dehydrogenase (U/L), and haptoglobin (g/L) were analyzed. Samples for analysis were collected directly from the RBC (C1) bags external ports, after free flow of the blood component on the infusion disposable set (C2) and after submitted to the studied rate (E), exception made to haptoglobin that was analyzed in C1 and E. Data obtained were analyzed according to mean ± standard deviation, ANOVA and t student tests (p≤0.05).

Results: A total of 54 analyses were performed. The comparisons between C1, C2 and E biomarkers values and hemolysis ratio demonstrated no significant variation: plasma hemoglobin of 0.92 ± 0.22, 0.90 ± 0.21 and 0.94 ± 0.20 (p = 0.966); potassium 30.0 ± 2.6, 30.5 ± 2.6, 30.8 ± 3.8 (p = 0.459); lactate dehydrogenase 705.2 ± 207.4, 739.9 ± 239.6 and 778.3 ± 318.7 (p = 0.475); hemolysis ratio 0.136 ± 0.038, 0.127 ± 0.035, 0.136 ± 0.049 (p = 0.615). The haptoglobin level was statistically similar between C1 and E (70.2 ± 38.1; 70.2 ± 38.0; p = 0.993). Comparisons of the studied infusion rates evidence significant variations (p≤0.001) in plasma hemoglobin levels among 10ml/h (0.106 ± 0.013) and 300 ml/h (0.072 ± 0.018), and comparing 100 ml/h (0.098 ± 0.010) and 300 ml/h (p = 0.002), without variations (p = 0.164) between 10ml/h and 100 ml/h. The infusion rate did not influenced significantly the hemolysis ratio (p > 0.05), that was 0.145 ± 0.030 at 10 ml/h, 0.131 ± 0.032 at 100 ml/h, and 0.122 ± 0.053 at 300 ml/h.

Conclusions: The overall analyzes of the studied biomarkers and hemolysis ratio of RBC demonstrated no significant alterations related to the peristaltic infusion pumps, and the infusion rate of 300 ml/h caused less variation on plasma hemoglobin than 10 ml/h and 100 ml/h.

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A549

Targeting physiotherapy resources - evaluation of the southampton physiotherapy post-operative screening tool (SPPOST)

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Introduction: The benefit and necessity for prophylactic physiotherapy post operatively remains unclear [1]. Combined with an increased demand on resources, scores to identify those patients who would most benefit are being increasingly used. The SPPOST is a tool to identify patients who are at high risk of developing post-operative pulmonary complications (PPC's). A previous trial of its implementation demonstrated physiotherapy to be safely withdrawn from 46% of post-operative patients with minimal risk [2].

Objectives: To assess the feasibility of the SPPOST as an effective tool in prioritising patients for post-operative physiotherapy treatment within a large UK based specialist surgery service.

Methods: All patients undergoing abdominal surgical procedures between 29th August and 5th October 2013 were included in the analysis. Patients were excluded if they had their operation at a weekend. SPPOST scores were calculated on the first post-operative day, with a score ≥10 identifying a patient as high risk and requiring physiotherapy assessment and intervention. Physiotherapists were blinded to the threshold score and treatment was delivered based on individual clinical reasoning. Patients were assessed daily for the development of a PPC using the Brooks-Brunn criteria. Data was analysed using the Chi squared test.

Results: Ninety three patients were included in the analysis, with 54 (58%) deemed high risk. More PPC's were identified in the high risk patients, although this was not significant (9, 17% vs 3, 8%; p = 0.20).A subsequent analysis identified 16 low risk patients having received physiotherapy, whilst 14 high risk patients were not assessed by a physiotherapist. It was noted junior members of staff were more likely to screen out high risk patients.

Conclusions: A threshold score of 10 appeared to be sensitive for identifying patients at higher risk of developing PPC's. Although not statistically significant, it is acknowledged as a pilot project that the study may not have been appropriately powered. A sub analysis of the data suggested the SPPOST could provide a structured and robust approach to identifying post-operative patients who would most benefit from physiotherapy, particularly for junior members of staff. It is acknowledged that a number of patients in the low risk category still received physiotherapy, which may have reduced the incidence of PPC's observed. Appropriately powered trials using the SPPOST as a screening tool for physiotherapy input are therefore needed to confirm its effectiveness.

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A550

Machine learning can classify vital sign alerts as real or artifact in online continuous monitoring data

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Introduction: Alarm hazards continue to be the top patient safety concern of 2015. Machine learning (ML) can be used to classify patterns in monitoring data to differentiate real alerts from artifact.

Objectives: To determine the degree to which ML, specifically random forest (RF), can classify vital sign (VS) alerts in continuous monitoring data as they unfold online as either real alerts or artifact.

Methods: Noninvasive monitoring data from 8 weeks of admissions in a 24-bed step-down unit (heart rate [HR], respiratory rate (RR; bioimpedance), oscillometric blood pressure (BP), peripheral oximetry (SpO_2)) were recorded at 1/20Hz. VS deviation beyond stability thresholds (HR 40-140, RR 8-36, systolic BP 80-200, diastolic BP < 110, SpO_2>85%) and persisting for 80% of a 5 min moving window comprised alerts. Of 1,582 alerts, 631 were labeled by a 4-member expert committee as real alerts, artifact, or unable to classify. Alerts were: RR 132 real, 25 artifact; BP 45 real, 40 artifact; SpO_2 181 real, 93 artifact (HR alerts too few to analyze). Following feature extraction from expert-annotated alerts, we constructed a series of 10 moving windows of 3 min width each, and ending at 0, 20, 40, 60, 80, 100, 120, 140, 160, and 180s from the time the VS first crossed alert threshold. The experiment is performed within a leave-one-alert-out setup. In each iteration, one of the alerts is the test alert, and the rest are used as the training alerts. We trained the model using only the windows ending at 180s after the time VS crossed the alert threshold from the training alerts (one for each VS), and then made predictions from each of the sliding windows on the test alert. We then computed area under the curve (AUC) scores by aggregating prediction at each test window.

Results: The RF classifier was able to discriminate between real BP alerts and artifact using information from the prior 3 min with an AUC of 0.8 in the 0s window, which improved to 0.86 for the window ending at 180s into the alert. SpO2 has an AUC of 0.88 for the 0s window, and improved to 0.96 at 180s window. RR discrimination has an AUC of 0.73 at the 0s window, and improved to 0.92 at the 180s window.

Conclusions: A RF model trained on a small set of expert-annotated data was able to accurately classify RR, BP and SpO_2 alerts in monitored data as they are unfolding online as real or artifact to a helpful degree. BP and SpO_2 did not improve much with more information gained after alert onset, while information gained as the alert continued to unfold improved RR discrimination. This approach holds promise to improve monitor alerting technology and clinical care.

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A551

Early ambulation using a cycle ergometer on quadriceps muscle morphology in mechanically ventilated critically ill patients in the intensive care unit: a randomized controlled trial

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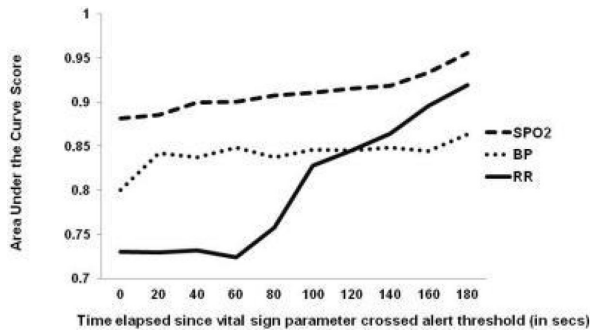

Figure 1(abstract A550) ***Random forest Area Under the Curve scores for accurate discrimination of real alerts vs. artifact in vital sign abnormalities developing in online continuous monitoring data.***

Introduction: Patients in the intensive care unit (ICU) are exposed to prolonged immobility, which leads to loss of muscle mass. One resource that has proved to be of great utility in hospitals is the cycle ergometer, which is a stationary piece of equipment designed to enable cyclical rotations of lower and/or upper extremities and can be used to perform passive, active and resisted exercises.
Objective: To evaluate and compare the effects of early ambulation using a bedside cycle ergometer with conventional physical therapy on the thickness and architecture of the quadriceps muscle in critically ill patients receiving invasive mechanical ventilation (IMV).
Methods: Single-blind randomized controlled trial was conducted at Hospital de Clínicas de Porto Alegre (Brazil) ICU. Forty-two patients receiving IMV for 24 to 48 hours who were hospitalized for no longer than 1 week and had no restriction of lower limb movements. Interventions: After randomization, passive cycling exercise for the lower extremities was performed once daily for 20 minutes, at 20 revolutions per minute, until extubation or day 7 of the protocol plus conventional physical therapy in the intervention group. Bronchial hygiene maneuvers and passive exercises for the upper and lower extremities were performed twice daily for 30 minutes in both groups.
Results: Thirty-two patients were included in the final analysis: 18 in the intervention group (52.3 ± 22.7 years) and 14 in the conventional group (56.1 ± 23.0 years). The interaction group*time showed no difference in the cross-sectional thickness of the quadriceps muscle (p = 0.100) or in the vastus lateralis fascicle length (p = 0.712), pennation angle (p = 0.603) and muscle thickness (p = 0.552) as assessed by ultrasound before and after the protocol.
Conclusion: There was preservation of muscle thickness and architecture in the acute phase of ICU stay. However, the addition of exercise using a cycle ergometer to conventional physical therapy did not change the outcomes analyzed.

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A552

Use of electrical neuromuscular stimulation to preserve the morphology of abdominal and chest muscles of critical patients: randomized clinical trial

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Introduction: Neuromuscular electrical stimulation (NMES) has been used as an early therapeutic modality at intensive care units (ICUs) to treat patients on invasive mechanical ventilation (IMV) to compensate and/or decrease loss of muscle mass.
Objective: To evaluate and compare the effects of NMES combined with conventional physical therapy on muscle thickness of critically ill patients on IMV.
Methods: Double blind randomized controlled trial conducted at the ICU of the Hospital de Clínicas de Porto Alegre, Brazil. Twenty-five patients who had been in hospital for at most 15 days and were receiving IMV for 24 to 48 hours were included in the study. Patients were randomized to the intervention group (NMES + conventional physical therapy) or conventional group (conventional therapy + placebo NMES). Interventions were conducted daily for 30 minutes until the seventh day or upon extubation.
Results: The primary outcome was thickness of the transverse rectus abdominis and chest muscles of the dominant side assessed by ultrasound before and after the intervention. Eleven patients were included in the intervention group (56 ± 13 years) and fourteen in the conventional group (61 ± 15 years). After NMES administration, rectus abdominis muscle thickness (0.47 ± 0.08 before vs. 0.51 ± 0.08 after, p = 0.505) and chest muscle thickness (0.44 ± 0.08 before vs. 0.49 ± 0.08 after, p = 0.083) were preserved in the intervention group, whereas there was significant reduction of thickness in the conventional group (rectus abdominis: 0.43 ± 0.05 before vs. 0.36 ± 0.04 after, p = 0.001; chest: 0.42 ± 0.05 before vs. 0.35 ± 0.04 after, p = 0.001), with a significant difference between the groups. There was statistically significant difference between the groups in terms of length of ICU stay, with shorter length of stay in the intervention group (10 ± 4, p = 0.045). We found no significant difference related to the other secondary outcomes between the groups.
Conclusion: There was no change in the rectus abdominis and chest muscle thickness in the intervention group; however, we found a significant decrease in the measures in the conventional group.

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A553

Is the manchester mobility score a valid and reliable measure of physical function within the intensive care unit

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Introduction: Early and structured rehabilitation programmes have been shown to decrease both critical care and hospital length of stay (LOS) [1] as well as improve functional ability at the point of critical care discharge [2]. At present there is no general or universally accepted method for measuring mobility within the critical care unit or to track rehabilitation progress [3]. The Manchester Mobility Score was developed in 2005 as one such tool to describe the levels of mobility seen within critical care. Since development, the MMS has been used and adapted in several large critical care units within the UK, but has not previously been investigated in terms of validity and reliability.
Objectives: Our aim was to test the validity and reliability of the Manchester Mobility Score (MMS) as a quick and simple tool for monitoring rehabilitation within critical care.
Methods: This prospective observational study was performed within a large 75 bed, UK based mixed dependency critical care unit. The study was divided into 2 stages: stage one was the inter-rater reliability testing of the MMS and stage 2 was to assess for correlation with another validated measure of function within critical care and explore any relationship with hospital length of stay post critical care discharge.
Results: Stage 1 - MMS were collected for 111 patients over a 2 day period. All participating physiotherapists and nursing staff reported that the MMS took less than 1 minute to complete and was easy to use. The