

Intelesens Surveillance Monitoring in a cardiac day procedure unit

Caregiver and patient evaluation of Intelesens Surveillance
Monitoring at the Southern Health and Social Care Trust
Nicola Donnelly, Dr David McEneaney MD, David Branagh

ABSTRACT

This case study presents evaluation of Intelesens Surveillance Monitoring in a cardiac catheterisation suite. The objective was to assess the wireless monitoring system in a real world clinical setting and review clinicians' and patients' interactions with the system. Of particular interest was the acceptability of the technology to healthcare personnel. The study found the system to be effective in detecting vital signs that signal potential patient deterioration. Healthcare personnel reported clinical value in the technology and found it enhanced their workflow. Patients found the monitoring device comfortable to wear

BACKGROUND

With the patient population aging and chronic illnesses becoming more prevalent, there is ever increasing pressure on healthcare systems. Nursing staff are challenged to continue providing a high level of care despite increased patient throughput and reduced resources.^{1, 2}

Although day case discharge is now increasingly routine in the cardiac day

procedure unit patient monitoring of vital signs remains important. Patients may receive sedation and careful monitoring of vital signs particularly in the post procedure period. In addition in the ACADEMIA study by J. Kause, it was shown that changing vital signs can identify a period of deterioration some 6-8 hours before a cardiopulmonary arrest.³



About Craigavon Area Hospital
Craigavon Area Hospital is located in County Armagh, Northern Ireland, and is part of the Southern Health and Social Care Trust.

It is the major acute hospital for the Trust and delivers the full range of acute services to a population of about 360,000.

¹ D.E. Bloom, et. al, "Program on the global demography of aging" *Harvard University*. Oct. 2009.

² J.M. Corrigan, et. al, "Crossing the quality chasm: A new health system for the 21st century" Washington, DC: National Academy Press, 2001.

³ J. Kause, et. al, "Intensive Care Society (UK), Australian and New Zealand Intensive Care Society Clinical Trials Group: A comparison of antecedents to cardiac arrests, deaths and emergency intensive care admissions in Australia and New Zealand, and the United Kingdom—the ACADEMIA study." *Resuscitation* 2004; 62:275– 82.

Appropriate vital signs monitoring that is convenient and acceptable for patients and easy to implement by healthcare staff is essential in this clinical environment. Patient vital signs information must be accurately and consistently measured, recorded, and relayed to frontline staff frequently enough to allow deteriorating patients to be identified and cared for appropriately.

The Intelesens Surveillance Monitoring solution provides healthcare professionals with relevant and timely indicators of patient vital signs. A comfortable and discreet body-worn monitor intelligently measures ECG and heart rate, respiration waveform and rate, and skin temperature. Pulse oximetry can also be monitored using third-party bedside solutions. The vital signs information is sent via Wi-Fi to an intuitive central station platform.

Clinicians can see at a glance each patient's current and previous vital signs status, view trending information and are alerted immediately to breaches in predefined limits for heart rate, respiration rate, skin temperature and SpO₂ each of which can be tailored to suit each patient. Key cardiac arrhythmia detection algorithms are also used to notify healthcare professionals of ventricular fibrillation and asystole events.

STUDY OBJECTIVE

Feasibility testing of Intelesens Surveillance Monitoring aimed to review the wireless monitoring system in a real world clinical setting and review user interactions with the system. Of particular interest was how healthcare personnel would accept the technology, how it would affect workflow, and the potential clinical impact the system could have if used routinely to support patient care.



CLINICAL SETTING

The study was conducted at Craigavon Area Hospital, located in County Armagh, Northern

Ireland, and part of the Southern Health and Social Care Trust. It is the major acute hospital for the Trust and delivers the full range of acute services to a population of about 360,000. The cardiac catheterisation suite consists of two cardiac catheterisation theatres and a ten bed day procedure unit. The facility provides a full range of cardiac investigations and therapies including coronary angiography, percutaneous intervention (PCI) electrophysiological procedures and device implantation. In addition to ten day procedure beds a further 12-14 patients can be accommodated in recliner seats. There is a mixture of elective and emergency patients. After their procedures, patients rest in bed for 4-6 hours while being continuously monitored using a bedside ECG monitor with functionality for respiration monitoring. The patients then get dressed and move to a seated area, where continuous monitoring is used until discharge. This maximizes the throughput of the unit and facilitates a high turnover of emergency and elective work. Intelesens Surveillance Monitoring was evaluated in this specialist ward setting and was integrated with existing activities carried out by nursing staff.

EVALUATING SURVEILLANCE MONITORING

Taking existing ward practices into account, use of the surveillance system was discussed with ward management to establish how it could best be implemented by nursing staff. Healthcare personnel were provided with basic system training. A 50 patient feasibility study was undertaken in which eligible patients were invited to wear the monitor throughout their stay in the unit. Healthcare personnel applied a patch electrode and vital signs monitor to each patient. Patient details were added to the Intelesens Surveillance Monitoring Central Station using a unique anonymised ID number. Healthcare personnel interacted with the system as often as possible during their shifts, and when the monitor was removed at the time of patient discharge. Healthcare personnel who had interacted with the system completed a questionnaire at the end of the evaluation. Questions were based around how easy the system was to use, their impressions of the system, and how well it integrated with their existing workflow. Once monitoring was completed patients were provided with a questionnaire to record feedback on device acceptability. Patients were asked about how comfortable the vital signs monitor and electrode were, what they liked most and

least about it, and whether they would wish to wear it during a future hospital stay.

DATA SAMPLE AND ANALYSIS

Quantitative outputs of user acceptability were provided from the data collected. Open text boxes allowed users to provide further comment on answers given if they wished. These comments were analysed and main themes were pinpointed and reviewed. Ten members of staff returned a completed questionnaire at the end of the evaluation. Fifty patients (38 male and 12 female) were monitored using the Intelesens Surveillance Monitoring system while receiving care in the cardiac catheterisation suite. Patient ages ranged from 46 to 84 years (mean 63 years). Most of the patients monitored were post-procedure percutaneous coronary intervention (PCI) patients. Patient monitoring times ranged from 49 minutes to 5 hours and 53 minutes. In total, almost 162 hours of data was recorded.

FINDINGS

Healthcare Personnel Acceptance

System Impressions

The Intelesens Surveillance Monitoring solution was evaluated positively by healthcare personnel who returned questionnaires. Overall, 60% of healthcare personnel had a positive impression of the surveillance monitoring system, and 40% had a neutral impression.

General comments about Surveillance Monitoring

The patient is able to mobilise freely around the ward without connection to a continuous monitor. They don't have to bring the wheeled monitor to the bathroom

It would be more convenient for patients.

The great value of this is the mobility it provides – with all the physical and psychological benefits attached. I think it also reassures the patient that he/she is continuously monitored.

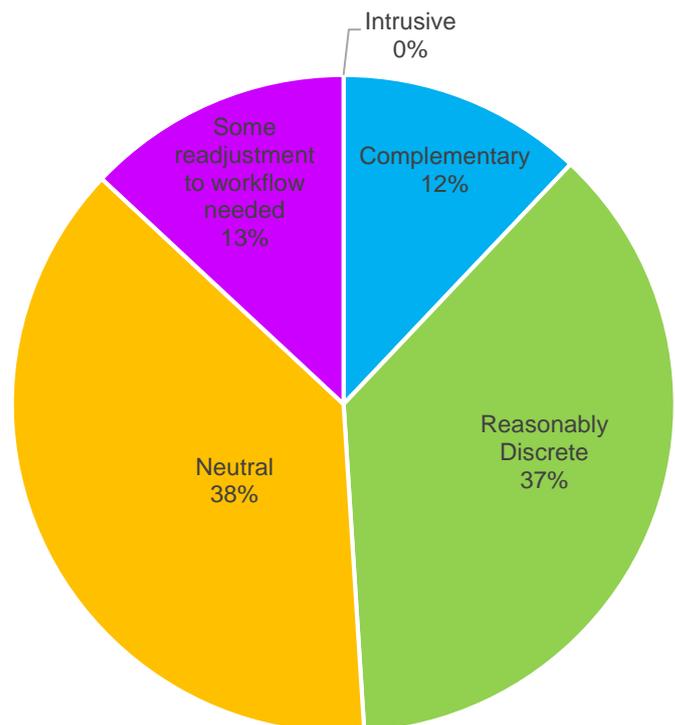
The device will provide the patient with more freedom and staff with extra monitoring information; however, no monitor can replace face-to-face assessment and monitoring of patients.

Ease of Use

Overall, healthcare personnel rated the system as being easy to use: 83% rated all system interactions as being easy or very

easy. Tasks that staff rated as difficult were limited to creating reports and acknowledging alarms. Given the reduced level of training delivered to nursing staff, the positive ratings recorded are most encouraging. Integration with Workflow Almost all respondents believed the system to be complementary, reasonably unobtrusive, or neutral in its impact on existing workflows. No healthcare personnel reported that the system was intrusive to the existing workflow in the care area.

Integration with Existing Workflow



Comments about the benefits of Surveillance Monitoring

It is more convenient than a mobile monitor on wheels; it does not have to be attached to the patient throughout the day.

Using this as step-down monitoring would free up continuous monitors for patients most in need. Then all patients in the ward could be monitored.

It is easy to apply to the patient and easy to connect the device. It is less likely to be pulled off by patients or get caught in other pieces of equipment.

There is no need to disconnect and reconnect the continuous monitors when patients wish to use the bathroom.

Patient Acceptance

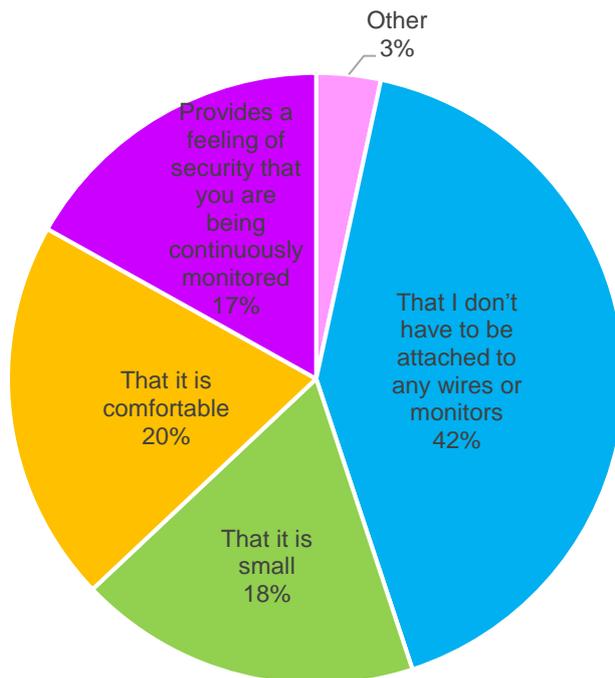
Overall, patients who took part in the evaluation reported a high level of system acceptance.

Patients were asked to select what they found most positive and least positive about wearing the device, and they had the opportunity to provide an alternative response to those listed. The charts below show what patients valued most, and what they tolerated the least (if anything).

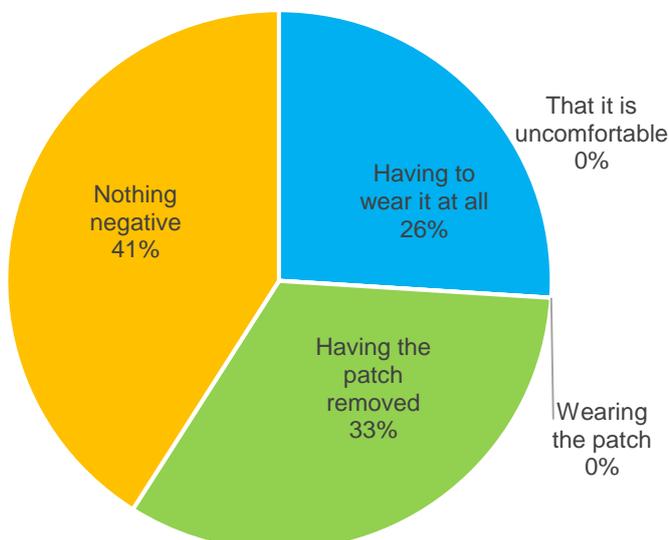
Opinions from Patient Users

This is a great piece of medical equipment. I find it far better to be able to get up and walk about without worrying about leads being reconnected or setting off alarms. The device is completely unnoticeable and I am still being monitored. The monitor was very comfortable and I didn't know I had it on. It's nice to have fewer wires to get tangled. I thought it was very good.

What Patients Valued Most about Surveillance Monitoring



What Patients liked least about Surveillance Monitoring



CLINICAL IMPACT

The Intelesens Surveillance Monitoring system integrated seamlessly in this high throughput clinical environment. After a brief training programme the staff found the system easy to use with patient registration on the central monitoring unit straightforward. The user interface was clear providing easily read current and trended data. The mobility advantages of wireless monitoring were evident as patients were able to move easily between various clinical areas. This helps enhance workflow which is a high priority in this clinical setting.

CONCLUSIONS

The results of the evaluation demonstrated that the Intelesens Surveillance Monitoring system was beneficial when installed and operated in the clinical environment. The system was easy for healthcare professionals to use and acceptable for patients to wear. Hospital management responded positively to the system and understood the benefits the system could bring to the nursing team and to patients. The system integrates easily with existing workflow offering the potential to enhance throughput in this high turnover clinical environment. There were high levels of interest in the technology from the patient group that took part in the evaluation. The device and electrode were well accepted, and patients were aware of the benefits this monitoring could bring to them and their caregivers.

This work has been supported by Intelesens Ltd. and the Southern Health and Social Care Trust



Quality Care - for you, with you

Special gratitude is extended to the consultants, nursing staff and patients of the Cardiac Catheterisation Suite, Craigavon Area Hospital, Northern Ireland

ABOUT THE AUTHORS:

Dr David McEneaney MD
Consultant Cardiologist, Southern Health and Social Care Trust

Nicola Donnelly
Clinical Research Manager, Intelesens Ltd.

David Branagh
Principal Engineer, Intelesens Ltd.

Two-thirds of healthcare personnel believed the system would have a very positive or positive impact on routine care and patient care.

100% of healthcare personnel found the system to be beneficial to patients

**100% of healthcare professionals reported that their patients found wearing the monitor to be positive
80% reported that their patients easily tolerated patch removal**

**100% of patients found the system comfortable to wear
98% found the system to be unobtrusive
89% reported acceptance of patch removal
100% would wear the system again**

Intelesens Ltd.,
17 Heron Road
Belfast
BT3 9LE
Northern Ireland, UK

**T: +44 (0)28 9073 6801
F: +44 (0)28 9099 2433
E: info@inteleSENS.com**