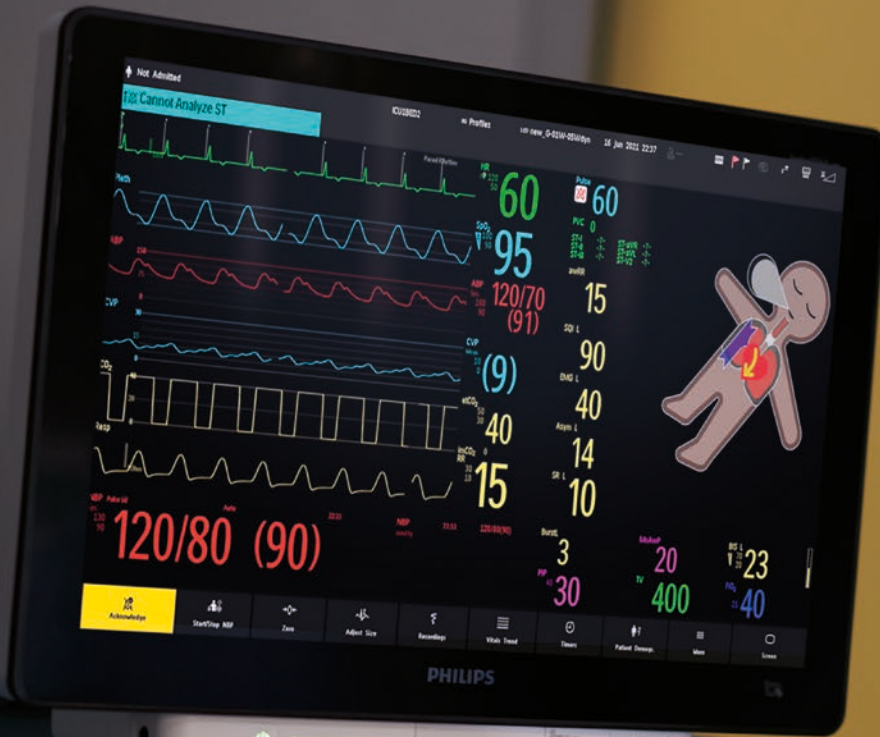


PHILIPS

Hospital Patient Monitoring



Philips Visual Patient Avatar

Insights and study findings





Improving situational awareness

Philips Visual Patient Avatar is an innovative tool that provides a simple, image-based representation of the patient's body and vital signs. Used together with a conventional patient monitor, it is designed to help anesthesiologists and nurse anesthetists gain a fast visual understanding of a patient's condition and significant changes during a procedure – while helping to improve peripheral view of vital signs and heighten situational awareness.

81.5 percent of anesthesia incidents are related to situational awareness failures¹.

Human centered. Customer focused.

Visual Patient Avatar was conceptualized and developed in collaboration with the Visualization Technology Research Group at the Institute of Anesthesiology, University Hospital Zurich. The concept has been continuously refined to meet our customers' unique needs and challenges.

Together, we have created an innovation that has the ability to improve users' situational awareness and may reduce stress² and augment patient care.

Researchers have conducted a number of studies with caregivers using a range of proven methods. This brochure provides an overview of the key findings. All of the studies are published documents that are available online via the links on the back page and by scanning the embedded QR codes.

If you require more information, please do not hesitate to reach out to your Philips representatives.

Elevate clinical confidence²



Goal

This study was the first of several computer-based studies conducted to validate and refine the Visual Patient concept.



Method

The study included 150 clinicians in two Swiss hospitals.



Results

We found that a training video of only six minutes enabled study participants to recognize all visualizations with 94% or higher accuracy. Compared to the identical conventional monitoring scenarios, Visual Patient more than doubled the number of vital signs the participants were able to recall after 3- and 10-second looks at the monitor.

Looking at the patient avatar for three seconds transmitted more information than 10 seconds of conventional monitoring.

Read the study



Sharpen focus under distraction³



Goal

We conducted this computer-based study to investigate the effects of a standardized distraction, a simple mathematical task, on the perception of vital signs during conventional and Visual Patient monitoring.



Method

Using recognized PASAT (Paced Auditory Serial Additions Test) to simulate standardized distraction, clinicians rated vital sign states with both monitoring modalities with and without distraction.



Results

Visual Patient Avatar increased the number of perceived vital signs and reduced the perceived workload during 3- and 10-second scenarios under distraction. (see figure 2 of referenced study above or adjacent QR code)

Avatar-based monitoring improved anesthesia providers' perceptive performance under distraction and reduced perceived workload.

Read the study



Identify changes in multiple patients⁴



Goal

This study discusses the impact of a visual avatar when caregivers use a central screen to monitor multiple patients.



Method

In this computer-based study, clinicians watched the vital signs of multiple patients on one screen with or without Visual Patient avatars and assessed the vital sign states.



Results

Visual Patient Avatar increased the percentage of perceived vital signs by 57% (from 7 to 11 of 22 total) when viewed for 10 seconds. In addition, the perceived workload for the task decreased by 12%.

12%
decrease in
perceived
workload

Read the study



Accelerate information transfer⁵



Goal

This eye-tracking study extended the available quantitative evidence regarding the underlying mechanisms by which Visual Patient enhances clinicians' vital sign perception.



Method

We analyzed the eye movements of participants while they observed conventional and avatar-based monitoring scenarios. Visual Patient Avatar could display 11 frequently monitored vital signs.



Results

In two 3-second monitoring scenarios, the median numbers of vital sign fixations with avatar-based monitoring were almost twice as high as conventional monitoring. Participants using avatar-based monitoring visually fixated on a median of (9 vs. 4) and (9 vs. 5) vital signs compared to conventional monitoring; $P < 0.002$ for both.

Using conventional patient monitoring, participants perceived information by reading one number after the other in sequence. With Visual Patient technology, clinicians read information about multiple vital signs with each glance at the monitor. A single glance anywhere at the avatar's body provides information about pulse rate (frequency of body pulsation), blood pressure (intensity of body pulsation), oxygen saturation (skin color), neuromuscular relaxation (limp or stiff extremities), and body temperature (heat waves or ice crystals).

The Visual Patient Avatar can help improve the parallel perception of multiple parameters and vital sign information transfer with a single glance at the avatar.

Read the study



Access information during critical events⁶



Goal

This study looked at the impact of using Visual Patient in emergency OR situations.



Method

The study examined the Visual Patient concept in a high realism simulation with 52 anesthesia teams. Real anesthesia teams managed simulated anesthesia incidents in an actual operating room. We performed video-based evaluations (gold standard) of the 154 simulations.



Results

For performance of critical tasks during a scenario, splitscreen was non-inferior to conventional monitoring (HR=1.13; 95%CI, 0.96-1.33).

For verbalization of the cause of the emergency, splitscreen was non-inferior to conventional monitoring (HR=1.56; 95%CI 0.97-2.51) while avatar was associated with a higher probability compared to conventional monitoring (HR=1.78; 95% CI, 1.13-2.81).

Clinicians were more likely to verbalize the correct cause of an emergency during a surgical procedure when using Visual Patient Avatar.

Read the study



Enrich conventional monitoring data⁷



Goal

The goal of this study was to collect and evaluate participants' opinions after using conventional monitoring only, Visual Patient Avatar only and a combination of the two modalities on a split screen.



Method

This study evaluated the feedback provided by the 104 clinicians who participated in the Visual Patient high-fidelity simulation study, focusing on the technology's clinical applicability.



Results

Participants noted the split-screen view as helpful, effective, and allowing for faster recognition of changes.

A split-screen layout combines the advantages of both Visual Patient Avatar and traditional monitoring technologies.

Read the study



Benefit from human-centric design⁸



Goal

This study aimed to adapt the design of Visual Patient before its real-life introduction based on the analysis of clinicians' feedback.



Method

We conducted 51 clinician interviews and a computer-based study with 30 clinicians. To allow for unbiased, non-preconceived feedback, participants received no prior training.



Results

The intuitive recognizability of several vital signs increased after improving their anatomical correctness. Based on the feedback, we implemented a head-up avatar position, a 45° clockwise rotated position, and a slightly darker skin color to reflect all of humanity adequately.

73%

of all vital sign information was correctly identified at first use of Visual Patient Avatar.

Read the study





Conclusions and further reading

As the studies in this paper illustrate, Visual Patient Avatar can help caregivers gain a quick overview of patient condition by delivering a simple visual representation of vital signs. This helps heighten situational awareness in the OR and can positively impact clinical confidence, concentration and perceived workload, particularly when working under distraction.

For additional information, please read the narrative summary, "Situation Awareness-Oriented Patient Monitoring with Visual Patient Technology: A Qualitative Review of the Primary Research".⁹ It summarizes the scientific background of the Visual Patient Avatar, including situational awareness, the limitations of conventional patient monitors, synthetic vision, and aviation. Moreover, it explores the design philosophy behind the solution and connections with related topics, such as alarm fatigue, artifacts, trend monitoring, pattern recognition, and event monitoring.





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