Managing Patient Deterioration in HMC
The Qatar Early Warning System (QEWS)

Dr David Vaughan
Dr Ibrahim Fawzy
Mr Colin Hackwood

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PROGRAM EXECUTIVE
PROGRAM MANAGER
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Session Objectives & Outcomes

1) Describe the QEWS safety net system
2) Understand the role of Early Warning System in the early detection of clinical deterioration in a patient’s condition
3) Describe how such systems *may* fail
4) Describe how to achieve large scale implementation through the adoption of a systematic framework
5) Knowledge of current system performance since introduction across HMC
6) Describe how you can improve the performance of your system locally
Part A

Dr David Vaughan  
PROGRAM DIRECTOR
Background

- “Unexpected” clinical deterioration occurs commonly in healthcare systems around the world
- Usually preceded by changes in vital signs and other physiological and/or laboratory test derangement
- Respiratory Rate
- Blood Pressure
- Heart Rate
- Mental Status
- Low Glucose
Reasons for Failure to Rescue

- Monitoring technology only used in certain units
- Ward monitoring is usually intermittent (e.g. q 8)
- Regular assessment by nurse and doctor may be infrequent
- Vital signs measurement may be incomplete
- When VS are abnormal, there may not be a criteria for escalation
- Individual judgment is used, which is often variable
- If alert is issued, may often go through a long chain of command
- Staff may not be available to respond

Pre-Implementation Objectives

- Establish legitimate Corporate-level and Facility governance structures
- Develop policies and protocols to support sustainable implementation;
- Develop a suite of population-specific, standardized observation charts for use by all clinicians in non-continuous monitoring environments;
- A functional Rapid Response System within all facilities;
- An appropriate education model to train to all HMC staff to program requirements;
- A relevant evaluation model that will support continuous professional improvement; and
- An electronic medical record platform that will support improved documentational practices by nurses and physicians.

RAPID-RESPONSE TEAMS HAVE BEEN INTRODUCED TO INTERVENE IN THE CARE OF PATIENTS WITH UNEXPECTED CLINICAL DETERIORATION. THESE TEAMS ARE KEY COMPONENTS OF RAPID-RESPONSE SYSTEMS, WHICH HAVE BEEN PUT IN PLACE BECAUSE OF EVIDENCE OF “FAILURE TO RESCUE” WITH AVAILABLE CLINICAL SERVICES, LEADING TO SERIOUS ADVERSE EVENTS. A SERIOUS ADVERSE EVENT MAY BE DEFINED AS AN UNINTENDED INJURY THAT IS DUE TO DELAY OR INADEQUATE MEDICAL MANAGEMENT AND THAT EXPOSES THE PATIENT TO AN INCREASED RISK OF DEATH AND RESULTS IN MEASURABLE DISABILITY. RAPID-RESPONSE SYSTEMS AIM TO IMPROVE THE SAFETY OF HOSPITAL-WARD PATIENTS WHOSE CONDITION IS DETERIORATING. THESE SYSTEMS ARE BASED ON IDENTIFICATION OF PATIENTS AT RISK, EARLY NOTIFICATION OF AN IDENTIFIED SET OF RESPONDERS, RAPID INTERVENTION BY THE RESPONSE TEAM, AND ONGOING EVALUATION OF THE SYSTEM’S PERFORMANCE AND HOSPITAL-WIDE PROCESSES OF CARE. RAPID-RESPONSE SYSTEMS HAVE BEEN IMPLEMENTED IN MANY COUNTRIES AND ACROSS THE UNITED STATES.

RAPID-RESPONSE TEAMS DIFFER FROM TRADITIONAL CODE TEAMS IN A NUMBER OF WAYS (TABLE 1). THEY ASSESS A GREATER NUMBER OF HOSPITALIZED PATIENTS AT AN EARLIER STAGE OF CLINICAL DETERIORATION, WITH THE AIM OF PREVENTING SERIOUS ADVERSE EVENTS SUCH AS CARDIAC ARRESTS AND UNEXPECTED DEATHS. THESE, RAPID-RESPONSE TEAMS ASSESS PATIENTS IN WHOM RESPIRATORY, NEUROLOGIC, OR CARDIAC DETERIORATION DEVELOPS RATHER THAN PATIENTS WHO HAVE ALREADY HAD A RESPIRATORY OR CARDIAC ARREST.

WHETHER RAPID-RESPONSE SYSTEMS ARE EFFECTIVE IS CONTROVERSIAL. THEIR INTRODUCTION WAS PROMPTED BY FIVE BEFORE-AND-AFTER COMPARISONS THAT WERE SINGLE-CENTER STUDIES. THESE STUDIES SHOWED A REDUCTION IN THE RATE OF CARDIAC ARRESTS AND A GREATER EFFECT WITH A GREATER “DOSE” OF CARE FROM THE RAPID-RESPONSE TEAM (I.E., A LARGER NUMBER OF ASSESSMENTS PER 1000 ADMISSIONS). HOWEVER, A MAJOR MULTI-CENTER, CLUSTER-RANDOM...
Challenges to Implementation

- Cultural
- Logistical
- Political
- Anthropological
- Social
- Technical
- Medical
- Financial
# Program Benefits

## Benefits to HMC

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<th>Benefit</th>
<th>Details</th>
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<tr>
<td>Standardized and uniform policy and process for the management of deterioration in the conditions of in-patients</td>
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<td>Decreased critical incidence and mortality</td>
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<tr>
<td>Leader of best practice clinical measures within GCC</td>
<td></td>
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<td>Reduction of operational costs due to reduction in length of stay</td>
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<tr>
<td>Decreased operational burden</td>
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## Comparison Between Code & Rapid Response Teams

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<tr>
<th>Typical Feature</th>
<th>Traditional Code Team</th>
<th>Rapid Response Team</th>
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<tbody>
<tr>
<td>Calling Criteria</td>
<td>No recordable pulse; No recordable BP; Absence of respiratory effort; unresponsive</td>
<td>Low BP; Rapid HR; Respiratory Distress; altered consciousness</td>
</tr>
<tr>
<td>Condition that the team assesses and treats</td>
<td>Cardiac Arrest; Respiratory Arrest; Airway Obstruction</td>
<td>Sepsis, pulmonary edema, arrhythmias; respiratory failure</td>
</tr>
<tr>
<td>Team Composition</td>
<td>Anesthesia Fellow; ICU Fellow; residents; ICU nurse</td>
<td>Anesthesia Fellow; ICU Fellow; residents; ICU nurse</td>
</tr>
<tr>
<td>Call Rate (no/1000 admissions)</td>
<td>0.5–5</td>
<td>20–40</td>
</tr>
<tr>
<td>In-hospital Mortality (%)</td>
<td>70–90</td>
<td>0–20</td>
</tr>
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Deteriorating Patient Response System

Qatar Early Warning System (QEWS)

Go Live Dates

2/11 HGH
9/11 WH
22/11 NCCR
29/11 AWH Maternity
15/12 RH
17/12 AWH
15/12 HH
22/12 HH
26/12 AKH
24/12 TCH

01/11/2015
01/01/2016
Slippery Slope of Deterioration

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
Clinical Reviews & Rapid Response Teams

Clinical Reviews  (24/7 coverage)
*Defined* the ‘home’, ‘attending’ or ‘admitting’ team

Rapid Responses  (24/7 coverage)
Responders must be capable of identifying and responding to all acute inpatients
Must have ACLS certification

*Defined* “ideal membership”
Senior physician x 1
Senior/skilled nurse x 1
Respiratory Therapist (as needed) x1
4 Components of a Successful Rapid Response System

- Are we taking Vital Signs and charting correctly?
- Are we escalating appropriately and timely
- Have we identified plan of care?
- Have we communicated appropriately?
- Have we identified risks in advance?
- Has patient received appropriate care?

4 Components of a Successful Rapid Response System

1. Has team arrived in time?
2. Has team the correct members?
3. Did team deliver appropriate care?
4. Did team debrief?
5. Do we do regular simulations

4 Components of a Successful Rapid Response System

- Do we have a clear data collection process (who, when, how etc.?)
- Do we use the data in real time?

Quality improvement, data & audit

4 Components of a Successful Rapid Response System

- Is there clear local and organizational governance?
- Are the leaders using the data to drive improvement?
What was the HMC Framework?

- Separate program of effort into addressable elements
- Benchmark delivery against global evidence
- Establish structures to support delivery
- Identify suitable and influential sponsors
- Identify personnel capable of delivery
The 5 Elements of the QEWS Program

- Governance
- Deteriorating Patient Response System
- Education
- Evaluation
- Standard Calling Criteria

Policy and Governance Plan
Clinical Review Rapid Response
Observation Charts
Key Performance Indicators
Awareness Recognition & Response ALS

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
The 5 Elements of the QEWS Program

Corporate Governance

Facility Governance

Policies & Protocols

Governance

Standard Calling Criteria

Deteriorating Patient Response System

Education

Evaluation

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
Program Governance

**Corporate-level**
- QEWS Steering Committee

**Facility-level**
- 8 Local QEWS committees established with the following functions:
  1. Facility Implementation
  2. Performance Monitoring
  3. Data Management and Reporting

**Corporate Policy**
- CL 6111 - Recognition And Response To Clinically Deteriorating Patients

**Local Protocols**
- 8 Local Facility Protocols developed
## Functions

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<tr>
<th>Structure</th>
<th>Role</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Corporate Committee (Multi-disciplinary)</td>
<td>Design, approve strategy, tools and policies</td>
<td>Four sub committees established; 1. Charts &amp; tools 2. Education 3. Cerner 4. Evaluation and metrics</td>
</tr>
<tr>
<td>Local Committees (Multi-disciplinary)</td>
<td>Define local RRT membership, calling mechanism, data collection and escalation of issues</td>
<td></td>
</tr>
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</table>
The 5 Elements of the QEWS Program

- Adult
- Adult ED
- Pediatric (x 6no.)
- Maternity
- Neonatal

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
Charts and Standard Calling Criteria

• Appropriate tool chosen by senior clinicians across HMC

• Based on Between the Flags from New South Wales

• Charts tested on small scale across HMC in various units using PDSA approach and modifications made
The 5 Elements of the QEWS Program

Governance

- Standard Calling Criteria
- Deteriorating Patient Response System
- Education
- Evaluation

Clinical Review
Rapid Response

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
Rapid Response Teams

• Each facility must identify its team members and their calling system.

• Most use their code team, but at least one has developed a 24/7 nurse led team

• Identify scope of service
<table>
<thead>
<tr>
<th>Facility</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Consultant-led (anesthesia, medicine, critical care)</td>
</tr>
<tr>
<td>2</td>
<td>Specialist who then escalates</td>
</tr>
<tr>
<td>3</td>
<td>Critical Care nurse-led</td>
</tr>
<tr>
<td>4</td>
<td>Code Blue team</td>
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</tbody>
</table>
The 5 Elements of the QEWS Program

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
## Education & Training Model

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<th>Tier</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>eLearning Module (HITC)</td>
<td>&gt;11000 completed</td>
</tr>
<tr>
<td></td>
<td>Bedside teaching (NMER)</td>
<td>&gt;90% completed across all facilities</td>
</tr>
<tr>
<td>Level 2</td>
<td>A.L.E.R.T (or equivalent)</td>
<td>Training of frontline clinical staff on-going</td>
</tr>
<tr>
<td>Level 3</td>
<td>Advanced Life Support</td>
<td>Prioritization of training for RRT members</td>
</tr>
<tr>
<td></td>
<td></td>
<td>without ALS certification on-going</td>
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Level 1 Education

Staff Completion on QEWS Level 1 Education
as of March 2016

No. of Staff

<table>
<thead>
<tr>
<th></th>
<th>Bedside</th>
<th>E-Learning</th>
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<tbody>
<tr>
<td>AKH</td>
<td>1190</td>
<td>11000</td>
</tr>
<tr>
<td>AWH</td>
<td>1049</td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>294</td>
<td></td>
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<tr>
<td>HGH</td>
<td>603</td>
<td></td>
</tr>
<tr>
<td>HH</td>
<td>3205</td>
<td></td>
</tr>
<tr>
<td>NCCCR</td>
<td>368</td>
<td></td>
</tr>
<tr>
<td>RH</td>
<td>1419</td>
<td></td>
</tr>
<tr>
<td>WH</td>
<td>553</td>
<td></td>
</tr>
<tr>
<td>All HMC Hospital</td>
<td>8,682</td>
<td>11,000</td>
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Educating Patients & Families

AN IMPORTANT MESSAGE FOR FAMILIES

If you are worried your child is getting sicker, tell your bedside nurse right away. If you are still worried that your child needs more help you should follow steps.

STEP 1
Ask to speak to the nurse in charge of the shift. Tell them why you are worried and ask them to look at your child.

STEP 2
If the nurse in charge has seen your child but you are still worried, ask the nurse to call for a doctor to look at your child. This is called a "clinical review".

STEP 3
If the doctor has seen your child but you are still very worried, ask your nurse to make a "Rapid Response" call.

Help will arrive very quickly.

We understand that you know your child best and we would like to work with you to make sure your child gets the best care.

Further information can be provided by your healthcare team.

In Collaboration with

Institute for Healthcare Improvement
The 5 Elements of the QEWS Program

Adapted from Between the Flags, Education Strategy & Implementation Guide 2012
Evaluation

- Three Corporate (Mandatory) Metrics
  - eLearning education (HITC)
  - Rapid Response Team activation rate
  - Cardiac arrest rate
Summary

Dr David Vaughan

PROGRAM DIRECTOR
“Successful rapid-response systems consistently deliver a high response “dose” (>25 calls per 1000 admissions).

Mature academic systems have at least 40 calls per 1000 admissions”

HMC facilities are already reporting activation rates of 25/1000 discharges
Evidence

- 5 studies (single center) showed a substantial improvement in before & after comparison, following introduction of a RRT
- A large multi-center randomized trial (Merit) failed to show effectiveness
- Two meta-analyses have failed to show reduction in cardiac arrest rates
Outcome

RRT Call Rate and CPR Code Rate per 1,000 Discharges
All HMC Facilities*

<table>
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<tr>
<th>Month</th>
<th>RRT Call Rate</th>
<th>CPR Code Rate</th>
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<tbody>
<tr>
<td>Apr-15</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>May-15</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Jun-15</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Jul-15</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Aug-15</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Sep-15</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Oct-15</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Nov-15</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>Dec-15</td>
<td>18.4</td>
<td></td>
</tr>
<tr>
<td>Jan-16</td>
<td>24.8</td>
<td></td>
</tr>
<tr>
<td>Feb-16</td>
<td>25.5</td>
<td></td>
</tr>
<tr>
<td>Mar-16</td>
<td>25.2</td>
<td></td>
</tr>
<tr>
<td>Apr-16</td>
<td>25.9</td>
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*All HMC Facilities
Outcome

No. of CPR Calls Across HMC Pre- and Post-Implementation

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<tr>
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<th>Pre QEWS May-Oct '15</th>
<th>Post QEWS Nov '15-Apr '16</th>
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<tr>
<td></td>
<td>120</td>
<td>70</td>
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Anecdotes

“I feel safer” (Al Khor Hospital patient)

“The standardized observation chart has made my job easier” (Emergency Department Consultant)

“There has been a culture change” (Executive Director of Nursing)

“The implementation of Pediatric QEWS has empowered our nursing staff to act upon and obtain medical assistance in an early stage of patients’ deterioration. e.g. since implementation of Ped QEWS nursing staff have been able to pick up abnormalities / changes in vital sign earlier – this has resulted in many cases of Sepsis being recognized at the earliest point and implementation / initiation of antibiotic treatment in under one hour.”

“Pediatric nurses often recognize deterioration in patients through intuition rather than through routine measurement of vital signs. Adding the ‘concern’ sign to the Rapid Response System has provided opportunities for nurses to act upon their intuitive feelings. e.g. patient was inadvertently given wrong medication – patient and mother reported to nurse 20 minutes later that the patient did not feel well. Although the child’s vital signs were normal the nurse felt that the child did not look well and called the RRT – outcome – patient treated rapidly on the unit and did not need transfer to high level of care (PICU)” (Ms Judith Nelmes, Director of Nursing Pediatrics, HGH)

“This is how HMC should deliver large-scale system programs” (Director of Nursing)
• 42% reduction in cardiac arrest rate

• Equates to >100 lives saved per year across HMC

• Rapid Response Team activation rate is a world class standard
Lessons Learned

• Large scale improvement initiatives can demonstrate rapid results

• Taking a systems approach is critical

• Aligning internal stakeholders and resources

• Clinicians (nurse, doctor, RT) are essential

• Alignment with organizational strategy, accreditation and external initiatives
Next Steps

• Where to from here?
• Cerner
• Sepsis
• Continual Improvement
  – Audit
  – Ask to see your data
  – Debrief all cases
  – Local governance is critical
QEWS Phase II CERNER Enhancements
# Acknowledgements

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<th>Role</th>
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<tr>
<td><strong>Program Sponsors</strong></td>
<td>Dr Hanan Al Kuwari, Prof Mike Richmond, Prof Anne Marie Cannaby, Dr Adeel Butt</td>
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<td><strong>Program Delivery</strong></td>
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<td>Dr Khalid Saifeldeen</td>
</tr>
<tr>
<td>Bedside Education</td>
<td>NMER Educators &amp; Facility Educators</td>
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<tr>
<td>Electronic Medical Record</td>
<td>Dr Alex Tuli &amp; Mr Russell Mayne (CERNER)</td>
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<tr>
<td>Steering Committee</td>
<td>Dr Ibrahim Fawzy, Prof Alison Robertson, Ms Annie Topping, Ms Michelle Hill, Ms Judith Nelmes, Ms Catherine Gillespie, Dr Badriya Al Ali, Ms Linda Peters, Ms Alan Dobson, Mr Talib Yaseen, Dr Alex Tuli, Dr Marco Marcus, Dr Ali Sanousi, Dr Adiba Hamad</td>
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<td>Office of the Chief Medical Officer</td>
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<td>Ms Minara Chowdhury, Mr Dieter Burckhardt, Mr Joe San Koh, Ms Najia Rizvi, Ms Ghada El Mandoury, Mr Mark Agramon, Mr Glenn Giducos, Ms Catherine Jamias, Mr Rashid Peedikayil</td>
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<td>Facility Governance</td>
<td>Ms Colene Daniel, Ms Lara Waywell, Mr Wilson Ross, Dr Mahmoud Heidous, Mr Philip Lowen, Ms Liz Thiebe, Mr Mohamed Al-Jusaiman, Prof Abdulbadi AbuSamra, Dr Amal Abousad, Dr Hanadi AlHamad, Dr Hani Al Kilani, Dr Hilal Al Rifai, Prof David Barlow, Mr Glenn Ocampo, Mr Ali Naimat, Mr Segla Tro, Josephine Tindogan</td>
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<tr>
<td>Critical Care Center/Network</td>
<td>Mr David Selwood, Dr AbdulSalam Saif, Dr Ahmed Lutfi, Dr Faisal Malmstrom, Mr Maged Al Hijah</td>
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<td>HICT/CIS</td>
<td>Dr AbdulWahab Abubaker Al Musleh, Mr Rida Miladi, Mr Clive Gibbons, Mr Grant Goodman, Dr Kiran Hegde, Mr Ananth Rao, Mr Punial Hareesh, Mr Ashraf Sharief, Dr Wafik Awni Musbah Sakallah, Mr Shameer Sam</td>
</tr>
<tr>
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<td>Dr Wasmiyah, Mr Richard Browne, Dr Abdulatif Al Khal, Dr Mohammed El- Tawil, Ms Banan Al- Arab, Amal Al Thlatheny, Zehra Mazhar, Dr Dabia Al Mohannadi, Dr Ahmed Badar, Dr Baha, Dr Suresh</td>
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<th>Population</th>
<th>Program Champions</th>
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<tr>
<td>Maternity EWS</td>
<td>Dr Huda Saleh, Dr Najah Ali, Dr Shamsa Ahmad, Dr Mahmoud Abu Jubara, Dr Mohamed Ibrahim Amin Alloub, Dr Hussein Sharara, Ms Faiza Bahnas, Mr Hector Molina, Ms Yolennis Fajardo, Ms Tamara Shdafat, Ms Eufemia Ongodi</td>
</tr>
<tr>
<td>Pediatric EWS</td>
<td>Dr Mohammad Al Janahi, Dr Najeh Khalid, Dr Adiba Hamad, Dr Magda Youssef, Ms Fiona Riordan, Ms Leena Varghese, Ms Nagwa Mohd</td>
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<td>Neonatal EWS</td>
<td>Dr Ghassan Abdo, Dr Fouad Ghanem</td>
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<td>ED EWS</td>
<td>Dr Stephen Thomas, Dr Dominic Jenkins, Dr Kaleelullah Farook, Dr Yogdutt Sharma, Mr Andrew Frazer</td>
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Thank you for your attention

Questions?