APPENDIX 1 DESIGN OF THE FACT

Based upon our understanding of the complex relationship between an ever-changing team of multi-professional healthcare individuals in the emergency bays of hospitals that receive traumatically injured children on an infrequent basis, we chose a framework approach to the FACT. In situ simulations are at the core of the data collection for FACT as there is significant evidence [1-4] that the clinical care provided to children can be enhanced by targeted simulation training with child-like human patient simulators. The simulators are, computerised and programmed to respond in real time to interventions or lack of and can be programmed to behave in terms of physiological responses (including vocal, pupillary responses, breathing, cardiovascular and neurological status) as a real human. Cutting edge simulation technology and techniques can provide the appropriate environment to encourage self-reflection, and to furthermore identify deficits in knowledge, skills and attitudes. Such simulation based education techniques provide the opportunities to develop performance and self-confidence, and to improve the patient care provided by an individual or a clinical team, directly where they work.[5] The process of participating in simulated trauma training as designed in FACT, is reflective and designed to promote learning with debriefing strategies highlighting good practice and areas for improvement in care. Mobile mannequin technology allows simulation-based critical pediatric trauma exercises to be conducted onsite this allows staff to “train together when they work, with whom they work and where they work”. The FACT approach also allows reflection on the complex healthcare processes involved in trauma care and the opportunity to invoke healthcare changes to improve care at all levels.

An assessment system requires triangulation of data sets to build up a picture of performance and interactions.[6,7] Moreover an effective assessment instrument should be transparent, justifiable, evidence based and recognise the restraints of the ‘real world’. [8,9] To achieve this, FACT is designed based on a number of different data sources, both qualitative and quantitative, as described elsewhere.[10]
Keeping a family centered lens

Parents or carers almost always accompany traumatically injured children in the emergency department. The parents or carers are also integral to the care provided. The parents can be directly next to or very close to the acute care provision, their perspective and thoughts as to the design and process of a tool to improve the complex trauma team – hospital interactions is invaluable. Patient, parent or carer input will be sought to provide a child and family centred lens on the FACT composition. This will be achieved by inviting parents to attend and participate in a forum at the base major trauma centre, facilitated by an external (to the trauma centre) member of the research team. The perspective of both parents and carers will be sought on current trauma team care training in addition to the FACT methodology. The forum will be set up as a focus group, with 4-8 family members and carers present for each group. Focus groups provide opportunity for a dynamic and interactive exchange and reflection. By hosting regular forums the family centered perspective will remain central in the FACT development and use.

How the FACT combines with simulation

High reality human patient simulators of traumatically injured children are brought into the emergency bay at the pilot hospital by researchers acting as paramedics. Prior to this, the hospital is notified using the same standard Major Trauma Alert procedure for all traumatically injured children, as used by the paramedic ambulance service. A hospital wide trauma alert code is activated, team members arrive and work together on the severely injured simulated child in the emergency bay. Each team member then completes a questionnaire (as described in Table 2). All team members record their role in the team, for example Trauma Team Leader or trauma nurse, but not their names to ensure anonymity. A team-debrief then follows, conducted by an experienced facilitator from the research team. The process takes approximately 45 minutes in total, for each of the two scenarios. The time line for collection of the FACT data is shown in Table 2. Details on the principles behind the development of the FACT can be found elsewhere [10]. The components of the FACT are depicted below (Table 3).
Distribution of the FACT within hospitals

The FACT for each hospital will be constructed based on the findings of the FACT data collection. There will be an electronic copy and a hard copy of the FACT made available. The hard copy consists of a four-page document. The FACT will be distributed horizontally across all the potential members of the trauma team in each hospital. The distribution will be achieved via the clinical leads within the teams. Vertical transmission of the FACT will be achieved through direct contact of each member of the hospital trauma governance infrastructure by the research team.

Table 2. FACT data collection timeline for each participating hospital
<table>
<thead>
<tr>
<th>Time points</th>
<th>FACT Elements</th>
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<tbody>
<tr>
<td>1. First visit by research team</td>
<td>The trauma care facility, equipment and standard operating procedures are reviewed using the World Health Organization (WHO) trauma essentials checklist.[11] Hospital Site Visit section in FACT</td>
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<td>2. Trauma team members participate in two In-situ simulations of traumatically injured children in their hospital trauma bay (second visit of research team).</td>
<td>The team performance in providing advanced trauma care is assessed against latest trauma care guidelines (including the Advanced Trauma Life Support program objectives).[12] Adherence to Best Practice section in FACT The process of care is measured against key timing points recorded in the Trauma Audit Research Network database network. Key Timings in Clinical Management section in FACT</td>
</tr>
<tr>
<td>3. Trauma team members complete the on-line Knowledge Test &amp; on-line Mental Model Survey</td>
<td>A random sample of the potential medical &amp; nursing trauma team members undertake a twenty question multi-choice, standard questionnaire on the management of traumatically injured children. Knowledge Test section in FACT All potential members of the trauma team (nursing, medical and allied health professionals) are invited to participate in an online survey of practice. They are shown a video of a standard case with differing vital signs and questioned on their clinical priorities and the factors delaying the passage of such traumatically injured child from the emergency bay, to CT scanner to operating theatre. On-line Mental Model Survey sections in FACT</td>
</tr>
<tr>
<td>4. Trauma team members anonymously complete a modified OTAS questionnaire</td>
<td>Team Performance in Communication, Co-operation, Co-ordination, Leadership, Monitoring &amp; Global Assessment. Factors requiring improvement to enhance Team-Hospital interactions. Team participants are invited to complete a standard Observational Teamwork Assessment for Surgery (OTAS).[13] checklist of the team performance. In addition the members are asked to complete a free text box, by answering the following standard question, “How could we improve the care provision of the traumatically injured child that you have just managed, in terms of the trauma team and hospital systems interactions?” <strong>Trauma Team Performance Self-Reflection and Simulation Feedback Free Text Analysis</strong> sections in FACT.</td>
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<td>5. Trauma team members participate in a standard team debrief</td>
<td>Critical (sudden untoward) Incidents Participants allowed to add to their previous comments Any free text answers to the above standard question (“How do you feel the trauma team – hospital interaction could be optimized to improve the care of the traumatically injured child you have just managed?”) that would trigger a critical incident/sudden untoward incident report in real-life are captured. These comments are graded against a standard Hospital Risk Management Matrix (from the research pilot site) <strong>Hospital Incident Report Scoring</strong> section in</td>
</tr>
</tbody>
</table>
FACT
Table 3. The FACT components

FIELD ASSESSMENT CONDITIONING TOOL (FACT)
Assessment of the Hospital Readiness to Receive Traumatically Injured Children

POSITIVE ELEMENTS
These elements aim to highlight the high quality care already being provided by each hospital.

1. ADHERENCE TO BEST PRACTICE
2. KEY TIMINGS IN CLINICAL MANAGEMENT
3. TRAUMA TEAM PERFORMANCE SELF-REFLECTION
4. ON-LINE MENTAL MODEL SURVEY
5. KNOWLEDGE TEST
6. HOSPITAL VISIT

DELTA ELEMENTS
These elements aim to highlight area for improvement of care provision at each hospital, based upon the thoughts and reflections of the team members within each hospital.

7. SIMULATION FEEDBACK FREE TEXT ANALYSIS
8. HOSPITAL INCIDENT REPORT SCORING

DISSEMINATION
HORIZONTALLY – TO ALL POSSIBLE TEAM MEMBERS
VERTICALLY - TO HOSPITAL GOVERNANCE BOARD
**Appendix References**


