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Designing team success - an engineering solution to avoid chest tube equipment chaos using best available evidence, consensus and prototyping

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Background: Chest tube insertion is a time and safety critical procedure with a significant complication rate (up to 30%). Industry routinely uses Lean and ergonomic methodology to improve systems. This process improvement study used best evidence review, small group consensus, process mapping and prototyping in order to design a lean and ergonomically mindful equipment solution. **Aim Statement:** By simplifying and reorganising chest tube equipment, we aim to provide users with adequate equipment, reduce equipment waste, and wasted effort locating equipment. **Measures & Design:** The study was conducted between March 2018 and November 2018. An initial list of process steps from the best available evidence was produced. This list was then augmented by multispecialty team consensus (3 Emergency Physicians, 1 Thoracic Surgeon, 1 medical student, 2 EM nurses). Necessary equipment was identified. Next, two prototyping phases were conducted using a task trainer and a realistic interprofessional team (1 EM Physician, 1 ER Nurse, 1 Medical student) to refine the equipment list and packaging. A final equipment storage system was produced and evaluated by an interprofessional team during cadaver training using a survey and Likert scales. **Evaluation/Results:** There were 47 equipment items in the pre-intervention ED chest tube tray. After prototyping 21 items were removed while nine critical items were added. The nine items missing from the original design were found in four different locations in the department. Six physicians and seven RNs participated in cadaver testing and completed an evaluation survey of the new layout. Participants preferred the new storage design (Likert median 5, IQR of 1) over the current storage design (median of 1, IQR of 1). **Discussion/Impact:** The results suggest that the lean equipment storage is preferred by ED staff compared to the current set-up, may reduce time finding missing equipment, and will reduce waste. Future simulation work will quantitatively understand compliance with safety critical steps, user stress, wasted user time and cost.

Keywords: chest tube, lean, quality improvement and patient safety

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Reigniting improvements in emergency departments – New approaches to resolving unsolvable problems

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Background: In 2016 The Fraser Health Authority's Emergency Network established a priority to standardize patient access and flow through their 13 emergency departments (ED). A Model of Care (MOC) was developed after an extensive review of the literature and current practices across BC. **Aim Statement:** The ED Model of Care (MOC) specifies best practice expectations with respect to emergency patient access and flow. Rather than a 'top-down' mandate of expected practices, the MOC provided the opportunity for site-based teams to promote solutions that were 'locally actioned and regionally enabled'. **Measures & Design:** ED Quality Improvement (QI) teams were developed at all sites. The ED Network developed a "QI

Bootcamp", a one-day course focused on imparting tools to drive improvements, providing a baseline understanding of how to launch and sustain local QI initiatives. Using Prosci's change approach, an emphasis was placed on using local ingenuity to implement plans, analyze feedback and diagnose gaps. This approach measured utilization of the changes to tangibly link initiatives and change to specific outcomes. As part of this strategy, an online scorecard was created to measure local results against best practice outcomes. The scorecard tracked quantitative access metrics such as ED Length of Stay (EDLOS), Left Without Being Seen rate, and triage time. Measures such as forming a QI team, identifying a QI project and completing a PDSA cycle were included in the scorecard. **Evaluation/Results:** The MOC change management strategy was launched in May of 2018. By December 2018 all 13 EDs had formed a local QI team and identified a project. Twelve sites had completed at least one PDSA cycle and 10 sites had at least 75% of their members attend the QI Bootcamp. The scorecard displayed improvements in flow metrics. Highlights include the average arrival to triage time decreasing by 36% at one site, EDLOS for moderately ill patients decreased from 4.8 to 3.4 hours at another, and a community hospital had low acuity patient EDLOS decrease from 3.52 to 2.37 hours. **Discussion/Impact:** A standardized approach to patient access and flow in the ED (MOC), combined with the engaging grass roots approach to inspiring local innovation, allied with a concrete change management approach demonstrated significant results for patients accessing and moving through EDs. This pattern that is more likely to sustain itself because the results are felt and locally owned.

Keywords: emergency access, patient flow, quality improvement and patient safety

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Community based naloxone usability testing

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Background: In Alberta in 2016 more people died from an opioid overdose than from motor vehicle crashes. Naloxone is an opioid antagonist - it can reverse an opioid overdose for a period of 30 to 60 minutes. Naloxone kits are available free at emergency departments and community organizations around the province with training provided at the point of pickup. It is possible that training may be refused or may be forgotten and people are often left to rely solely on the instructions included in the kit. Human centred design can improve the way people interact with overdose instructions. **Aim Statement:** This study will measure the effectiveness and usefulness of prototype community naloxone kit instructions over a six month period of time (2018) in Calgary and Edmonton with the aim to use human centred design principles to improve the way people interpret emergency overdose response directions. **Measures & Design:** Information design experts engaged people with lived experience to provide a process map outlining the current role that educational materials and instructions for community naloxone kits play in responding to an opioid overdose. Alberta Health Services (AHS) Human Factors, in collaboration with AHS harm reduction developed the protocol and administered pre- and post-questionnaire and specific 'performance checkpoints' intended to measure effectiveness and usefulness. A simulated overdose including a mannequin, injection trainer and anatomical paper diagram was designed and a community naloxone kit with instructions setting was provided. Participants were recruited through harm reduction nurses with