Major Emergency Planning –

Your Medical Equipment Considerations.

Ms Ann O Shea,
General Services Manager,
Naas General Hospital, HSE.

ETCI, Medical Equipment,
Quality Management,
Conference,
Thursday 26th March, 2009.

Overview

1. Major Emergency Planning Group

2. Simulations, Tests & Education

3. Activated Plan Medical Equipment Implications & Lessons
   - External Emergency - Major Multivehicle Incident
   - Internal Emergency - Hospital Wide Power Down

4. Conclusions/Summary
Naas General Hospital

- Serves the catchment area of Kildare and West Wicklow.
- Population of approximately 200,000.
- The hospital currently has 243 patient beds which includes 13 day service beds.
- An important aspect of the hospital's role is the provision of a 24-hour Emergency Department service.

The hospital is in close proximity to the main motorway arteries serving Dublin and the South of the Country.

Medical Emergency Planning Committee

Organisational Hierarchy

- Multidisciplinary group by Composition.
- Meets 5-6 Times per Year.
- Medical Emergency Plan Elements Involve:
  1. External Emergencies.
  2. Internal Emergencies.
  3. Flu pandemic.
- Simulations & Tests have been carried out for all 3 elements of our plan over the past 4 years.
- We also have had to activate our MEP.
- Roll Out of Education Programmes.
Simulation and Tests - External

2005
Train Derailment
Bond Bridge Exercise

Kildare has the most Train Accidents and also largest Fatalities in Irish Rail History
- 2 crashes
- 23 fatalities

A joint exercise involving the Gardai, Ambulance and Fire Services and seven acute hospitals in the region.

Following on from a local debriefing subsequent to this exercise, the Major Emergency Planning Group updated the Major Emergency Plan for Naas General Hospital.

Thirty six actions were identified from this testing exercise.

Simulation and Tests - External

2006
Music Festival Exercise
Oxygen - Punchestown

Developed with the close cooperation and assistance of the HSE Emergency Planning Office in the Phoenix Park.

This exercise was developed with the intention of designing a test model for other acute hospitals who wished to test their emergency plan.

This was a simulated Major Incident at the Punchestown Oxygen Music Festival which has an attendance of over 100,000 people which is one of the hospital big Major Emergency risks.

Again this was a very successful testing exercise and further modifications were made to the Major Emergency Plan for the hospital as a result.

There were 18 actions following on from this testing exercise.
Simulation and Tests - Internal

**2006 Staff Communication Test.**
A night time communication test simulated an out of hours Major Emergency.
We audited how many staff were contactable and in a position to report for duty if required.

**2007 Simulated Chemical Explosion**
The objective of this exercise was to test our capacity to handle a large influx of relatives and to test the capacity of our temporary mortuary. It was a joint exercise with the Garda Siochana to facilitate the Gardai in testing their involvement in an acute Hospital during a Major Emergency.
We used volunteers from our local drama group Moate Theatre in Naas.
A great learning exercise particularly for our relative reception. Gardai found it most useful.
New actions cards developed post this exercise.

**2007 Simulated Explosion in Hospital Kitchen Area.**
This Test involved a simulated explosion in our kitchen area with the subsequent evacuation of one of the adjoining wards. There was also an element in this exercise to test the Emergency Department and Pathology Departments handling of blood specimens from unidentified patients who require blood transfusions.

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Education
Learning from Simulation & Tests

- In 2006 a Major Educational Programme was initiated on the MEP by the Major Emergency Planning group.

- It was delivered by the Consultant in Emergency Medicine and the Assistant Director of Nursing.

- By March 2007 over 200 hospital staff had attended the 30 minute briefings on the Naas General Hospital Major Emergency Plan. In 2008 over 150 staff attended these sessions which were delivered at ward level and open to all staff.
Tuesday March 27th 2007

This morning the hospital was undergoing its Irish Health Services Accreditation Board (IHSAB) Survey.

**By total coincidence**

The Emergency Team was being interviewed between 9am and 10.30am.

At 10am, the questions were focussing on the hospitals preparations for emergency planning when the team were informed the Major Emergency Plan had been activated due to a multivehicle incident on the nearby motorway M7/M9.

By 10.05 the Hospital Emergency Control Centre was set up and the communication cascade to all staff had been initiated.

The Consultant in Emergency Medicine had briefed the emergency team in the ED.

Patients in the ED were moved to the Observation Unit.

The first patient presented to the ED at 10.15am.

This was fifteen minutes post activation of Major Emergency Plan.
Naas General Hospital:
was in the process of dealing with
the largest multivehicle incident (approximately 100 vehicles)
in the History of the State.

Young mother dies after motorway crash

Motorway madness: Chaos in the fog

Action Card

Clinical Engineering

- Departmental Roles and Responsibilities

(a) Assist with the setting up of temporary emergency and intensive care beds and the provision of required clinical engineering services in Clinical Areas.

(b) Assist in the support and utilization of all life dependant equipment.

(c) Ensure provision of available Electro Medical Equipment as required.

(d) Obtain extra equipment from service companies or other health care institutions if required, and the equipment is available.

(e) Provide clinical support in equipment application in emerging situations where skills allow.
External Incident – MEP Activation

Multi Vehicle Accident – Clinical Engineering Action

- Set up 3 additional ICU type bays in Theatre Recovery.
- Provide additional Defibrillators to A&E and Temporary ICU Bays.
- Recommission previously decommissioned Ventilators as standby units.
- Redistribute from general ward and clinical OPD areas Physiological Monitors to A&E, ICU, Temporary ICU and High Dependency Areas.
- From Equipment store/library distribute additional Suction Units, Infusion Pumps and Syringe Drivers.

External Incident – MEP Activation

Multi Vehicle Accident – Clinical Engineering Action

- Provide additional backup batteries for Defibrillators in Critical Care Areas.
- Source and distribute all available additional IV poles *** Very big demand.
- Redistribute from OPD and General ward areas Patient ECG Recorders to Critical Care Areas.
- When transferring many patients from A&E to ICU designated areas, assist with equipment in transfer.
External Incident – MEP Activation

Equipment Lessons, and Recommendations

- Good liaison with key suppliers is essential. We had equipment delivered to site within 1 hr of request; and afterwards because of MEP Activation the company never invoiced but were just happy to assist. (Ventilators, suction units and IV Poles).

- Keep reserve stock of equipment accessories. In Major Emergency with plenty of movement of Staff, Patients and Equipment, Equipment Accessories get broke or lost very easily. It is essential to have spare ECG, SpO2, NIBP, Temp, Leads etc.

- Apart from Life dependant equipment the request that we then received the most was for IV poles & drip stands. This was new for us.

- Develop an Equipment store room, or Equipment Library. The ability to draw on reserve is critical. If space allows keep old/decommissioned equipment in store.

Internal Incident – MEP Activation

Whole Hospital – Power Outage 6th December 2006

Duration – 90 Minutes
### Internal Incident – MEP Activation

**Whole Hospital – Power Outage**

**Effects**

- No MEP Control Centre, Bleeps Down.
- All Life dependant Medical Equipment on Back up power supply – UPS/Battery.
- Fortunately no patients in Theatre O. R. nor on Ventilation in ICU.
- No Central Patient Monitoring Stations.
- No Patient Telemetry from CCU.

**Effects**

- Unknown PACS Battery Backup Reserve.
- CT Issues on UPS.
- Query on lifespan of Products in Fridges.
- No Lifts – Effect Patient Transfer.

### Single Biggest Equipment Issue

“Reserve Capacity of all UPS’s and Battery Back Up Systems Not Easily Accessible”.

“Staff did not know exactly how long their equipment would last”.
ACTION - “Equipment Battery/UPS Guide”.

- Designed laminated double sided Equipment Battery and UPS Information Guide for every Battery Dependent Item of Equipment and UPS in Hospital.
- Provided Education Sessions at Head of service, Allied health Professional and CNM Nursing Meetings regarding “Equipment Battery/UPS Guide”.
- Distributed to all clinical areas in Hospital.

MEDICAL EQUIPMENT BATTERY CHARGE UP SHEET GUIDELINES

<table>
<thead>
<tr>
<th>Equipment with Backup Sources</th>
<th>Battery Charge Uptime</th>
<th>Capacity on Full Charge</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defibrillator</td>
<td></td>
<td></td>
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<tr>
<td>HeartStart XL</td>
<td>4 hours to 90%</td>
<td>100 minutes monitoring or 30 200j shocks or 75 minutes monitoring while pacing at 100ma 100ppm</td>
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</tr>
<tr>
<td>Heartstream XL</td>
<td>4 hours to 90%</td>
<td>100 minutes monitoring or 30 200j shocks or 75 minutes monitoring while pacing at 100ma 100ppm</td>
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</tr>
<tr>
<td>MRX</td>
<td>3 hours to 80% capacity per battery. Batteries are charged sequentially. 5 hours monitoring with ECG/SPO2/CO2, Temperature, 1 BP/NP every 15 minutes and 20 200j shocks or 3.5 hours monitoring with ECG/SPO2/CO2, Temperature, 2 BP/NP every 15 minutes and pacing 180ppm @ 160ma</td>
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<td></td>
</tr>
<tr>
<td>Infusion Pump</td>
<td>3 hours from discharge to 100%</td>
<td>4 hours @ 100mhr nominal for SE1, 3 hours @ 100mhr (sum of channels) nominal for SE2</td>
<td></td>
</tr>
<tr>
<td>Syringe Pump</td>
<td>2.5 hours from discharge to 100%</td>
<td>4 hours from fully charged battery @ 5 m/hr at 20°C</td>
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<tr>
<td>Suction</td>
<td>5 hours to 100%</td>
<td>30 minutes on full suction</td>
<td></td>
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<tr>
<td>Central Station</td>
<td>12 hours</td>
<td>90 - 120 seconds</td>
<td></td>
</tr>
<tr>
<td>Anaesthetic Machine</td>
<td>44 hours to 100%</td>
<td>20 mins, mechanical ventilation. Only supports ventilator screen not patient monitoring</td>
<td></td>
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</tbody>
</table>

Battery capacity/time are based on one battery. Only one battery can be charged in the MRXs at a time as the second battery bay is taken up with the AC module. Batteries can be charged in an external battery support system.
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<th>Battery Charge Uptime</th>
<th>Capacity on Full Charge</th>
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<tbody>
<tr>
<td><strong>Patient Monitoring</strong></td>
<td></td>
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</tr>
<tr>
<td>A1</td>
<td>9 hours to 100%</td>
<td>4 hours with NBP taken every 15 minutes</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>8 hours to 100%</td>
<td>2.5 hours with NBP taken every 15 minutes</td>
<td></td>
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<tr>
<td>M3/M4</td>
<td>4.5 hours to 100%</td>
<td>2.5 hours with standard parameters NBP measured every 15 minutes or 3.35 hours when CO2 measurement is in use.</td>
<td></td>
</tr>
<tr>
<td>Intellivue</td>
<td>4 hours to 100% Capacity</td>
<td>3 hours with basic monitoring: Brightness set to optimum and NBP every 15 minutes. Or 4 hours with the above and CO2 recorder every 15 minutes connected.</td>
<td></td>
</tr>
<tr>
<td>Drivecapt</td>
<td>2 hrs to 100%</td>
<td>Will deliver 48 BP measurements</td>
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<tr>
<td><strong>Ventilators per battery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3hrs to be fully charged</td>
<td>Half hour per battery</td>
<td></td>
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<tr>
<td><strong>Pacs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UPS system, Will Last 47 Mins</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CT</strong></td>
<td></td>
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<tr>
<td></td>
<td>UPS Designed to Support Control Console so that the Console can be brought down safely. UPS lasts approximately 30 mins. Does not support patient scanning.</td>
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<tr>
<td><strong>ECG Carts</strong></td>
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<td></td>
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<tr>
<td>Pagewritters 103, 203, 300</td>
<td>7 hours to 90% 16 hours to 100%</td>
<td>40 12 Lead ECGs or 60 minutes of continuous ECG recording.</td>
<td></td>
</tr>
<tr>
<td>Trim 3</td>
<td>18 hours to 100%</td>
<td>30 Automatic ECGs or 30 Minutes of continuous recording</td>
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<tr>
<td><strong>Electronic Beds</strong></td>
<td></td>
<td></td>
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<tr>
<td>Royal Masterpiece</td>
<td>24 hours to full capacity</td>
<td>4-5 Functions</td>
<td></td>
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<tr>
<td>Nestell Evans</td>
<td>24 hours to full capacity</td>
<td>4-5 Functions</td>
<td></td>
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<tr>
<td>Alps</td>
<td>12 hours to 100% capacity</td>
<td>3 Functions</td>
<td></td>
</tr>
<tr>
<td>Hill-Rom</td>
<td>24 hrs to 100% capacity</td>
<td>3 Full Functions</td>
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**Hospital Power Outage – Some Typical Issues**

1. Capacity too low on internal power breaker trip settings to take hospital power demand.
2. Synchronisation problems with back up generators.
3. Need for routine testing of battery cells in UPS's.
4. Generator not big enough to start at full load.
5. Unbalanced power phase distributions.
6. Hospital Power Load Shedding Systems not Installed.
Hospital Power Outage – ETCI Report

- Reported incident to ETCI TC10 in 2006.
- Did not find significant Guidance on Hospital Power Installation and Backup Supply Testing.
- Requested that TC10 consider this in their next version of National Wiring Rules and Provide National Guidance.

MEP – Flu Pandemic Protective Equipment Test

- Flu pandemic sub group hold meetings to “Develop the Hospital Flu Pandemic Preparedness Plan” Draft Plan in place for Flu Pandemic outbreak.
- September 2008 Testing of Flu Pandemic Exercise:
  - Educate staff on what Flu Pandemic is.
  - Educate staff on the use of PPE and good hand hygiene practice in the event of Flu Pandemic;
  - Staff Testing of Fitting of High Particulate Filtration masks.
- Very successful day. 145 staff attended over the course of the day (4 sessions). Good interaction from groups. Great input from variety of staff on the day to ensure the test was successful and practical.
- With Medical Equipment we are now at a stage where we need to engage with National Medical Equipment Suppliers Organisations to complete our Medical Equipment Contingency Planning, e.g. IMSTA.
The hospital’s Major Emergency Plan worked very effectively and efficiently on both occasions.

This was in no small measure attributed to the outstanding staff who were familiar with their actions and who had really engaged in the test exercises and briefings over the previous two years.

Prepare, Test and Simulate, and then Prepare Again.