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Literature search results

Search completed for: 
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Impact (mortality/freeing up beds etc) of electronic clinical observations technology.

Resources searched

CINAHL; HMIC; MEDLINE; Google Scholar

Database search terms: (observation* OR "vital sign*" OR "physiological sign*" OR monitor* OR bedside*), mobile* OR digital* OR electronic* OR computer*, "computer* on wheels", (e-observation* OR "e-vital sign*" OR "e-physiological sign* OR e-monitor*")

Published Research – Databases

Predictive monitoring of mobile patients by combining clinical observations with data from wearable sensors.

Author(s) Clifton L, Clifton DA, Pimentel MA, Watkinson PJ, Tarassenko L

Citation: IEEE Journal of Biomedical & Health Informatics, May 2014, vol./is. 18/3(722-30), 2168-2194;2168-2208 (2014 May)

Publication Date: May 2014

Abstract: The majority of patients in the hospital are ambulatory and would benefit significantly from predictive and personalized monitoring systems. Such patients are well suited to having their physiological condition monitored using low-power, minimally intrusive wearable sensors. Despite
data-collection systems now being manufactured commercially, allowing physiological data to be acquired from mobile patients, little work has been undertaken on the use of the resultant data in a principled manner for robust patient care, including predictive monitoring. Most current devices generate so many false-positive alerts that devices cannot be used for routine clinical practice. This paper explores principled machine learning approaches to interpreting large quantities of continuously acquired, multivariate physiological data, using wearable patient monitors, where the goal is to provide early warning of serious physiological determination, such that a degree of predictive care may be provided. We adopt a one-class support vector machine formulation, proposing a formulation for determining the free parameters of the model using partial area under the ROC curve, a method arising from the unique requirements of performing online analysis with data from patient-worn sensors. There are few clinical evaluations of machine learning techniques in the literature, so we present results from a study at the Oxford University Hospitals NHS Trust devised to investigate the large-scale clinical use of patient-worn sensors for predictive monitoring in a ward with a high incidence of patient mortality. We show that our system can combine routine manual observations made by clinical staff with the continuous data acquired from wearable sensors. Practical considerations and recommendations based on our experiences of this clinical study are discussed, in the context of a framework for personalized monitoring.

Source: Medline

Eliminating errors in vital signs documentation.
Author(s) Fieler VK, Jaglowski T, Richards K
Citation: CIN: Computers, Informatics, Nursing, September 2013, vol./is. 31/9(422-7; quiz 428-9), 1538-2931;1538-9774 (2013 Sep)
Publication Date: September 2013
Abstract: This study compared two methods of documenting vital signs: a traditional method where staff wrote vital signs on paper then keyed into an electronic medical record and a wireless system that downloaded vital signs directly into an electronic medical record. The study design was pretest and posttest. Sixty-four sets of vital signs were evaluated prior to the implementation of a wireless download system and 66 sets of vital signs were evaluated after. To compare the error rates for the two methods, chi tests were used, and t tests were used to compare the elapsed time. Questionnaires relating to the clinicians' experiences were analyzed qualitatively. The paper vital signs recording had an error rate of 18.75% and the wireless system has an error rate of 0% (P < .001). The mean (SD) elapsed time from when the vital signs were taken until they were available in the electronic medical record was 38.53 (32.87) minutes for the paper method and 5.06 (6.59) minutes for the wireless method (P < .001). The electronic vital signs documentation system resulted in significantly fewer errors and shorter elapsed time when compared with the paper system.
Source: Medline

Care at just a touch.
Author(s) Clare L
Citation: Nursing Standard, July 2013, vol./is. 27/44(22-3), 0029-6570;0029-6570 (2013 Jul 3-9)
Publication Date: July 2013
Abstract: As NHS trusts across the UK strive to make better use of
information technology to improve patient safety, some nurses are using an electronic observation system called Wardware on iPod Touch devices. It not only saves time on paperwork and reduces errors, but alerts nurses when action needs to be taken and allows patient data to be shared at once with doctors.

Source: Medline
Available in print at Pilgrim Hospital Staff Library
Available in fulltext from Nursing Standard at EBSCOhost
Available in fulltext at Nursing Standard; Collection notes: On first login to a ProQuest journal you will need to select ‘Athens (OpenAthens Federation)’ from Select Region, and then ‘NHS England’ from Choose your Library.

Adoption of an electronic observation chart with an integrated early warning scoring system on pilot wards: a descriptive report.
Author(s) Nwulu U, Westwood D, Edwards D, Kelliher F, Coleman JJ
Citation: CIN: Computers, Informatics, Nursing, July 2012, vol./is. 30/7(371-9), 1538-2931;1538-9774 (2012 Jul)
Publication Date: July 2012
Abstract: The charting of physiological variables in hospital inpatients allows for recognition and treatment of deteriorating patients. The use of electronic records to capture patients’ vital signs is still in its infancy in the United Kingdom. The main objective of this article was to describe the adoption of an electronic observation charting function integrated into an established bedside e-prescribing record system on acute wards in a large English university hospital. This new function also has the capability of contacting Critical Care Outreach and clinical staff when patients deteriorate. Data captured over a 4-month period from the pilot wards showed that 80% of observation sets were completed sufficiently to produce early warning scores over the time period. A daily average of 419 Standardized Early Warning Score produced 74 alerts to clinical staff, and two critical alarms per day were e-mailed to the Outreach team. The wards showed different levels of completeness of observations (from 69% to 92%). Although a good overall rate of completeness of physiological data was found, traditional gaps in observation recording documented in the literature (eg, recording of respiratory rate) were still apparent. This system can be used for audit for targeted staff education and to evaluate the Critical Care Outreach service.
Source: Medline

A controlled trial of electronic automated advisory vital signs monitoring in general hospital wards.
Citation: Critical Care Medicine, August 2012, vol./is. 40/8(2349-61), 0090-3493;1530-0293 (2012 Aug)
Publication Date: August 2012
Abstract: OBJECTIVES: Deteriorating ward patients are at increased risk. Electronic automated advisory vital signs monitors may help identify such patients and improve their outcomes.SETTING: A total of 349 beds, in 12 general wards in ten hospitals in the United States, Europe, and Australia.PATIENTS: Cohort of 18,305 patients.DESIGN: Before-and-after
INTERVENTION: We deployed electronic automated advisory vital signs monitors to assist in the acquisition of vital signs and calculation of early warning scores. We assessed their effect on frequency, type, and treatment of rapid response team calls; survival to hospital discharge or to 90 days for rapid response team call patients; overall type and number of serious adverse events and length of hospital stay. MEASUREMENTS AND MAIN RESULTS: We studied 9,617 patients before (control) and 8,688 after (intervention) deployment of electronic automated advisory vital signs monitors. Among rapid response team call patients, intervention was associated with an increased proportion of calls secondary to abnormal respiratory vital signs (from 21% to 31%; difference [95% confidence interval] 9.9 [0.1-18.5]; p=.029). Survival immediately after rapid response team treatment and survival to hospital discharge or 90 days increased from 86% to 92% (difference [95% confidence interval] 6.3 [0.0-12.6]; p=.04). Intervention was also associated with a decrease in median length of hospital stay in all patients (unadjusted p<.0001; adjusted p=.09) and more so in U.S. patients (from 3.4 to 3.0 days; unadjusted p<.0001; adjusted ratio [95% confidence interval] 1.03 [1.00-1.06]; p=.026). The time required to complete and record a set of vital signs decreased from 4.1+1.3 mins to 2.5+0.5 mins (difference [95% confidence interval] 1.6 [1.4-1.8]; p<.0001). CONCLUSIONS: Deployment of electronic automated advisory vital signs monitors was associated with an improvement in the proportion of rapid response team-calls triggered by respiratory criteria, increased survival of patients receiving rapid response team calls, and decreased time required for vital signs measurement and recording (NCT01197326).

Source: Medline
Available in fulltext from Critical Care Medicine at the ULHT Library and Knowledge Services' eJournal collection

Bedside electronic capture of clinical observations and automated clinical alerts to improve compliance with an Early Warning Score protocol.

Author(s): Jones S, Mullally M, Ingleby S, Buist M, Bailey M, Eddleston JM
Citation: Critical Care & Resuscitation, June 2011, vol./is. 13/2(83-8), 1441-2772;1441-2772 (2011 Jun)
Publication Date: June 2011
Abstract: BACKGROUND: Failure to comply with clinical protocols and failure of communication to ensure delivery of the most appropriate timely clinical responses to patients whose conditions are acutely deteriorating have been shown to be significant causative factors associated with inhospital adverse events.OBJECTIVE: To determine whether automated clinical alerts increase compliance with an Early Warning Score (EWS) protocol and improve patient outcomes.METHODS: We performed a historically controlled study of bedside electronic capture of observations and automated clinical alerts. The primary outcome measure was hospital length of stay (LOS); secondary outcome measures were compliance with the EWS protocol, cardiac arrest incidence, critical care utilisation and hospital mortality.RESULTS: Between baseline and intervention, 1481 consecutive patients were recruited generating 13 668 observation sets. There was a reduction in hospital LOS between the baseline and alert phase (9.7 days v 6.9 days, P < 0.001). EWS accuracy improved from 81% to 100% with electronic calculation. Clinical attendance to patients with EWS 3, 4 or 5 increased from 29% at baseline to 78% with automated alerts (P < 0.001). For patients with an EWS > 5, clinical attendance increased...
from 67% at baseline to 96% with automatic alerts (P < 0.001).

CONCLUSIONS: Electronic recording of patient observations linked to a computer system that calculates patient risk and then issues automatic graded alerts can improve clinical attendance to unstable general medical ward patients.

Source: Medline
Available in fulltext from Critical Care & Resuscitation at EBSCOhost

**Comparison of the quality and timeliness of vital signs data using three different data-entry devices.**

Author(s) Wager KA, Schaffner MJ, Foulois B, Swanson Kazley A, Parker C, Walo H

Citation: CIN: Computers, Informatics, Nursing, July 2010, vol./is. 28/4(205-12), 1538-2931;1538-9774 (2010 Jul-Aug)

Publication Date: July 2010

Abstract: It is important to evaluate the impact of clinical information systems on the quality and timeliness of documentation in the patient's record to ensure the systems are improving clinical care processes and providing value to the organization. An observational study was conducted to measure the accuracy and timeliness of vital signs data during three different stages of clinical documentation system implementation at a large academic medical center: (1) a paper medical record system, (2) a clinical documentation system with "computers on wheels" workstation outside the patient's room, and (3) a clinical documentation system with a Tablet PC affixed to the vital signs monitor. Patient observations (n = 270) were completed as patient care technicians made routine vital sign rounds. Equipping patient care technicians with a Tablet PC affixed to the vital signs monitor significantly improved (P < .05) the accuracy and timeliness of vital signs. In addition, a number of unintended consequences were discovered that proved helpful to the nurse managers and nursing informatics leadership team in providing support of the new system. Findings from this study emphasize the importance of ensuring that staff has the appropriate devices needed to effectively document patient care at the bedside.

Source: Medline

**Connected care: reducing errors through automated vital signs data upload.**

Author(s) Smith LB, Banner L, Lozano D, Olney CM, Friedman B

Citation: CIN: Computers, Informatics, Nursing, September 2009, vol./is. 27/5(318-23), 1538-2931;1538-9774 (2009 Sep-Oct)

Publication Date: September 2009

Abstract: Vital signs are a fundamental component of patient care. Omitted or inaccurately transcribed vital sign data could result in inappropriate, delayed, or missed treatment. A previous baseline study determined that error rates for vital signs captured on plain paper then entered into a paper chart or EMR were 10% and 4.4%, respectively. This study evaluated the impact of automated vital signs captured using a PDA with bar-code technology for patient identification. The PDA enabled the wireless capture and transmission of data directly from the vital sign monitor into the EMR. Researchers reviewed 1514 sets of vital signs collected electronically for accuracy and compared the error rate with data from the previous paper and EMR systems. Automated upload of vital signs directly into an EMR reduced the documentation error rate to less than 1%. This represented a significant reduction in vital sign documentation errors with the use of
mobile technology when compared with traditional charting methods (P < .001). The automated vital sign data upload system helped promote a culture of patient safety by greatly reducing documentation error rates. Additional safety benefits may include improved timeliness to vital sign data and clinical work-flow processes.

Source: Medline

A randomised controlled trial of the effect of continuous electronic physiological monitoring on the adverse event rate in high risk medical and surgical patients.

Author(s) Watkinson PJ, Barber VS, Price JD, Hann A, Tarassenko L, Young JD

Citation: Anaesthesia, November 2006, vol./is. 61/11(1031-9), 0003-2409:0003-2409 (2006 Nov)

Publication Date: November 2006

Abstract: We conducted a randomised controlled trial of mandated five-channel physiological monitoring vs standard care, in acute medical and surgical wards in a single UK teaching hospital. In all, 402 high-risk medical and surgical patients were studied. The primary outcome was the proportion of patients experiencing one or more major adverse events, including urgent staff calls, changes to higher care levels, cardiac arrests or death, in 96 h following randomisation. Secondary outcomes were the proportion of patients requiring acute treatment changes, and the 30-day and hospital mortality. In the 96 h following randomisation, 113 (56%) patients in the monitored arm and 116 (58%) in the control arm (OR 0.94, 95% CI 0.63-1.40, p = 0.76) had a major event. An acute change in treatment was necessary in 107 (53%) monitored patients and 101 (50%) control patients (OR 0.55, 95% CI 0.87-1.29). Thirty-four (17%) monitored patients and 35 (17%) control patients died within 30 days. Thirteen patients in the control group received full five-channel monitoring at the request of the ward staff. We conclude that mandated electronic vital signs monitoring in high risk medical and surgical patients has no effect on adverse events or mortality.

Source: Medline

Available in fulltext from Anaesthesia at EBSCOhost
Available in fulltext from Anaesthesia at Wiley

Impact of introducing an electronic physiological surveillance system on hospital mortality

PE Schmidt, P Meredith, DR Prytherch - BMJ Quality & Safety, 2015

Background: Avoidable hospital mortality is often attributable to inadequate patient vital signs monitoring, and failure to recognise or respond to clinical deterioration. The processes involved with vital sign collection and charting; their integration, interpretation and analysis; and the delivery of decision support regarding subsequent clinical care are subject to potential error and/or failure. Objective: To determine whether introducing an electronic physiological surveillance system (EPSS), specifically designed to improve the collection and clinical use of vital signs data, reduced hospital mortality. Methods: A pragmatic, retrospective, observational study of seasonally adjusted in-hospital mortality rates in three main hospital specialties was
undertaken before, during and after the sequential deployment and ongoing use of a hospital-wide EPSS in two large unconnected acute general hospitals in England. The EPSS, which uses wireless handheld computing devices, replaced a paper-based vital sign charting and clinical escalation system. Results: During EPSS implementation, crude mortality fell from a baseline of 7.75% (2168/27 959) to 6.42% (1904/29 676) in one hospital (estimated 397 fewer deaths), and from 7.57% (1648/21 771) to 6.15% (1614/26 241) at the second (estimated 372 fewer deaths). At both hospitals, multiyear statistical process control analyses revealed abrupt and sustained mortality reductions, coincident with the deployment and increasing use of the system. The cumulative total of excess deaths reduced in all specialties with increasing use of the system across the hospital. Conclusions: The use of technology specifically designed to improve the accuracy, reliability and availability of patients’ vital signs and early warning scores, and thereby the recognition of and response to patient deterioration, is associated with reduced mortality in this study.

Introduction of an electronic physiological early warning system: effects on mortality and length of stay
TR Dawes, E Cheek, V Bewick - British Journal of Anaesthesia, 2014

Background The Worthing physiological scoring system (PSS) was first validated in 2005 as a tool to predict hospital mortality on admission and was subsequently introduced into clinical practice at Worthing Hospital, UK. Five years on, this study was conducted to determine the effects on mortality and length of stay (LOS) after the introduction of electronic alerting software using the PSS. In addition, we investigated whether the Worthing PSS predictive ability could be improved by addition of further variables.

Methods Prospective observational study conducted in the acute medical unit, Worthing Hospital, UK. Patient physiological data on admission and discharge/transfer were collected between February and July 2010 from the electronic alerting software VitalPAC™. Patient characteristics, co-morbidity, outcomes, and biochemistry data were taken from the hospital administration and pathology systems.

Results The observed mortality reduction from 8.3% to 5.2% over 5 yr was not statistically significant after adjustment for admission Worthing PSS score. Median LOS was reduced from 4 to 2 days, but this reflected an increase in short stay admissions. Worthing PSS was not significantly improved with the addition of biochemical variables or patient co-morbidity. A score taken before admission to a medical ward showed an improved predictive ability when compared with the initial admission score, but further analysis found no additional clinical benefit.

Conclusions The introduction of an electronic alerting PSS did not lead to a reduction in mortality when adjusted for severity of illness defined by physiological variables. Predictive performance was not enhanced by the addition of biochemical variables and co-morbidities.