expert radiographers to provide real-time guidance to on-site technologists using audiovisual, chat, and remote console access. The system improves efficiency and quality across multiple imaging sites.

TYPE OF SOLUTION

Process Innovation • Digital Infrastructure

WHERE IS IT APPLIED?

UK

Why does it matter?

By enabling remote collaboration, expert support can be delivered instantly without requiring travel. This approach ensures consistent imaging quality, accelerates workforce training, and maintains high standards of patient safety.

Outcomes at a glance

+91%
more evening cardiac MR scans, with no exams recalled

2×
as many staff trained, in half the time

38%
more consistent scan times

Up to 7 min
faster cardiac MR exams, on average

During the pilot period, evening **cardiac MR scans increased by 91%**, while no exams had to be recalled. Radiographer **training was accelerated**, with twice as many staff trained in half the time. **Scan times became 38% more consistent**, and cardiac MR exams were completed **up to seven minutes faster on average** (Philips, 2025).

A secure and scalable digital infrastructure allows for seamless remote support, while real-time guidance from experts enabled high-quality imaging even in understaffed settings. Finally, structured training protocols enabled rapid onboarding and skill development.

BEST PRACTICE · 4.3

Innovative Capillary Blood Collection and Microsampling

Innovative capillary blood collection and Patient-Centric Microsampling (PCmS) are creating new opportunities to bring diagnostic testing closer to patients by enabling minimally invasive collection of small blood samples in settings such as primary care, pharmacies, community services and, where clinically validated, patients' homes. By reducing reliance on conventional venous blood draws while maintaining access to established laboratory workflows, these approaches can make testing more comfortable, accessible and patient-centred, particularly for people requiring frequent monitoring, older adults, individuals with limited mobility and underserved populations. They also have the potential to support chronic disease management, preventive care and population screening by facilitating repeated testing and its integration into routine care pathways.

TYPE OF SOLUTION

Medical Technology • Process Innovation

WHERE IS IT APPLIED?

EU · UK

Why does it matter?

Decentralised blood collection can reduce unnecessary patient travel, ease pressure on healthcare professionals and improve access to diagnostics, particularly for underserved populations. The EU-funded Project COMFORT is exploring the clinical, logistical and regulatory requirements for integrating patient-centric microsampling into routine care. While evidence supports its reliability for selected biomarkers, broader adoption will depend on appropriate clinical validation, user-friendly implementation and clear regulatory and reimbursement frameworks. With these safeguards, microsampling could support more accessible, efficient and patient-centred diagnostic services across Europe (IHI, 2024).

Success depends on integrating capillary collection into existing care pathways, designing devices that align with patient and provider needs, and gaining acceptance of capillary methods as a reliable alternative to venous sampling. Training and user-centered design are essential to ensure both staff and patients can adopt the new process effectively.

BEST PRACTICE · 4.4

Managing Difficult Venous Access (DVA) in Blood Collection

Managing Difficult Venous Access (DVA) is an approach that helps safely collect blood from patients with hard-to-find veins. It focuses on safe and efficient blood collection for people with whom venipuncture could be challenging. By combining the right devices with the right techniques, staff can reduce complications, improve patient comfort, and increase efficiency.

TYPE OF SOLUTION

Medical Device • Process Innovation

WHERE IS IT APPLIED? EU · UK

Why does it matter?

Difficult venous access could lead to repeated needle attempts, patient discomfort, sample rejection, and delays in care. These challenges place additional burden on staff and can disrupt laboratory workflows. A structured approach ensures safe, effective, and compassionate blood collection while protecting staff.

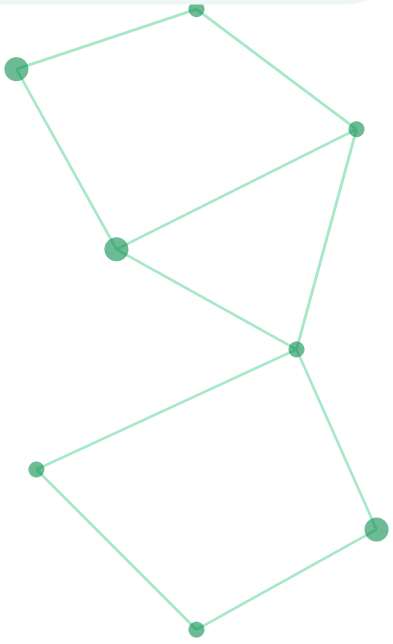
Outcomes at a glance

- **Fewer sample rejections**
- **More reliable test results**
- **Greater patient comfort**
- **Lower staff workload & stress**

The number of **sample rejections** due to haemolysis or clotting has been **significantly reduced** (Gupta, Thomas, Sbetan, et al., 2021), leading to **more reliable test results**. Patients experience greater comfort and overall satisfaction during blood collection (Giussani, et al., 204), while **delays and complications caused by difficult venous access have been minimised** (Skokoohi, Loesche, Duggan, et al., 2020).

By reducing repeated attempts and complications, DVA strategies can help **lower staff workload and stress**. They could also help**improve workflow efficiency** in wards and diagnostic labs, decreasing delays and wasted resources while allowing staff to focus on other clinical priorities.

Effective DVA management relies on a combination of training, equipment, and clinical guidelines. Staff need education on tailored techniques and access to advanced equipment such as thin-wall needles.



05 Treatment & Intervention

Following a confirmed diagnosis, the focus shifts towards treatment and intervention, where patients begin to engage with a range of tailored options designed to address their specific needs. This stage may involve medical, surgical, therapeutic, or pharmacological measures, each selected to target the condition effectively while supporting the individual's recovery and long-term well-being. The treatment journey often requires careful coordination between multiple professionals, ensuring that interventions are both safe and optimally sequenced. Advances in precision medicine, minimally invasive techniques, and digital therapeutics are further transforming how care is delivered, allowing interventions to be more personalised, less burdensome, and more efficient.

BEST PRACTICE · 5.1

Smart Infusion Pump Integration

Smart infusion pumps equipped with Drug Error Reduction Software (DERS) provide automated, closed-loop medication delivery in intensive care units. By combining technology with centralised ICU monitoring, these systems help ensure precise dosing, reduce human error, and streamline workflow for clinical staff.

TYPE OF SOLUTION

Digital Technology

Why does it matter?

Medication errors in ICUs can have serious consequences for patient safety. Nurses often spend significant time manually calculating and administering infusions, which can increase the risk of mistakes and reduce efficiency. Smart pumps with DERS address these challenges by automating dosage adjustments, reducing reliance on manual calculations, and supporting safer care delivery (Orsini et al., 2025).

Outcomes at a glance

Studies have shown that implementation of these smart infusion systems result in impressive outcomes. **Medication errors were reduced by up to 100%**, and hospitals saw a return on investment of up to 645% in the Swedish branch of the study (Orsini et al., 2025).

Up to 100%
reduction in medication errors

Up to 645%
return on investment (Swedish branch)

By automating repetitive tasks and reducing errors, these smart pumps **improve staff confidence and safety in ICU medication administration**. This allows ICU teams to manage more patients effectively and facilitates smoother transitions of care, helping hospitals maintain high-quality care even under staffing pressures.

Successful adoption relies on seamless integration with existing pharmacy and electronic health record systems. Adequate staff training and careful change management ensure that ICU teams are confident in using the technology.

BEST PRACTICE · 5.2

Minimally Invasive Heart Valve Replacement

Transcatheter Aortic Valve Implantation (TAVI) allows aortic valve replacement to be performed through a catheter inserted in the groin, avoiding the need for open-heart surgery. This minimally invasive approach reduces trauma, accelerates recovery, and shortens hospital stays.

TYPE OF SOLUTION

Medical Procedure

Why does it matter?

Traditional open-heart surgery requires stopping the heart and opening the chest, which demands significant surgical resources, ICU care, and extended hospital stays. TAVI offers a safer, less resource-intensive alternative that benefits both patients and hospital workflows. Patients recover faster, while hospitals can optimise staff and bed utilisation.

Outcomes at a glance

(GIRFT & NHS, 2023; Gupta Strategists, 2021)

- Hospital stays shortened to **1–3 days**, compared with 5–10 days for open surgery
- Procedures require **six times fewer personnel**
- Procedural productivity increased by **80%**
- Lower ICU admissions and **fewer post-operative complications**

1–3 days
hospital stay vs 5–10 for open surgery

6×
fewer personnel per procedure

+80%
procedural productivity

Impact on the workforce

By reducing the need for extensive surgical teams and ICU care, TAVI eases clinical workforce pressure and frees up specialist staff for other procedures. Hospitals benefit from increased patient throughput, shorter stays, and more efficient use of beds and resources.

Successful implementation depends on advances in catheter-based technology and standardised clinical protocols for patient eligibility, procedural steps, and post-operative care. Training and coordination among surgical and nursing teams are also essential.

BEST PRACTICE · 5.3

Streamlined TAVI Pathway for Better Outcomes

Evidence-based pathways for TAVI are structured care protocols that guide cardiac teams in treating patients undergoing valve replacement. By following these pathways, hospitals can shorten procedure times, reduce ICU stays, and safely discharge patients faster, all without compromising outcomes.

TYPE OF SOLUTION

Clinical Protocol Optimisation • Process Innovation

Why does it matter?

Cardiac procedures like TAVI traditionally require significant staff involvement, ICU resources, and extended hospital stays. Variations in practice can slow workflows and increase pressure on clinical teams. Implementing standardised pathways ensures every patient receives efficient, safe care while helping overburdened staff manage their workload more effectively.

What the evidence shows:

Studies (Frank et al. 2023) and real-world implementation highlight tangible improvements:

- Hospital stays dropped from **7.7 to 5.8 days** in the BENCHMARK study, with some patients discharged the next day under the 3M pathway
- ICU time reduced from **1.8 to 1.3 days**
- More procedures are performed under local anaesthesia (96.1% vs. 84.3%)
- Average procedure time fell from **60 to 47 minutes**
- No increase in 30-day adverse events such as stroke, bleeding, or mortality

5.8 days	1.3 days	96.1%	47 min
hospital stay, down from 7.7 (BENCHMARK)	ICU time, down from 1.8 days	under local anaesthesia (vs. 84.3%)	average procedure time, down from 60

BEST PRACTICE · 5.4

Medication Traceability Systems in Cancer Medication

Medication traceability systems provide a comprehensive approach to ensuring the safe, efficient, and accurate delivery of cancer therapies. These integrated software solutions guide the medication process from prescription and preparation to administration, connecting physicians, pharmacists, and nursing staff while reducing errors and improving patient care.

TYPE OF SOLUTION

Digital Technology • Process Innovation

WHERE IS IT APPLIED?

EU · UK

Why does it matter?

Cancer medications often involve narrow therapeutic windows, complex dosing, and high-risk substances. Manual processes for prescribing, preparing, and administering these therapies are prone to errors, which can compromise patient safety. By implementing traceability systems, hospitals can standardise workflows, minimise human error, and ensure that patients receive the right medication at the right dose.

Outcomes at a glance

Medication traceability systems for cancer medication connected to Electronic Health Records have been included in the European Comprehensive Cancer Centers standards, under Europe´s Beating Cancer Plan program.

These systems have demonstrated significant benefits in patient safety, efficiency, and service delivery. They reduce the risk of medication errors, ensuring safer prescribing and administration of high-risk cancer medicines.

Automated preparation and administration streamline pharmacy and nursing workflows, with studies showing up to **35% improvement in medication preparation efficiency** (BD Blog, 2024) **and 43% improvement in medication administration efficiency.** By speeding up processes, these systems can also reduce patient waiting times; in Spain, implementation was shown to **cut up to eight days from waiting times for cancer therapy** (ECO Foundation et al., 2023). By minimising medication errors and error risks (Bay & Meren 2021; Fan et al. 2022; Marzal-Alfaro et al. 2020), they can help **decrease staff stress and burnout, improving job satisfaction and retention**. From a system perspective, traceability solutions increase operational efficiency, reduce medication waste, and deliver a measurable return on investment. A study across EU hospitals estimated that implementing **such systems requires €274 million but can generate a return on investment of 350%** (Orsini et al., 2025)..

+35%
medication preparation efficiency

+43%
medication administration efficiency

Up to 8 days
cut from cancer therapy waiting times (Spain)

350%
return on investment across EU hospitals

BEST PRACTICE · 5.5

Innovative Peripherally Inserted Central Catheter Placement

These Confirmation Systems enable nurse-led bedside placement of Peripherally Inserted Central Catheters (PICCs), replacing the need for traditional consultant-led procedures in theatres or interventional radiology. It uses real-time electrocardiogram (ECG) technology to confirm the catheter tip's location in the superior vena cava, ensuring accurate placement without the need for X-ray verification.

TYPE OF SOLUTION
Medical Technology • Process Innovation

WHERE IS IT APPLIED?
EU · UK

Why does it matter?

Traditional PICC placement requires highly skilled consultants and access to operating theatres or interventional radiology, which can be costly and limited in availability. In the context of increasing demand for vascular access and consultant shortages, nurse-led PICC insertion offers a safe and efficient alternative, reducing procedural bottlenecks and enhancing hospital capacity.

Outcomes at a glance

Implementation of similar systems has led to reduced staff time for consultants, faster procedures, and improved accuracy of catheter placement. Hospitals report **better workflow and increased capacity**, as theatre and interventional radiology resources are freed for other procedures (Helm, 2015; Royal College of Radiologists, 2024; Patel et al, 2018; Mussa et al, 2021, Barton, 2022).

Success relies on structured training programs for nurses, regulatory frameworks that permit task delegation, and strong collaboration between clinical teams. Institutional support for adopting new technologies and integrating them into standard care pathways is essential for sustained implementation.

BEST PRACTICE · 5.6

Automated Dispensing Systems (ADS)

Automated Dispensing Cabinets (ADCs) are computerised systems that securely store and dispense medications at the point of care. By integrating with pharmacy information systems and electronic health records, these systems ensure accurate, timely access to medications.

TYPE OF SOLUTION

Medication Management System • Process Innovation

Why does it matter?

Medication errors are a major contributor to patient harm and staff workload. Manual processes for dispensing and tracking medications are time-consuming and prone to mistakes. Automated dispensing systems streamline these workflows, reduce human error, and free staff to focus on higher-value clinical tasks.

Outcomes at a glance

Implementation of ADCs improves medication safety, reduces staff time spent on manual dispensing, and ensures accurate access to medications. Studies show a significant return on investment, with estimates **indicating a 250% ROI for EU hospitals, and a 37% reduction in costs related to medication errors and extended patient stays** (ECAMET & EAASM, 2024)**.**

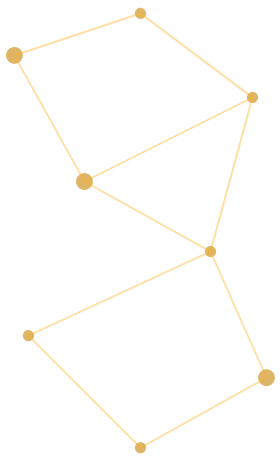
250%

estimated return on investment for EU hospitals

37%

lower costs from medication errors and extended stays

Successful adoption depends on access to the equipment, staff training, integration with existing digital systems, and strong institutional support for workflow redesign.



BEST PRACTICE · 5.7

Same-Day Discharge after Percutaneous Coronary Intervention

Same-Day Discharge after PCI allows selected patients to leave hospital within 12 hours after the procedure, following routine monitoring. Advances in PCI techniques, stent technology, pharmacotherapy and operator expertise have made this approach increasingly safe for appropriate elective patients.

TYPE OF SOLUTION

Process Innovation

WHERE IS IT APPLIED?

EU

Why does it matter?

By reducing unnecessary overnight stays, SDD-PCI helps free up inpatient beds, optimise staff time and improve patient flow, while maintaining safe care for selected elective patients (Gąsecka, A., et al., 2024; Liberman, F et al., 2024; Kim, M et al., 2013).

Outcomes at a glance

SDD-PCI can shorten post-procedure stays from around 24 hours to 4–6 hours, improving bed availability and hospital capacity (Rao SV et al., 2021; Maximillian Bourdillon et al., 2026). It may also reduce healthcare spending by approximately 50% in elective procedures, while supporting high patient preference and satisfaction (Rinfret, S. et al., 2010), By avoiding unnecessary overnight admissions, the pathway helps staff redirect time and resources to patients requiring more intensive care.

4–6 hours
post-procedure stay, down from around 24 hours

~50%
lower healthcare spending in elective procedures

< 12 hours
from procedure to discharge for selected patients

06 Monitoring & Ongoing Management

Once treatment has been initiated, ongoing monitoring becomes essential to track progress and ensure that interventions remain effective. This stage involves the continuous observation of vital signs, disease progression, and responses to therapy, enabling professionals to make timely adjustments where necessary. Through regular assessments, digital health tools, and remote monitoring technologies, clinicians can detect changes early, intervene promptly, and prevent complications before they escalate, without needing to be next to the patient's bed. Such proactive management not only improves patient safety and the patient's experience, but it also enhances efficiency, as professionals are able to prioritise care for those whose conditions require immediate attention.

BEST PRACTICE · 6.1

Female External Urinary Systems

Female external catheters offer a non-invasive solution for managing urine output in women. Using low-pressure suction, they help keep urine away from the skin, reducing the risks of infection, skin damage, and falls associated with incontinence, while improving comfort and efficiency of care.

TYPE OF SOLUTION

Medical Technology • Process Innovation

WHERE IS IT APPLIED?

EU · UK

Why does it matter?

Catheter-associated urinary tract infections (CAUTIs) and incontinence-associated dermatitis (IAD) are common complications in hospitalised and long-term care patients, often leading to extended hospital stays and additional treatments. Traditional indwelling catheters increase infection risks, while incontinence care places a heavy burden on nursing staff. These systems address both challenges by **providing a safer, non-invasive alternative that benefits patients and staff alike**. Importantly, external catheters and noninvasive solutions also **support rehabilitation and long-term care** by enabling patient mobility, preserving dignity, and reducing dependency on invasive devices. This contributes to **faster recovery and improved quality of life for patients** in post-acute and chronic care settings. In line with APIC 2025 and CDC guidance, healthcare facilities should evaluate appropriate non-invasive alternatives to indwelling urinary catheters, including external urinary collection devices for eligible patients, before proceeding with catheter insertion.

Outcomes at a glance

Hospitals implementing similar systems report **reduced infection rates and fewer complications, alongside more efficient use of equipment.** Patients experience **improved comfort, dignity and mobility**, while nursing staff may benefit from a reduced workload, as time spent on repetitive incontinence care is significantly decreased.

- **Reduced infection rates**
- **Fewer complications**
- **Comfort, dignity & mobility**
- **Reduced nursing workload**

Success relies on strong clinical evidence, best practice guidelines, and cost-effectiveness analyses support successful adoption. Clear protocols and staff training further ensure smooth integration into routine care.

BEST PRACTICE · 6.2

Visual Representation of Vital Signs

This digital tool, also referred to a visual avatar, transforms complex monitoring data into an intuitive, animated representation of a patient's vital signs. By visualising parameters such as pulse, oxygen saturation, and blood pressure, it allows clinicians to instantly assess patient status, even in fast-paced or high-stress environments.

TYPE OF SOLUTION

Digital Tool

Why does it matter?

Traditional monitoring displays can overwhelm clinicians, especially when caring for multiple patients or working under pressure. The visual representation simplifies interpretation, reduces cognitive load, and improves situational awareness.

Outcomes at a glance

Studies show a **94% accuracy rate** in **recognising patient conditions after just six minutes of training**, a **57% improvement in identifying vital signs** when monitoring multiple patients, and up to a **12% reduction in perceived workload** (Philips,2023b). Clinicians also demonstrated improved performance even when distracted.

94%
accuracy recognising patient conditions after six minutes of training

+57%
better at identifying vital signs across multiple patients

Up to 12%
reduction in perceived workload

The success of this solution relies on human-centred design, close collaboration with academic partners to validate usability, and minimal training requirements that make it easy to adopt.

BEST PRACTICE · 6.3

Noninvasive and Minimal Invasive Hemodynamic Monitoring to Reduce Hospital Healthcare Utilisation

In a perioperative Enhanced Recovery After Surgery (ERAS) program to coordinate the hospital pathway management for patients receiving radical prostatectomy, noninvasive and minimal invasive hemodynamic monitoring with predictive digital technology has been used as part of the anesthesia management. Less hypotension in absolute occurrence as well as depth and duration results in significantly lower overall healthcare utilisation after surgery.

TYPE OF SOLUTION

Medical Technology · ERAS Management

WHERE IS IT APPLIED?



Why does it matter?

Hypotensive events may occur during various types of surgery due to anesthesia. Depending on their severity and duration, these events may be associated with increased risks of perioperative complications, morbidity, and hospital healthcare utilisation. ERAS protocols aim at limiting the overall intravenous fluid infusions to the minimum necessary in order to assure an optimal fluid balance even in the postoperative phase, when oral intake is resumed.

Outcomes at a glance

The study group had a **65% reduction in hypotensive events, with a 72% reduction in their duration and an 85% reduction in their severity** compared to patients without the use of predictive hemodynamic monitoring. These patients showed a **reduction in postoperative infectious complications**, **3 days shorter in-hospital length of stay**, **less ICU admission after surgery and a lower rate of hospital readmission** (Brusasco et al., 2025).

65%
reduction in hypotensive events

72%
reduction in their duration

85%
reduction in their severity

3 days
shorter in-hospital length of stay

BEST PRACTICE · 6.4

Predictive intraoperative Monitoring to Reduce Hypotension, Postoperative Complication and Length of Stay

This innovation uses advanced minimal invasive sensor technology combined with machine learning algorithms in combination with a personalised treatment protocol to predict intraoperative hypotension (MAP <65mm/Hg) in non-cardiac high-risk surgical patients. By generating early alerts up to 15 minutes in advance, clinicians can intervene with protocol-based measures proactively to reduce the depth and duration of hypotension and the risk of associated complications.

TYPE OF SOLUTION

Medical Technology · Clinical Protocol

WHERE IS IT APPLIED?



Why does it matter?

Intraoperative hypotension (IOH) in surgery has been associated with a higher risk of short and long-term mortality and postoperative complications, including renal and cardiac injury, sepsis, and delirium and consequently extended recovery times. Traditional monitoring often reacts too late, increasing the burden on clinicians who must balancemultiple alerts. Predictive monitoring can help clinicians to shift care from reactive to preventive.

Outcomes at a glance

Patients which have been treated with the predictive monitoring system together with a personalised treatment protocol had significantly **lower intraoperative hypotension**. Postoperative complications were less prevalent in these patients. Finally, **LOS was significantly shorter** among these patients with a median difference of 2 days. This study shows that predictive hemodynamic monitoring combined with a personalised treatment protocol may help to **minimise the depth and duration of intraoperative hypotension during non-cardiac surgery** (Solares et al., 2022).

BEST PRACTICE · 6.5

Alarm Reduction in Intensive Care

This technology demonstrates how intensive care units can significantly cut down on non-actionable alarms by optimising monitoring settings, tailoring alarm profiles, and providing targeted staff training.

TYPE OF SOLUTION

Medical Technology · Process Innovation

WHERE IS IT APPLIED?



Why does it matter?

Alarm fatigue is a well-recognised issue in critical care. Excessive, clinically irrelevant alarms not only disturb patients' rest and recovery but also distract staff, increase stress, and risk desensitisation to critical alerts.

Outcomes at a glance

Following implementation, alarm frequency **dropped by 40% overall**, with **arrhythmia alarms reduced by nearly half** and **oxygen saturation alarms cut by more than 50%**. While patients benefited from reduced disturbances, staff reported a quieter work environment and greater job satisfaction (Philips, 2017).

40%
drop in alarm frequency overall

Nearly half
fewer arrhythmia alarms

>50%
fewer oxygen saturation alarms

The success of this initiative relied on a structured, data-driven approach, cross-disciplinary collaboration, and a strong change management framework.

Note

Please note that innovative solutions discussed in the previous chapter “Treatment & Intervention” such as medication traceability systems and smart pumps technologies also play an important role for patients’ monitoring and management.

07 Rehabilitation & Recovery

For most patients, the journey does not end with treatment alone; rehabilitation and recovery form a vital part of restoring independence and quality of life. This stage may include physical therapy to regain strength and mobility, psychological support to address mental health needs, or occupational rehabilitation to help individuals return to daily activities. Effective recovery rarely follows a linear path, requiring personalised plans, multidisciplinary input, and ongoing encouragement to sustain progress. Innovations such as tele-rehabilitation platforms, virtual reality therapies, and community-based recovery programmes are expanding access and reducing burdens on clinical services, while still providing high-quality support.

Evidence-based practices for this stage will soon be available.



08 Follow-up & Long-term Care

After recovery, patients benefit greatly from structured follow-up and long-term care to maintain good health, prevent recurrence, and manage chronic conditions. This stage may involve routine check-ups, secondary prevention strategies, and continuous support for individuals living with long-term illnesses. Consistent follow-ups help to identify emerging risks early, reinforce healthy behaviours, and adjust care plans to evolving needs. Increasingly, digital platforms, community-based services, and shared-care models are playing a crucial role in making long-term care more accessible and less resource-intensive. By adopting these approaches, healthcare systems can ensure continuity, reduce avoidable complications, and foster stronger partnerships between patients and professionals. In doing so, long-term care becomes not only a means of sustaining health but also a strategy for alleviating burdens on frontline services.

Evidence-based practices for this stage will soon be available.



PART TWO

Supporting Health Professionals Beyond Direct Patient Care

Improving efficiencies in the patient pathway certainly relieves significant pressure on health professionals' shoulders; however, it does not capture the full scope of their daily work. Beyond direct patient interactions, health professionals operate within complex systems where their effectiveness also depends on infrastructure, resources, and support structures around them. Areas such as training and skills development, recruitment and onboarding, workflow optimisation, digital literacy, staff wellbeing, interprofessional collaboration, and change management all play a decisive role in shaping the capacity of healthcare teams to deliver safe and effective care. Understanding these domains provides a more exhaustive picture of how healthcare systems function, ensuring that efforts to support professionals translate into both improved working conditions and better outcomes for patients.

1

Recruitment & Retention

attract, integrate, and sustain a skilled and motivated healthcare workforce.

2

Workforce Training & Risk Management

ontinuous education, upskilling, and preparedness to ensure safety and quality of care.

3

Workforce Optimisation & Efficiency

tools and processes to streamline workflows, reduce administrative burden, and maximise impact.

4

Staff Wellbeing & Psychological Support

initiatives to protect mental health, promote resilience, and foster supportive working environments

01 Recruitment & Retention

Sustaining a resilient healthcare system begins with attracting and retaining skilled professionals who can meet the evolving demands of patient care. Recruitment strategies must go beyond simply filling vacancies, focusing instead on creating pathways that bring in diverse talent, integrate new staff effectively, and foster a sense of belonging from the outset. Equally, retention depends on providing supportive work environments, growth opportunities, and recognition of professional contributions. Innovations such as digital recruitment platforms, predictive workforce planning, and flexible employment models are helping organisations to adapt more quickly to workforce needs.

BEST PRACTICE · 1.1

Clap Clap Tour for Healthcare Workforce Recruitment

This initiative is a national recruitment initiative designed to address nursing shortages in the wake of the COVID-19 pandemic. Over 30 days, existing staff acted as recruitment ambassadors, visiting 25 hospitals across France and combining live events with a coordinated digital communications campaign to raise awareness and attract new talent.

WHERE IS IT APPLIED?

Why does it matter?

By creating visibility for nursing roles and highlighting the excitement and value of the profession, the Clap Clap Tour addresses health workforce challenges in a highly engaging and public-facing way.

Impact on the workforce

By directly engaging potential recruits and promoting nursing as a rewarding career, the tour helped reduce vacancy rates and attract younger generations, supporting long-term workforce sustainability. The improved recruitment efforts that followed, strengthened the continuity of care, reduced the need for temporary or agency staff, and ensured that hospitals are better staffed to meet patient demand.

Key results in France

The initiative reached over **800,000 individuals through social media**, generated **27 press articles**, conducted **561 interviews**, and received **400 job applications**. It also won **three media awards** for innovation and outreach (UEHP & Relyens, 2023; Relyens, 2023).

BEST PRACTICE · 1.2

Digital Onboarding to Support Workers Retention and Recruitment

Quirón Salud implemented a digital onboarding and workflow support programme to address physician burnout and high retirement rates. The initiative provides physicians with flexible, streamlined access to digital tools and enabled them to focus on complex patient care.

TYPE OF SOLUTION

Digital Platform · Workforce Education · Process Innovation

WHERE IS IT APPLIED? 

Why does it matter?

Physician shortages and burnout negatively impact care quality and continuity. Traditional onboarding processes can be time-consuming and bureaucratic, adding stress and slowing integration into hospital workflows. By simplifying and digitalising onboarding, this programme improves engagement, efficiency, and overall job satisfaction.

Impact on the workforce

This initiative supports physician well-being, mitigates burnout, and enhances staff retention, particularly in high-demand specialties. Digital onboarding enables faster, more focused care delivery without requiring additional headcount, supporting efficient patient flow and optimised resource use.

Outcomes at a glance

The programme has led to **shorter patient wait times**, **faster** and **more responsive** triage and referrals, and **increased physician flexibility and satisfaction** in their roles (UEHP & Relyens, 2023; Relyens, 2023).

BEST PRACTICE · 1.3

ASL Piemonte's Empowerment Programme

Piemonte's Local Health Authority has put in place a structured empowerment programme aimed at fostering user-centred care, transparency, and improved communication within healthcare settings. The initiative combines legislative KPIs, staff media training, patient engagement activities, and experience measurement to strengthen relational quality and ensure that patient perspectives inform care delivery.

TYPE OF SOLUTION

Workforce Training · Process Innovation

WHERE IS IT APPLIED? 

Why does it matter?

Healthcare quality depends not only on clinical outcomes but also on the experience and trust of patients and staff. By prioritising communication, transparency, and relational care, this programme addresses challenges related to workforce engagement, satisfaction, and retention, while simultaneously improving patient experience.

Outcomes at a glance

The programme has led to **higher trust and satisfaction among both patients and healthcare staff**, the creation of "patient courts" to manage feedback, and a continuous improvement cycle for staff training and development (UEHP & Relyens, 2023).

Success depends on alignment with legislative requirements, structured professional training, and a strong organisational commitment to relational and user-centred care.

BEST PRACTICE · 1.4

Mental Health for Health Professionals: Strengthening Psychological Safety Through Structured Collegial Support

MeSu is a peer support for mental health initiative that introduces a simple, scalable model to strengthen the mental well-being of healthcare workers through two structured practices: short supportive peer-to-peer conversations and defusing sessions after difficult events. First piloted at Herlev Hospital and developed by PS! and CAMES, the model promotes open dialogue, empathy, and everyday psychological support, and can be adapted to any healthcare department.

TYPE OF SOLUTION

Workforce Well-Being & Psychological Safety Intervention

WHERE IS IT APPLIED?



Why does it matter?

Healthcare staff face intense emotional pressure that can lead to burnout, poor well-being, and risks to patient safety. Strengthening psychological safety and collegiality improves staff resilience, retention, and team effectiveness, directly benefiting patient care and organisational stability.

Outcomes at a glance

The initiative led to significant improvements in psychological safety, with more than five percentage-point gains across multiple indicators. Staff reported stronger communication and awareness, with one-third speaking more openly about important issues and half becoming more attentive to colleagues' need for support. **Overall, 78% said the conversations had a great or very great positive impact** (MeSu, 2022). MeSu is the winner of the 2025 EUPSF's BIAPS award.

78%
said the conversations had a great positive impact

>5 pts
gains in psychological safety indicators

1/3
speaking more openly about important issues

Half
more attentive to colleagues' need for support

These discussions most often addressed **teamwork, work organisation, and challenging patient pathways,** and the model is now being scaled beyond the initial pilot department due to its success.

02 Workforce Training & Risk Management

Continuous training and effective risk management are cornerstones of a safe and adaptive healthcare environment. As medical knowledge and technologies evolve rapidly, professionals must be equipped with the latest skills and competencies to deliver effective care. Structured training programmes, simulation-based learning, and digital education platforms are expanding opportunities for skill development while ensuring learning is accessible and ongoing. At the same time, robust risk management systems, covering everything from infection control to data security, help safeguard both patients and staff. By combining training with proactive risk management, healthcare organisations can enhance safety, maintain compliance, and empower professionals to meet challenges with confidence.

BEST PRACTICE · 2.1

Digitally-Enhanced Medication Safety

Barcode Medication Administration systems use handheld scanners to verify both patient identity and the correct medication before administration. This dual-confirmation process significantly reduces medication errors while streamlining workflow.

TYPE OF SOLUTION

Technology · Digital Tool

WHERE IS IT APPLIED?



Why does it matter?

Medication errors are a major source of preventable harm and contribute to staff workload and stress. Traditional manual administration and documentation can be slow and error-prone, particularly in high-volume wards such as oncology or ICU. BCMA addresses both patient safety and efficiency challenges.

Outcomes at a glance

Implementation has reduced the **average time per medication from six minutes to 41 seconds**, saving up to **three hours per nurse per day** and **cutting overall medication administration time by 33%** (Moore et al., 2020).

6 min → 41 s
average time per medication

3 hours
saved per nurse per day

33%
less overall medication administration time

Impact on the workforce

By automating verification and documentation steps, BCMA frees nursing staff from repetitive tasks, reduces cognitive load, and improves job satisfaction. Faster and safer medication rounds improve patient throughput in high-volume wards, reduce errors, and allow staff to focus on higher-value clinical work.

Success depends on a user-friendly interface, minimal learning curve, and compatibility with existing EHR systems to ensure seamless integration into daily workflows.

BEST PRACTICE · 2.2

Luz Innovation Programme: The "Phygital" Experience

The Luz Innovation Programme combines physical and digital ("phygital") approaches to strengthen healthcare workforce capabilities and improve care delivery. It integrates simulation-based training, train-the-trainer modules, interdisciplinary teamwork, and digital literacy in diagnostics and patient care, fostering a modern, adaptable workforce.

TYPE OF SOLUTION

Digital Tool · Workforce Training

WHERE IS IT APPLIED?



Why does it matter?

Rapid technological advancement and increasing care complexity require staff to develop new skills quickly. Traditional training methods alone are insufficient to address generational differences and evolving clinical demands. By blending digital and in-person approaches, the programme enhances workforce competence and confidence.

The initiative **strengthens staff competence**, **engagement**, and **satisfaction**, helping reduce skill gaps, turnover, and burnout while supporting a culture of continuous learning. By improving productivity, diagnostic accuracy, and teamwork, the programme enables **high-quality care to be delivered more efficiently and at scale** (UEHP & Relyens, 2023).

Success depends on dedicated in-house innovation hubs, investment in staff training, and a patient-centric approach that ensures all initiatives directly enhance care delivery.

BEST PRACTICE · 2.3

Hospital Risk Management Based on Human Factors

This initiative integrates human factors into hospital risk management by combining soft skills training, behavioural analysis, and error-prevention strategies. Staff are trained in communication, fatigue management, and the use of standardised checklists to reduce cognitive errors and improve team coordination.

TYPE OF SOLUTION

Workforce Training · Safety Protocols & Human Factors

WHERE IS IT APPLIED?



Why does it matter?

Medical errors and miscommunication are significant contributors to patient harm and staff stress. Embedding human factor principles into daily practice strengthens the safety culture, improves performance under pressure, and supports predictable, low-error clinical environments. Implementation resulted in **fewer adverse events, improved team communication, and a measurable reduction in cognitive errors** during clinical tasks.

Impact on the workforce

By equipping staff with tools to prevent errors and manage stress, the programme **enhances job satisfaction, reduces burnout, and supports a more resilient healthcare workforce**. A safer, low-error environment improves overall hospital efficiency, ensures smoother operations, and allows healthcare teams to focus on patient care rather than managing preventable incidents.

BEST PRACTICE · 2.4

BeWell Pact for Skills and Workforce Resilience

The BeWell project is a Europe-wide, multi-stakeholder initiative under the umbrella of the Pact for Skills. It is designed to boost the resilience of the health and care workforce by focusing on digital and green skills, lifelong learning, and inclusive career pathways. The programme promotes co-creation of training, enhanced working conditions, and embedding new technologies and sustainable practices across health ecosystems.

TYPE OF SOLUTION

Workforce Training · Workforce Wellbeing and Strategic Planning

WHERE IS IT APPLIED?



Why does it matter?

Europe's health and care systems face multiple challenges: an ageing workforce, increasing demand, evolving technologies, and sustainability pressures. The BeWell initiative addresses these trends by anticipating skill mismatches and equipping professionals with the competencies to respond to complexity, transformation, and future roles.

Outcomes at a glance

Implementation of the BeWell project is expected to result in:

- A blueprint for the health and care workforce's digital and green skills, upscaled at local, regional, national and European levels.
- Training programmes co-created for current and emerging occupational profiles in health and care, fostering adaptability and continuous professional development.
- A strengthened culture of lifelong learning, improved working conditions (including wellbeing and retention), and more inclusive access to career pathways.

Impact on the workforce

By offering tailored upskilling and reskilling opportunities — particularly in digital literacy, green practices, and soft skills — the BeWell project helps build a more resilient, motivated, and future-ready workforce. Improved skills enable more efficient use of technology and resources, better integration of care, and enhanced retention and attractiveness of the health sector.

BEST PRACTICE · 2.5

Intern & Student-Centred Training Reforms

Reforms to medical intern and student training programmes were introduced in France to better address work-life balance, mental health, and non-medical stressors that impact patient safety. These focus on resilience, soft skills, and structured support systems, ensuring interns are equipped to provide safe, effective care.

TYPE OF SOLUTION

Workforce Training · Process Innovation

WHERE IS IT APPLIED?



Why does it matter?

Interns face high stress, long hours, and exposure to challenging clinical environments. Without supportive training frameworks, these pressures contribute to burnout, attrition, and potential safety risks for patients.

Impact on the workforce

By fostering wellbeing, resilience, and structured support, the initiative helps **retain interns, sustaining the future medical workforce and reducing burnout among early-career clinicians**. A more resilient and engaged intern cohort ensures a continuous, high-quality pipeline of healthcare professionals, strengthening long-term workforce capacity and safety culture in hospitals.

BEST PRACTICE · 2.6

Human-Centered Innovation to Alleviate Workforce Shortages in Nursing

ESNO has implemented a human-centered approach to introducing digital tools, AI, robotics, and other technological innovations in nursing. The initiative actively involves nurses and doctors from design through implementation to ensure that innovations align with clinical realities.

TYPE OF SOLUTION

Workforce Development and Retention Strategy · Culture and Change Management

WHERE IS IT APPLIED?



Why does it matter?

Nursing shortages and digitalisation pressures are increasing cognitive load, errors, and burnout. Aligning technology with the needs and workflows of nurses reduces these risks, making care safer and more efficient while keeping staff motivated and invested in their roles.

Outcomes at a glance

Implementation has led to **increased staff motivation and retention**, **improved alignment of digital tools with clinical workflows**, **stronger interdisciplinary collaboration**, and **sustainable adoption of technology** integrated into everyday practice.

Impact on the workforce

The programme engages nurses in meaningful co-creation, supports upskilling and role evolution, and fosters a resilient workforce. Staff retention improves as their professional expertise is recognised and embedded in innovation strategies. By aligning staff and technology, the initiative reduces delays, optimises clinical time, and supports sustainable, patient-centred care.

03 Workforce Optimisation & Efficiency

With rising demand and limited resources, optimising the healthcare workforce has become essential to maintaining effective service delivery. This involves redesigning workflows, reducing administrative burdens, and ensuring that staff skills are matched to tasks that maximise their impact. New delivery models, such as improved workflow analytics, task-shifting, and automation, help staff focus on high-value tasks, improve efficiency, and increase patient throughput despite workforce shortages. Digital solutions such as AI-assisted scheduling, integrated record systems, and automation of routine processes are transforming how professionals spend their time, freeing them to focus on direct patient care. Beyond technology, optimising efficiency also requires cultural and organisational shifts that promote collaboration, reduce duplication of effort, and support strong clinical leadership to sustain workflow improvements.

BEST PRACTICE · 3.1

Automation in Hospital Medication Management

The LIUC Cattaneo University study (Orsini et al., 2026) evaluated Medication Management Automation technologies in a model 561-bed hospital. This integrated approach addresses inefficiencies in medication administration, inventory management, and error reduction.

TYPE OF SOLUTION

Medication Management System · Digital Tool · Process Innovation

WHERE IS IT APPLIED?



Why does it matter?

Medication management is a high-risk and time-consuming part of hospital operations. Automation and improving traceability reduces errors , medication waste and inventory and frees staff to focus on direct patient care.

Outcomes at a glance

The integrated medication-management automation model estimated a total investment of €2.47 billion, generating €1.97 billion in annual savings, an average ROI of 206%, and a payback period of 3.46 years across the EU27 and the UK (Orsini et al., 2025). Of these savings, €1.24 billion stem from improved workforce efficiency, reduced medication waste and optimised inventory management, while €733.1 million are associated with fewer medication administration errors. These findings highlight automation's potential to improve patient safety, reduce operational costs and free up healthcare professionals' time for patient-centred care.

206 %
average return on investment

€1.97 billion
annual savings

3.46 years
average payback time

Success relies on scalable implementation models, robust financial evaluation, as well as validation by expert panels of pharmacists and clinicians.

Overall, the LIUC analysis found that **Europe would need to invest €3.3 billion in automation technologies, but the investment would pay for itself in about 4.6 years and save around €1.8 billion every year.**

BEST PRACTICE · 3.2

Medication Inventory Robots

An example of such technologies featured in the LUIC evaluation (Orsini et al., 2025) are Medication Inventory Robots, which are automated systems that track, store, and manage medications within hospital pharmacies, ensuring accurate stock control, reducing waste, and streamlining workflow.

TYPE OF SOLUTION

Medication Management System · Digital Tool

WHERE IS IT APPLIED?

Outcomes at a glance

Medication inventory robots **increase accuracy and efficiency** by automating counting, restocking, and inventory tracking, reducing manual effort and error. They **enhance medication safety** by monitoring expiration dates and preventing the dispensing of expired drugs, while also preventing stockouts of critical medications. Operational costs are reduced through lower labour requirements, minimised waste, and optimised storage space, leading to significant overall cost savings.

These robots free pharmacists and other staff from time-consuming manual work, allowing them to focus on higher-value clinical activities and patient care. They **improve operational efficiency, reduce medication-related costs, and optimise the level of stock** required. More specifically, the study shows that inventory robots in an 850-bed hospital virtually eliminate drug waste (100% reduction), cut product stock by 26.4%, reduce medication errors by 16%, and save over 31% of technicians' working hours, significantly improving efficiency and safety (Orsini et al., 2025).

100%	**26.4%**	**16%**	**>31%**
reduction in drug waste	cut in product stock	fewer medication errors	of technicians' working hours saved

Strong clinical evidence, adherence to best-practice guidelines, and cost-effectiveness analyses are essential to successful implementation. Staff training and integration with hospital workflows support optimalised use.

04 Staff Wellbeing & Psychological Support

The wellbeing of healthcare professionals is fundamental to the functioning of any healthcare system. High workloads, emotional strain, and systemic pressures place staff at risk of burnout, stress, and mental health challenges. Supporting wellbeing, therefore, requires proactive measures, from access to counselling and peer support networks to workplace policies that promote balance, flexibility, and recognition. Innovations such as digital platforms, mindfulness tools, and real-time feedback systems are increasingly used to provide immediate and ongoing support. By embedding psychological support and wellbeing initiatives into daily practice, healthcare organisations not only safeguard their workforce but also strengthen resilience, retention, and the quality of care delivered to patients.

BEST PRACTICE · 4.1

Peer Support Programme for Second Victims

The European Researchers' Network Working on Second Victims (ERNST) developed a comprehensive, evidence-based peer support programme to assist "second victim" healthcare professionals. The programme builds on the forYOU model and expands it into a five-tier framework including prevention, self-care, peer support, professional support, and clinical support. It provides training manuals, case studies, an online course, and a consensus-based checklist to guide effective implementation.

TYPE OF SOLUTION

Workforce Training · Organisational Structure · Structural Change

WHERE IS IT APPLIED?

Outcomes at a glance

Over 2,500 healthcare professionals completed the ERNST online course. Peer support programmes were established in multiple hospitals across Europe. Economic evaluations in Germany **estimated cost savings of €6,672 per supported healthcare worker** (ERNST, 2025). The initiative increased awareness of the second victim phenomenon, improved psychological safety, and reduced stigma associated with adverse events.

By addressing the emotional impact of adverse events, the programme **reduces burnout, absenteeism, and turnover**. It fosters resilience, supports mental health, and helps retain skilled professionals, ensuring continuity of care. The initiative **strengthens organisational learning, promotes patient safety, and encourages a just culture**. It equips healthcare systems to respond effectively to adverse events, improving both staff well-being and patient outcomes.

>2,500
healthcare professionals completed the ERNST online course

€6,672
estimated savings per supported healthcare worker (Germany)

5 tiers
prevention, self-care, peer, professional and clinical support

Strong international collaboration, interdisciplinary engagement, validated evidence-based frameworks, integration with organisational policy, and leadership support are critical for successful adoption.

BEST PRACTICE · 4.2

The AK Safety Circle for Staff Wellbeing and Retention

Asklepios Kliniken in Germany developed the AK Safety Circle, a comprehensive workforce wellbeing strategy combining training, staff wellbeing, diversity, and international recruitment. The programme includes medical schools, online learning, integration mentors, and an internal referral app to support recruitment and onboarding.

TYPE OF SOLUTION

Workforce Training · Process Innovation

WHERE IS IT APPLIED?



Outcomes at a glance

The AK Safety Circle has resulted in lower absenteeism and occupational accidents, more stable staffing, higher employee motivation, and improved long-term retention.

Impact on the workforce

By providing training, mentorship, and wellbeing support, the programme **strengthens the talent pipeline, improves working conditions, and helps retain skilled staff**. Enhanced workforce stability and safety contribute to consistent staffing, improved patient care continuity, and reduced operational disruptions.

Investment in workforce integration, ethical recruitment partnerships, comprehensive HR support, and structured onboarding were critical for success of the program.

CONCLUSION

Concluding Recommendations

The European Union's healthcare systems face a pivotal challenge. Rising workforce shortages and increasing care demands require solutions that go beyond theoretical potential, focusing on practical, evidence-based improvements that support both patient care and professional well-being. As demonstrated in this document, innovations, whether high-tech or low-tech, can help alleviate pressures by reducing administrative burden, improving workflow, and enhancing patient safety. Importantly, the positive impact of these tools depends on their thoughtful implementation, with active engagement, adequate training, and sufficient support for healthcare professionals.

Yet, alone cannot solve the workforce crisis. Sustainable solutions require strengthening the broader systems that underpin professional practice, including recruitment and retention strategies, ongoing training, interprofessional collaboration, and initiatives that promote mental health and wellbeing. By integrating innovation with investments in people and processes, Europe can foster a healthcare environment that is not only more efficient and effective, but also safer, more supportive, and ultimately more resilient, meeting the needs of both patients and the professionals who care for them.

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