



# Dorset Clinical Services Review: Modelling the Potential Impact on the Emergency Ambulance Service

## 1. Executive Summary

- 1.1 The operational modelling project was commissioned by Dorset CCG to establish the potential impact of the proposed CSR reconfiguration on the emergency ambulance service. The project analysed 21,944 SWAST patient records, covering all incidents within the County of Dorset where an ambulance attended and conveyed a patient to hospital during the sample period 01/01/2017 - 30/04/2017. It should be noted that almost half of patients are managed by the ambulance service through hear and treat and seat and treat, and were excluded from the report. The model used to produce this analysis was developed using key assumptions and is therefore subject to the limitations highlighted. No model can predict the future; it can only consider the potential impact of the Dorset CSR on historical data.
- 1.2 236 maternity related calls were identified, 154 (65%) were direct admissions to hospital from the community, and 82 (35%) were inter-hospital transfers. The closure of PGH maternity unit and change of RBH to become obstetric led resulted in an overall 1 minute decrease in the average journey time to hospital. Sixty patients had no difference in journey time, 53 had a shorter journey and 41 had to travel further. The greatest additional journey time would be 21 minutes longer than currently. The 95<sup>th</sup> percentile travel time reduced from 38 to 37 minutes, and the maximum travel from 48 to 47 minutes.
- 1.3 For adult patients, the change of Poole General Hospital's ED to an UCC will result in 3,719 fewer patients being received there, with an additional 3,569 being conveyed to RBH and 325 to DCH. 16,113 patients had no difference in journey time, 650 had a shorter journey and 3,067 had to travel further. The overall average weighted journey time to hospital will increase by 1 minute, however the 95<sup>th</sup> percentile travel time will decrease by 16 minutes, with the maximum travel time reducing by 56 minutes.
- 1.4 For children (under 16 years) the same change of service at PGH and RBH will result in 682 fewer paediatrics being received at Poole, with an additional 669 being conveyed to RBH and 15 to DCH. 832 patients had no difference in journey time, 214 had a shorter journey and 291 had to travel further. The overall average weighted journey time to hospital will decrease by 1 minute, the 95<sup>th</sup> percentile travel time will remain unchanged and the maximum journey time will reduce by 5 minutes.



- 1.5 A total of 3:34 additional hours of emergency ambulance cover per day would be required to manage the additional impact identified by the model. A number of important additional aspects were however identified which may have a greater impact on the ambulance service and require modelling to establish the overall impact.
- 1.6 The modelling included a review of patients who may have to travel further to hospital, to identify cases where they were critically unwell. Further review by a wider range of clinicians is required to confirm the overall clinical impact of the proposed changes.
- 1.7 The CSR team are asked to consider the following recommendations:
- Utilise the findings of the model and the additional information within the SWAST CSR preliminary report to support the CSR process.
  - Support the expert review of cases identified where extended journey times may increase the clinical risk.
  - Support additional modelling of the DCH/YDH consolidation of paediatric and maternity services.
  - Identify a national example of a change from an ED to UCC to provide information to enable the increased activity due to patients continuing to self-present at PGH with conditions which require an ED.
  - Consider the potential impact of the CSR on the emergency ambulance service, utilising the model to ensure that any changes are appropriately commissioned, and patients across Dorset continue to receive a timely response to 999 calls.



## 2. Introduction and Aims

- 2.1 The Dorset Clinical Services Review (CSR) was launched in 2014, with the aim of ensuring that everyone in Dorset receives the highest quality of care, wherever they live and whatever time of the day or week they need it. The programme represents an ambitious large scale change of health and care services across community and hospital settings.
- 2.2. With such large scale changes ahead to improve the care delivered to patients, it is vital that the impact on the ambulance service is better understood. The South Western Ambulance Service (SWAST) will play a vital role in enabling the success of the reconfigured services. However, in order to continue to deliver a responsive service to the people of Dorset, it is important that the operational impact on the 999 service is carefully modelled. This information will support commissioning decisions, to ensure that adequate resources continue to be available to respond to 999 calls across the County.
- 2.3 The operational modelling project was commissioned by Dorset CCG and builds on the initial work undertaken in the SWAST Dorset CSR Preliminary Report. The initial report profiled the typical range of clinical conditions present amongst patients conveyed by emergency ambulance to hospital from an incident address within the County of Dorset. The initial report provided a new level of granular detail, which has been used to gain a better understanding of the specific patient conditions which are likely to be managed at each hospital following implementation of the CSR.
- 2.4 The modelling report sets out the likely impact of the changes to acute hospital clinical services in Dorset on the emergency ambulance service. A model based on the proposed CSR configuration being in place during January-April 2017 was used to establish patient numbers and flows.

## 3. Method

- 3.1 Whenever face-to-face contact occurs between a patient and an ambulance clinician, an electronic patient clinical record (ePCR) is created. Each ePCR has a diagnosis code, which the ambulance clinician selects from a drop down list, to describe the main issue with which the patient presents. Using information supplied by the Dorset CSR to describe the potential services available at each site, the applicable diagnosis codes were identified for the sample period.
- 3.2 The project utilised SWAST data on emergency incidents which occurred within the County of Dorset, where the ambulance service attended and conveyed a patient to hospital. The report therefore also included hospitals which are located outside of the County. It covers the four month sample period 01/01/2017 - 30/04/2017, and required data to be extracted both from the ambulance Computer Aided Dispatch system (CAD) and the electronic Patient Clinical Record (ePCR).



- 3.3 Due to the range of proposed changes to acute clinical services, it was necessary to split the dataset of 21,944 emergency journeys into four clinical groups; maternity, paediatric, Urgent Care Centre (UCC) eligible and UCC not eligible. The specific inclusions and exclusions are described in the results section. Modelling was carried out on these groups separately, with a combined travel time analysis then being calculated.
- 3.4 For the purposes of the modelling, ambulance admissions and inter-hospital transfers (IHTs) were dealt with separately.
- 3.5 Journey times and distances to each hospital, from the incident location recorded in the dataset, were calculated using Google Mapping Services and were based on normal road speed. The data was then geographically modelled to calculate the operational impact of each CSR proposed change, in terms of a change in ambulance destination pattern, extended journey times and new activity.
- 3.6 The key assumption made in the modelling was that patients would be conveyed to the hospital that was closest to the incident AND could manage their presentation. It was also assumed that IHTs not directly affected by the proposed service changes would continue.
- 3.7 It should be acknowledged that as with any modelling, there are limitations:
- The model cannot predict the future. It can only establish the impact of the proposed CSR changes, should they have occurred during the sample period. The assumption is that subject to changes in emergency demand, this may then reflect the impact of the CSR when it is actually implemented.
  - The use of paramedic diagnosis codes may not identify the full medical picture for patients with multiple issues, and there is a risk of human error in selecting the correct code. Additionally, the breadth of clinical presentations contained within some of the diagnosis codes meant that directly mapping them to UCC admission criteria was not always straightforward, and assumptions have had to be made, as detailed in Appendix B.
  - Data cleansing was necessary before the data could be used, and this may have led to errors in allocating values in certain data fields. Records were carefully checked, but due to the volume and time allocated to the project, anomalies may still have remained.
  - Due to the complexities of current admissions policies for different hospitals and units, such as the midwife-led unit at Royal Bournemouth Hospital, it was decided to compare the real-world data on current emergency transfers against the hypothetical 'What If Analysis'; the scenario in which patients attend the nearest hospital where they are eligible for admission under the proposed service changes. This may impact upon the forecasting of patient flows, as anomalies created by specific clinical decisions cannot be predicted.



3.8 The proposed service change to convey suitable stroke patients to Southampton General Hospital for thrombectomy has been excluded from the modelling, as it is likely to occur prior to the CSR changes taking affect.

## 4 Maternity Services

### 4.1 Current Situation

4.1.1 In the four month sample period across Dorset, there were 236 maternity related calls to the ambulance service which resulted in the patient being conveyed to hospital. These included all patients who were conveyed to a maternity unit, or were being conveyed elsewhere including ED for pregnancy, labour or newborn related issues. Miscarriages were specifically excluded, as they may be managed at an ED, and are therefore included within the ED adult section of the report.

4.1.2 Of the 236 cases, 154 (65%) were direct admissions to hospital from the community, and 82 (35%) were inter-hospital or inter-facility (i.e. across the same hospital site) transfers. The distribution of the direct ambulance admissions and IHTs received among the local hospitals is detailed in Table 1. The current geographical distribution of maternity incidents is set out in Figure 1.

4.1.3 *Table 1 - Distribution of Maternity Related Admissions and IHTs by Destination Hospital (n)*

| Destination Hospital            | Ambulance Admissions | IHTs Received |
|---------------------------------|----------------------|---------------|
| Royal Bournemouth Hospital      | 3                    | 0             |
| Poole General Hospital          | 99                   | 73            |
| Dorset County Hospital          | 36                   | 0             |
| Yeovil District Hospital        | 6                    | 0             |
| Salisbury District Hospital     | 10                   | 0             |
| Musgrove Park Hospital, Taunton | 0                    | 1             |
| Royal Devon and Exeter Hospital | 0                    | 0             |
| Southampton General Hospital    | 0                    | 8             |

4.1.4 Of note, 56 of the IHTs were transfers from Royal Bournemouth Hospital's Midwife-led maternity unit to Poole General Hospital's Obstetrician-led maternity unit. A further 8 were inter-facility transfers between Poole General Hospital main site and its maternity unit at St. Mary's hospital.



4.1.5 Figure 1 - Map of Geographical Distribution of Maternity Incidents by Hospital



## 4.2 Closure of PGH Maternity Unit and RBH Maternity Unit Move to Obstetric Led

- 4.2.1 For this scenario, Poole General Hospital was closed to all maternity admissions and the Royal Bournemouth Hospital was changed to an obstetric led unit, receiving all admissions where it was the nearest maternity unit within the County of Dorset.
- 4.2.2 Table 2 displays the difference in travel times for direct maternity ambulance admissions between the real-world current situation and the modelled proposed service changes (the 'What If Analysis'), for the sample.
- 4.2.3 Table 2 - Predicted Change to Emergency Journey Travel Times for Maternity Unit Ambulance Admissions (mins)

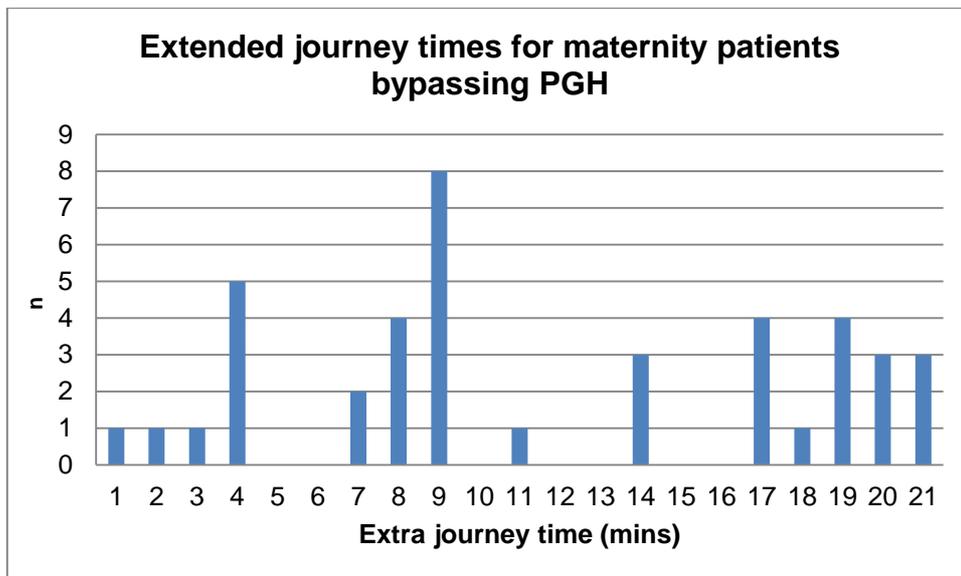
| Measure                      | Current Situation | What-if Analysis | Gain/Loss  |
|------------------------------|-------------------|------------------|------------|
| Weighted average travel time | 21                | 20               | <b>-01</b> |
| 95th percentile travel time  | 38                | 37               | <b>01</b>  |
| Minimum travel time          | 04                | 06               | <b>02</b>  |
| Maximum travel time          | 48                | 47               | <b>-01</b> |

- 4.2.4 The model suggests that the closure of Poole General Hospital's maternity unit and change of Royal Bournemouth Hospital's maternity service from a midwife-led to obstetrician-led unit will have little impact on emergency journey times for direct maternity admissions, reducing the average journey by 1 minute. This appears to be due to the fact that the majority of patients from the RBH catchment area are currently conveyed to PGH, with the change simply switching the bypass.



4.2.5 Sixty patients had no difference in journey time, 53 had a shorter journey and 41 had to travel further to either DCH or RBH. The greatest additional journey time would be 21 minutes longer than currently. The cases of increase travel time are demonstrated in Figure 2.

4.2.6 *Figure 2 - Extended Ambulance Journey Times for Maternity Related Patients*



4.2.7 With regard to IHTs, it is assumed that the current 56 transfers from the Royal Bournemouth Hospital maternity unit to Poole General Hospital maternity unit would no longer occur, nor would the 9 inter-facility transfers at the Poole General Hospital site. The nine transfers from Dorset County Hospital to Poole General Hospital would instead be conveyed to the Royal Bournemouth Hospital. This would result in 65 fewer ambulance IHTs and 9 longer IHT journeys. The emergency journey travel times for these 9 longer IHTs and the remaining 9 IHTs to hospitals outside of Dorset, are detailed in Table 3.

4.2.8 *Table 3 - Current Emergency Journey Travel Times for the 18 Maternity Related IHTs Predicted to Continue (mins)*

| Measure                      | IHTs |
|------------------------------|------|
| Weighted average travel time | 63   |
| 95th percentile travel time  | 71   |
| Minimum travel time          | 53   |
| Maximum travel time          | 71   |

4.2.9 Comparing again the real-world sample with the modelled service changes, the distribution of maternity direct transfers by hospital is shown in Table 4. The 9 continuing IHTs are added to give the total forecasted gain/loss figure per hospital.



4.2.10 Table 4 - Predicted Distribution by Hospital of Maternity Patients (n)

| Destination Hospital            | Current Situation | What-If Analysis | Continuing IHTs | Gain/Loss  |
|---------------------------------|-------------------|------------------|-----------------|------------|
| Royal Bournemouth Hospital      | 3                 | 94               | 9               | <b>100</b> |
| Poole General Hospital          | 99                | 0                | 0               | <b>-99</b> |
| Dorset County Hospital          | 36                | 44               | 0               | <b>8</b>   |
| Yeovil District Hospital        | 6                 | 7                | 0               | <b>1</b>   |
| Salisbury District Hospital     | 10                | 9                | 0               | <b>-1</b>  |
| Musgrove Park Hospital, Taunton | 0                 | 0                | 1               | <b>1</b>   |
| Royal Devon and Exeter Hospital | 0                 | 0                | 0               | <b>0</b>   |
| Southampton General Hospital    | 0                 | 0                | 8               | <b>8</b>   |

4.2.11 As would be expected, Royal Bournemouth Hospital would admit a greater proportion of patients (n=100) due to its service change, while Poole General Hospital would now receive none. Current PGH patients would be conveyed to the next nearest maternity unit, which in the majority of cases would be RBH. Accepting the limitations detailed in para 4.3.1, for the purposes of the modelling, it is assumed that DCH would be able to accept the 8 additional patients.

4.2.12 The map at Figure 3 demonstrates the new geographical distribution of maternity patients by incident postcode sector and destination hospital.

4.2.13 Figure 3 - Map of Predicted Geographical Distribution of Maternity Incidents by Hospital



4.3



4.3.1 Due to the longer timeframe before it will be known whether DCH will retain obstetric led maternity services, or become a midwife led unit, it has not been included within the modelling. The assumption has been that no changes occur to affect patients currently conveyed to DCH.

#### 4.4 Predicted Operational Impact

4.4.1 The predicted total operational impact during the 4 month sample period detailed in Table 5, indicates that the CSR changes would reduce ambulance operational minutes utilised by 3,835. Please refer to section 9 for the overall operational impact calculation.

4.4.2 *Table 5 - Predicted Maternity Related Cases Operational Impact*

| Journey Type             | Description   | Total Time Gain/Loss (mins) |
|--------------------------|---|-----------------------------|
| Hospital admissions      | All patients currently admitted to PGH maternity unit being conveyed to RBH or DCH (additional travel time).  | +482                        |
| Inter-hospital transfers | Inter-hospital transfers where the booking location is RBH maternity ceasing, due to change to obstetric led unit (resource time counted from time attending vehicle was allocated until vehicle booked clear). | -4079                       |
| Inter-hospital transfers | Inter-hospital transfers currently from DCH to PGH, but will now bypass to RBH (additional travel time).  | +171                        |
| Inter-facility transfers | Inter-facility transfers between PGH main site and maternity unit at St Mary's hospital (calculated as for IHTs).   | -409                        |
|                          | <b>Total Impact</b>   | <b>-3835</b>                |

#### 4.5 Clinical Risk

4.5.1 The closure of PGH will result in an overall 1 minute decrease in the average journey time to hospital. Sixty patients had no difference in journey time, 53 had a shorter journey and 41 had to travel further. The greatest additional journey time would be 21 minutes longer than currently. It should however be noted that overall the 95<sup>th</sup> percentile travel time will actually reduce from 38 to 37 minutes, and the maximum travel from 48 to 47 minutes.

4.5.2 All 41 cases where the travel time would be extended were reviewed by the SWAST Consultant Paramedic lead for Obstetrics and Maternity, to establish if any cases may present an additional clinical risk. Table 6 details the three potential cases identified, which we recommend receive a specialist review by a Consultant Obstetrician and senior Midwife, to determine any potential additional risk.



#### 4.5.3 Table 6 - Potential Maternity Higher Risk Cases

| Diagnosis Code                        | Details   | Additional Journey Time (mins) |
|---------------------------------------|---|--------------------------------|
| Post-Partum haemorrhage               | Absent radial, but improved en-route                                | 9                              |
| Hypoxic birth after shoulder dystocia | Potential neonatal distress but improved prior to ambulance arrival | 8                              |
| Ectopic Pregnancy                     | Extreme hypotension, systolic BP 66mmHg, pain score 10/10           | 19                             |

## 5. Emergency Department Provision (Adult)

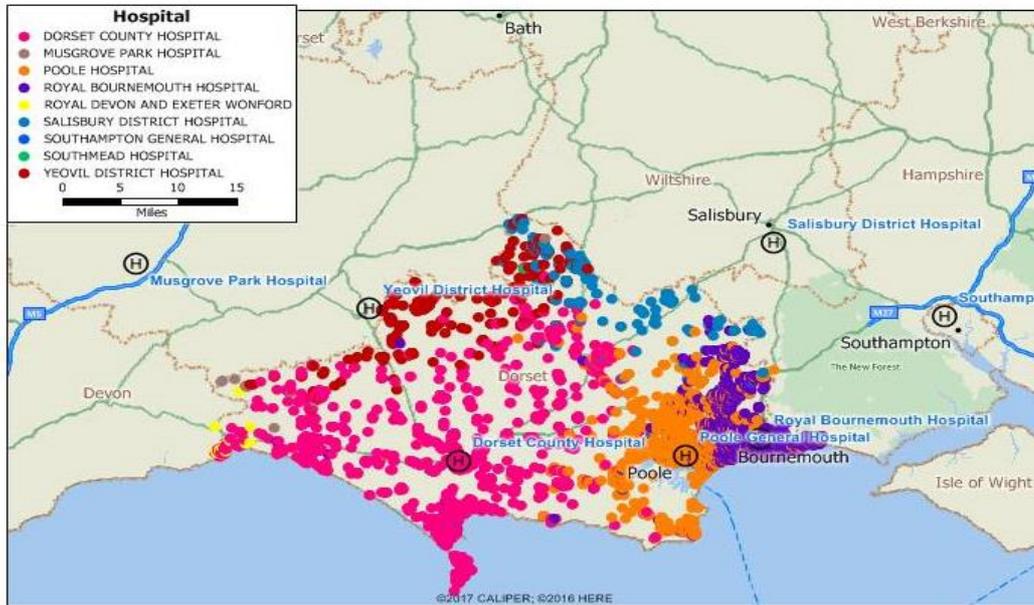
### 5.1 Current Situation

- 5.1.1 The Royal Bournemouth Hospital currently does not accept a range of presenting conditions, which are instead bypassed to Poole General Hospital. The specific criteria are detailed in Appendix A.
- 5.1.2 During the four month sample period, across Dorset there were 20,246 emergency medical and trauma calls to the ambulance service resulting in an adult patient (aged 16 years or over) being conveyed to an Emergency Department. With the exception of miscarriages, patients with a maternity related diagnosis code were excluded, as they were already included in section 4. Of the 20,246 incidents, 19,830 (98%) were direct admissions to hospital, with the remaining 416 (2%) inter-hospital or inter-facility transfers.
- 5.1.3 The distribution of the direct admissions and IHTs is detailed in Table 7, with the geographical distribution in Figure 4.
- 5.1.4 *Table 7 - Distribution of Adult ED Admissions and IHTs by Destination Hospital (n)*

| Destination Hospital            | Ambulance Admissions | IHTs Received |
|---------------------------------|----------------------|---------------|
| Royal Bournemouth Hospital      | 6992                 | 91            |
| Poole General Hospital          | 6584                 | 185           |
| Dorset County Hospital          | 4851                 | 17            |
| Yeovil District Hospital        | 786                  | 0             |
| Salisbury District Hospital     | 541                  | 8             |
| Musgrove Park Hospital, Taunton | 14                   | 0             |
| Royal Devon and Exeter Hospital | 34                   | 0             |
| Southampton General Hospital    | 26                   | 113           |
| Southmead Hospital              | 2                    | 2             |



5.1.5 Figure 4 - Map of Geographical Distribution of Adult Emergency Department Ambulance Admissions by Hospital



## 5.2 Change of Poole General Hospital’s Emergency Department to an Urgent Care Centre

5.2.1 The challenge for this sub-group of patients, was to map out the specific ambulance clinical condition codes that were likely to be within the scope of a GP led Urgent Care Centre (UCC). For simplicity, it was agreed that for the purposes of this model, the current admission criteria for the Tiverton GP-led UCC in Devon would be used as a proxy. The admission criteria used for the model are detailed in Appendix B.

5.2.2 Table 8 details the difference in travel times for adult emergency ambulance admission (excluded IHTs) between the real-world current situation and the modelled proposed service changes (the ‘What If Analysis’), for our sample.

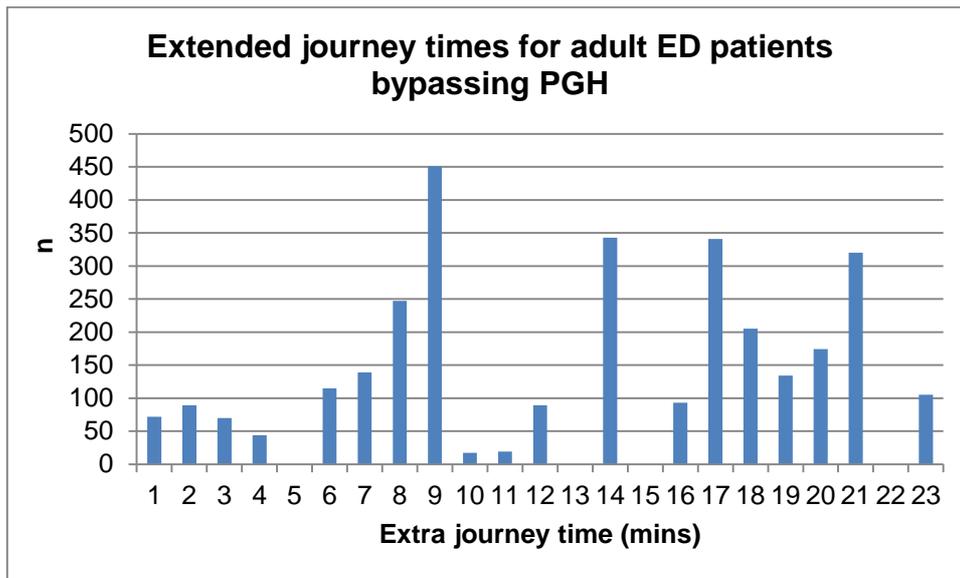
5.2.3 Table 8 - Predicted Change to Emergency Journey Travel Times for Adult ED Ambulance Admissions (mins)

| Measure                      | Current Situation | What-if Analysis | Gain/Loss  |
|------------------------------|-------------------|------------------|------------|
| Weighted average travel time | 17                | 18               | <b>01</b>  |
| 95th percentile travel time  | 60                | 44               | <b>-16</b> |
| Minimum travel time          | 01                | 01               | <b>00</b>  |
| Maximum travel time          | 133               | 77               | <b>-56</b> |



5.2.4 The model suggests that the change of Poole General Hospital’s ED to an UCC will have a minimal impact on emergency journey times for direct emergency adult admissions, adding an average of 1 minute to each journey. 16,113 patients had no difference in journey time, 650 had a shorter journey and 3,067 had to travel further. The longest additional time on top of the current journey length being 23 minutes. The extended journeys are detailed in Figure 5.

5.2.5 *Figure 5 - Extended Ambulance Journey Times for Adults:*



5.2.6 With regard to IHTs, it can be assumed that the 167 transfers from the Royal Bournemouth Hospital to Poole General Hospital would cease, together with the 7 inter-facility transfers across the Poole General Hospital site. Eleven transfers from Dorset County Hospital to Poole General Hospital would instead be conveyed to the Royal Bournemouth Hospital. Overall, this would therefore result in 174 fewer IHTs, with 242 still occurring, 11 of which would have to travel further. The emergency journey travel times for the remaining 242 IHTs are detailed in Table 9.

5.2.7 *Table 9 - Predicted Emergency Journey Travel Times for the 242 Remaining Emergency Adult IHTs (mins)*

| Measure                      | IHTs |
|------------------------------|------|
| Weighted average travel time | 44   |
| 95th percentile travel time  | 124  |
| Minimum travel time          | 24   |
| Maximum travel time          | 136  |

5.2.8 Comparing the real-world sample with the modelled service changes, the distribution of adult ED admissions by hospital is shown in Table 10. The 242 continuing IHTs are added to give the total forecasted gain/loss figure per hospital.



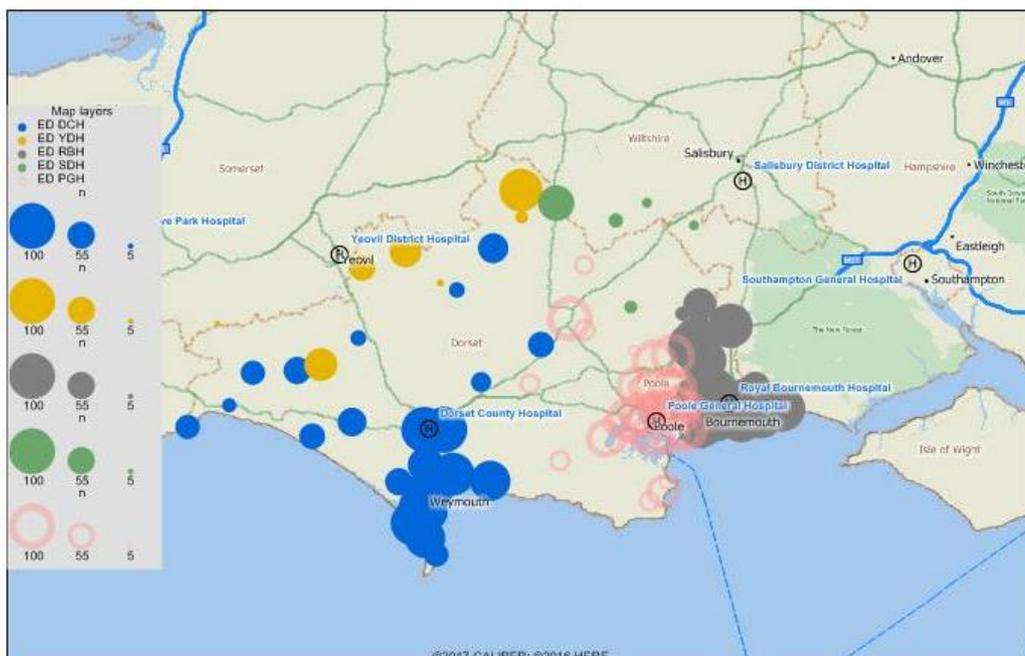
5.2.9 Table 10 - Predicted Distribution by Hospital of Adult ED Patients (n)

| Destination Hospital            | Current Situation | What-If Analysis | Continuing Received IHTs | Gain/Loss    |
|---------------------------------|-------------------|------------------|--------------------------|--------------|
| Royal Bournemouth Hospital      | 6992              | 10459            | 102                      | <b>3569</b>  |
| Poole General Hospital          | 6584              | 2865             | 0                        | <b>-3719</b> |
| Dorset County Hospital          | 4851              | 5159             | 17                       | <b>325</b>   |
| Yeovil District Hospital        | 786               | 880              | 0                        | <b>94</b>    |
| Salisbury District Hospital     | 541               | 455              | 8                        | <b>78</b>    |
| Musgrove Park Hospital, Taunton | 14                | 7                | 0                        | <b>-7</b>    |
| Royal Devon and Exeter Hospital | 34                | 5                | 0                        | <b>-29</b>   |
| Southampton General Hospital    | 26                | 0                | 113                      | <b>87</b>    |
| Southmead Hospital              | 2                 | 0                | 2                        | <b>0</b>     |

5.2.10 As a result of the change of Poole General Hospital from an ED to an UCC, it is predicted that 3,719 fewer patients would be conveyed by ambulance to PGH, and would instead be admitted to the Royal Bournemouth and other surrounding hospitals. In the West/North Dorset areas, the current small number of patients with specific conditions such as STEMI and stroke will continue to be bypassed to Musgrove Park and the Royal Devon & Exeter Hospitals (n=12), where they are the nearest unit with these facilities.

5.2.11 Figure 6 demonstrates the new geographical distribution of adult ED patients by incident postcode sector and destination hospital.

5.2.12 Figure 6 - Map of Predicted Geographical Distribution of Adult ED Incidents by Hospital:





5.2.13 When any hospital does not have an ED, some patients requiring ED services will continue to self-present e.g. severe bleeding or stroke. There are currently no examples of an ED becoming an UCC in the South West on which to base a model. It must be noted that this will have an operational impact on the emergency ambulance service, due to an increase in activity. Further work is required to understand the impact of any similar service changes using equivalent national examples.

### 5.3 Predicted Operational Impact

5.3.1 The predicted total operational impact during the 4 month sample period detailed in Table 11, indicates that the CSR changes would increase ambulance operational minutes utilised by 25,512. Please refer to section 9 for the overall operational impact calculation.

#### 5.3.2 Table 11 - Predicted Emergency Adult Operational Impact

| Journey Type             | Description  | Total Time Gain/Loss (mins) |
|--------------------------|--|-----------------------------|
| Hospital admissions      | PGH change to an Urgent Care Centre (additional travel times due to bypass).   | +40,719                     |
| Inter-hospital transfers | Inter-hospital transfers where the booking location is RBH ED ceasing, due to change to the Major Emergency Hospital (resource time counted from time attending vehicle was allocated until vehicle booked clear). | -14,862                     |
| Inter-hospital transfers | Inter-hospital transfers currently from DCH to PGH, but will now bypass to RBH (additional travel time).   | +209                        |
| Inter-facility transfers | Inter-facility transfers between PGH main site and maternity unit at St Mary's hospital (calculated as for IHTs).  | -554                        |
| PGH Self-presenters      | Patients requiring a full ED who continue to self-present at PGH and require ambulance transfer to RBH ED.   | TBC                         |
| <b>Total Impact</b>      |  | <b>25,512</b>               |

### 5.4 Clinical Risk

5.4.1 The change of PGH from an ED to an UCC will result in an overall 1 minute increase in the average weighted journey time to hospital. It will however conversely result in a 16 minute decrease in the 95th percentile travel time and a 56 minute reduction to the maximum travel time. Overall, 16,113 patients had no difference in journey time, 650 had a shorter journey and 3,067 had to travel further.

5.4.2 In order to establish the potential clinical risk, the data for all 3,067 cases with an extended travel time was reviewed. Only cases with a NEWS score of >7 and/or where medications were administered, cannulation attempted or an airway adjunct was required were considered. This identified a total of 1,636 patients, which were further cleansed to remove any incidents with a diagnosis code which was regarded



as low risk (e.g. anxiety attack, non-injury fall). The presenting complaint free text was reviewed in any cases where the risk level was not clear.

5.4.3 Following this exercise, 696 incidents remained. Due to the time required to manually clinically review this number of records, it would not have been possible to complete the task within the timeframe of this report. A randomised sample of 150 was therefore selected for further review. The ePCR for each case was reviewed by an experienced Paramedic (Quality improvement Paramedic and Clinical Development Officer East), to establish if any cases had the potential to pose an additional clinical risk.

5.4.4 From the sample of 150 cases, a total of 27 cases were highlighted, which are detailed in Table 12. It is proposed that each case is reviewed by the SWAST Acute Care Medical Director (Consultant in Emergency Medicine and Critical Care), to review the potential additional clinical risk.

5.4.5 *Table 12 - Potential Adult ED Higher Risk Cases for Further Clinical Review*

| Age | Provisional Diagnosis  | Provisional Diagnosis Free Text (Verbatim) | Extra Journey Time | Potential Harm   |
|-----|------------------------|--|--------------------|--|
| 75  | Sepsis                 | ?Chest sepsis                              | 23                 | Possible; Red flag sepsis with delay in abx                                      |
| 68  | Sepsis                 | septic                                     | 23                 | Possible, sepsis delayed Abx   |
| 90  | Overdose - Non-Opiate  | OVERDOSE ZOPICLONE/ PARACETAMOL            | 21                 | Yes - Reduced/ing GCS and difficult airway management                            |
| 95  | Sepsis                 | chest sepsis - aspiration                  | 21                 | Yes Red flag sepsis with shock, GCS 3, peri-arrest. 21 extra minutes without Abx |
| 42  | Medical Other          | Infection /sepsis                          | 21                 | Possible, sepsis delayed Abx   |
| 91  | PR Bleed               | large pr bleed                             | 20                 | Possible: large PR bleed, hypotensive and becoming shocked.                      |
| 81  | Sepsis                 | Sepsis                                     | 20                 | Possible, sepsis delayed Abx   |
| 84  | Sepsis                 | ?Sepsis // Tachycardia                     | 19                 | Possible, sepsis delayed Abx   |
| 42  | Overdose - Unspecified | MIXED OD                                   | 18                 | Possible - Fluctuating GCS requiring Airway interventions                        |
| 49  | Overdose - Unspecified | unresponsive ??OD                          | 17                 | Yes Airway management difficult  |
| 80  | Sepsis                 | ? sepsis.                                  | 17                 | Possible, sepsis delayed Abx   |



| Age | Provisional Diagnosis            | Provisional Diagnosis Free Text (Verbatim)                            | Extra Journey Time | Potential Harm   |
|-----|----------------------------------|---|--------------------|--|
| 85  | Sepsis                           | Sepsis  | 16                 | Possible, sepsis delayed Abx   |
| 33  | Trauma - Other                   | knocked over by car ? injuries ? KOD                                  | 14                 | Yes - agitated and dropping GCS  |
| 82  | Diahorrea/ Vomiting              | D&V sepsis  | 14                 | Yes - Hypotensive ++ despite fluids  |
| 78  | Sepsis                           | sepsis ? uti  | 14                 | Possible, Red flag sepsis with delay in abx                                    |
| 83  | Sepsis                           | Chest infection - likely sepsis                                       | 14                 | Yes Red flag sepsis with shock, GCS 6 peri-arrest. > extra minutes without Abx |
| 75  | Sepsis                           | ?sepsis   | 14                 | Possible, sepsis delayed Abx   |
| 85  | Stroke                           | ? CVA   | 14                 | Yes, increase travel time with unconscious patient candidate for CT            |
| 80  | Head Injury - Other              | ?Head injury/Spinal injury  | 14                 | Possible, immobilised patient vomiting and required suctioning                 |
| 84  | Neurological Other               | CVE - HAEMORRAGIC   | 9                  | Yes - Reduced GCS with ? CVE   |
| 89  | Stroke                           | ? Stroke ?? TIA - mild improvement with crew                          | 9                  | Yes - Confirmed CVE although still within window                               |
| 85  | Sepsis                           | sepsis  | 9                  | Possible, sepsis delayed Abx   |
| 73  | Other                            | SVT   | 8                  | Possible - Sustained SVT although CV stable                                    |
| 91  | Sepsis                           | ?Chest Sepsis.<br>?Chest Infection - and associated AF with Rapid VCs | 8                  | Possible; Sepsis delayed Abx   |
| 71  | Medical Other                    | ? sepsis  | 6                  | Possible, sepsis delayed Abx   |
| 76  | Cardiac Arrest After Amb Arrival | cardiac arrest  | 4                  | Possible, CPR in moving ambulance for further minutes?                         |
| 90  | Stroke                           | CVE   | 2                  | Yes - Although still well within Window  |



## 6. Emergency Department Provision (Child)

### 6.1 Current Situation

6.1.1 During the four month sample period, across the County of Dorset there were 1,462 calls to the ambulance service resulting in the conveyance of a paediatric patient (aged under 16 years) to hospital. These excluded any patients conveyed to a maternity unit, which were included in section 4. Of the 1,462 incidents, 1,337 (92%) were direct admissions to hospital, and 125 (8%) were inter-hospital transfers (IHTs).

6.1.2 The distribution of the direct admissions and IHTs by hospitals is detailed in Table 13. Within East Dorset, all paediatric patients are currently conveyed to PGH, as described in Appendix A. The only exception would be those who are significantly closer to RBH, and are so severely unwell that the ambulance clinician judges that they may not make the journey past RBH to reach PGH.

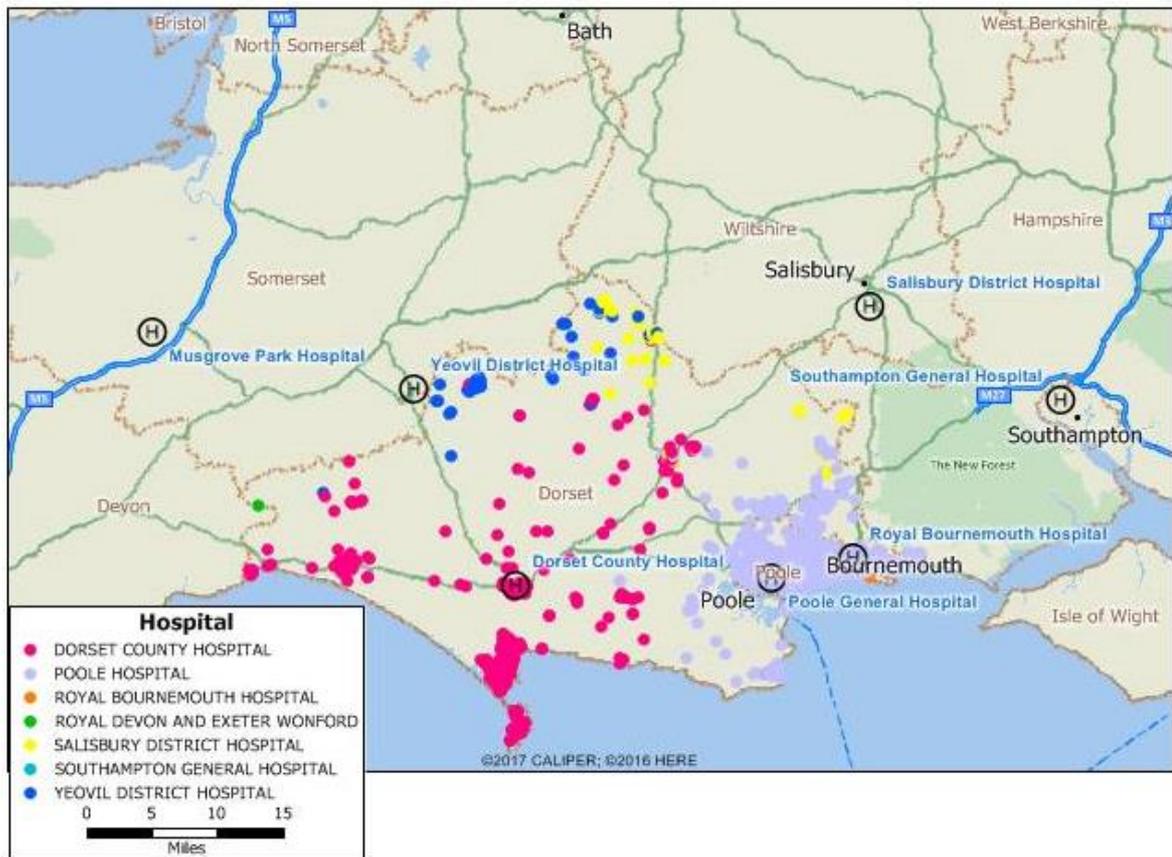
6.1.3 *Table 13 - Distribution of Paediatric Admissions and IHTs by Destination Hospital (n)*

| <b>Destination Hospital</b>     | <b>Ambulance Admissions</b> | <b>IHTs Received</b> |
|---------------------------------|-----------------------------|----------------------|
| Royal Bournemouth Hospital      | 9                           | 0                    |
| Poole General Hospital          | 895                         | 72                   |
| Dorset County Hospital          | 331                         | 0                    |
| Yeovil District Hospital        | 53                          | 0                    |
| Salisbury District Hospital     | 47                          | 3                    |
| Musgrove Park Hospital, Taunton | 0                           | 0                    |
| Royal Devon and Exeter Hospital | 1                           | 0                    |
| Southampton General Hospital    | 1                           | 50                   |

6.1.4 Seventy one of the 72 IHTs received by PGH were transfers from the Royal Bournemouth Hospital, with the remainder being an inter-facility transfer across the Poole General Hospital site.

6.1.5 The geographical distribution of paediatric incidents is set out in Figure 6.

6.1.6 Figure 6 - Map of Geographical Distribution of Paediatric Incidents by Hospital



## 6.2 Move of PGH to an UCC and Upgrading RBH to a Full ED

- 6.2.1 Although PGH would become an UCC, paediatric patients with more minor injuries and ailments would still be able to be managed at the unit. However more severely unless children would need to be conveyed to either RBH or DCH, whichever was the nearest ED.
- 6.2.2 With the exception of a small number of patients who are clinically too unstable to bypass to PGH, RBH does not currently accept children at its ED who have been conveyed by ambulance. Should RBH become the Major Emergency Hospital, all paediatrics within the RBH catchment area, as well as those within the PGH catchment who require a full ED, would instead be accepted there.
- 6.2.3 Table 14 displays the difference in travel times for ambulance admissions of paediatrics between the real-world current situation and the modelled proposed service changes (the 'What If Analysis'), for the sample.



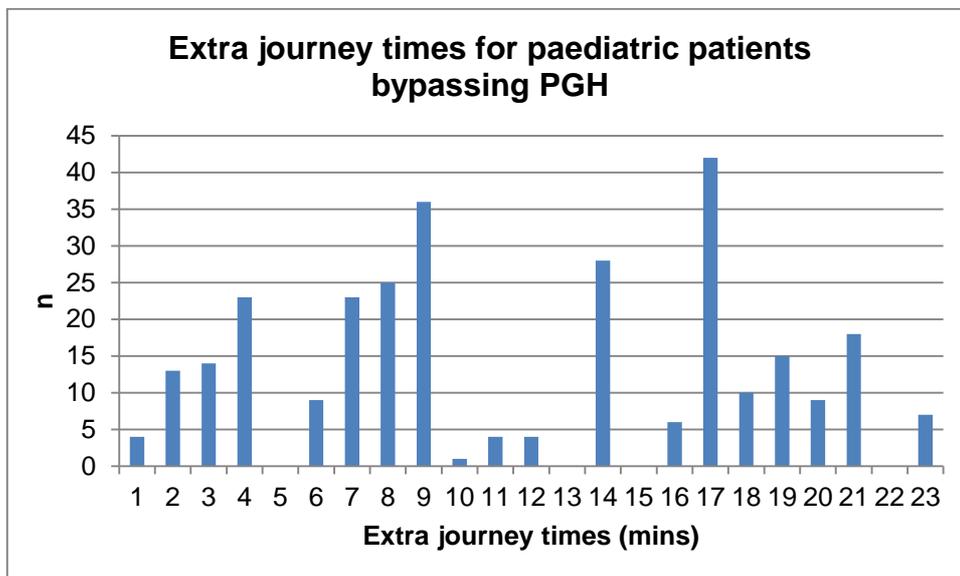
6.2.4 Table 14 - Predicted Change to Emergency Journey Travel Times for Paediatric Ambulance Admissions (mins)

| Measure                      | Current Situation | What-If Analysis | Gain/Loss |
|------------------------------|-------------------|------------------|-----------|
| Weighted average travel time | 19                | 18               | -01       |
| 95th percentile travel time  | 44                | 38               | -06       |
| Minimum travel time          | 01                | 01               | 00        |
| Maximum travel time          | 52                | 47               | -05       |

6.2.5 The model indicates that the new emergency paediatric service at Royal Bournemouth Hospital will reduce the average emergency journey travel time by 1 minute. The 95<sup>th</sup> percentile travel time will remain unchanged, with the maximum journey time reduced by 5 minutes. 832 patients had no difference in journey time, 214 had a shorter journey and 291 had to travel further.

6.2.6 A total of 291 patients from the PGH catchment area will have to travel further to an ED, with the longest additional time on top of the current journey length being 23 minutes. The extended journeys are detailed in Figure 10.

6.2.7 Figure 10 - Extended Paediatric Ambulance Journey Times



6.2.8 With regard to IHTs, it can be assumed that the 71 transfers from Royal Bournemouth Hospital to Poole General Hospital and the single inter-facility transfer across the Poole General Hospital site would cease. This would result in 72 fewer ambulance incidents. The remaining 53 IHTs would likely continue, with the travel times for these incidents detailed in Table 15.



6.2.9 *Table 15 - Current Emergency Journey Travel Times for the 53 Paediatric IHTs (mins) that are Predicted to Continue*

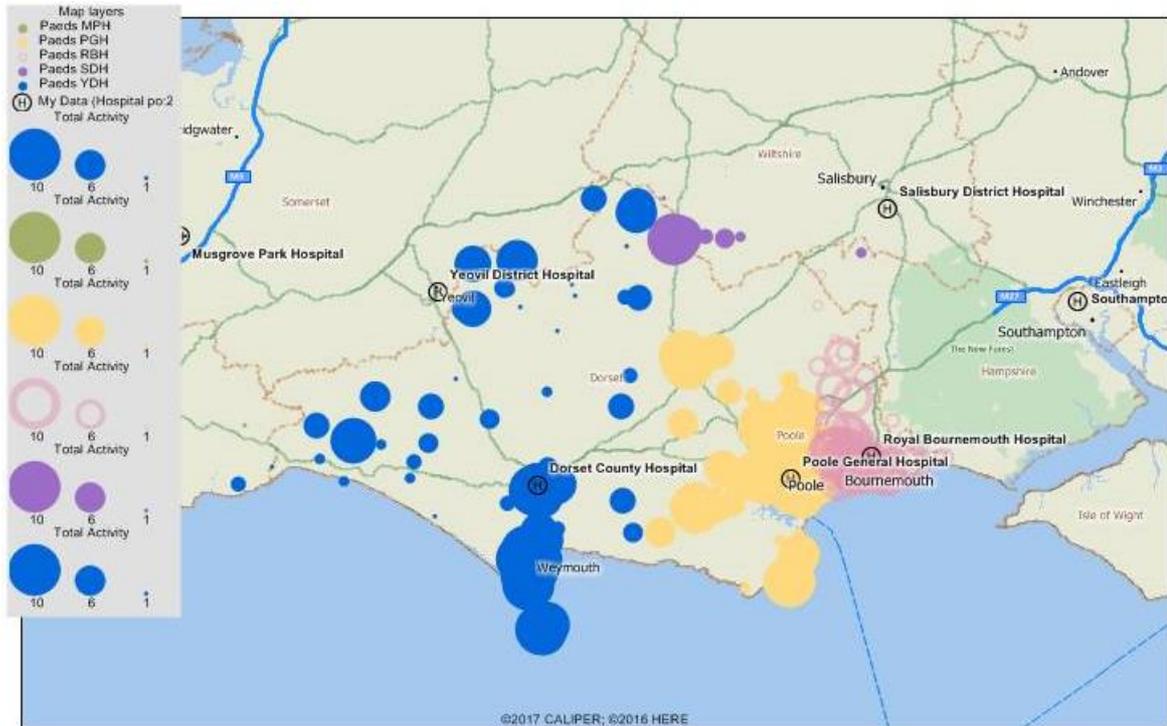
| Measure                      | Current Situation (min) |
|------------------------------|-------------------------|
| Weighted average travel time | 57                      |
| 95th percentile travel time  | 67                      |
| Minimum travel time          | 38                      |
| Maximum travel time          | 71                      |

6.2.10 Comparing the real-world sample with the modelled service changes, the distribution of paediatric direct transfers by hospital is shown in Table 16. The 53 continuing IHTs are included to give the total forecasted gain/loss figure per hospital.

6.2.11 *Table 16 - Predicted Distribution by Hospital of Emergency Paediatric Patients (n)*

| Destination Hospital            | Current Situation | What-If Analysis | Continuing Received IHTs | Gain/Loss   |
|---------------------------------|-------------------|------------------|--------------------------|-------------|
| Royal Bournemouth Hospital      | 9                 | 678              | 0                        | <b>669</b>  |
| Poole General Hospital          | 895               | 213              | 0                        | <b>-682</b> |
| Dorset County Hospital          | 331               | 346              | 0                        | <b>15</b>   |
| Yeovil District Hospital        | 53                | 68               | 0                        | <b>15</b>   |
| Salisbury District Hospital     | 47                | 31               | 3                        | <b>-13</b>  |
| Musgrove Park Hospital, Taunton | 0                 | 1                | 0                        | <b>1</b>    |
| Royal Devon and Exeter Hospital | 1                 | 0                | 0                        | <b>-1</b>   |
| Southampton General Hospital    | 1                 | 0                | 50                       | <b>49</b>   |

6.2.12 Figure 7 - Map of Predicted Geographical Distribution of Emergency Paediatric Incidents by Hospital



6.2.13 When any hospital does not have an ED, some patients requiring ED services will continue to self-present e.g. severe bleeding or stroke. There are currently no examples of an ED being changed to an UCC 24/7 in the South West on which to base a model. It must be noted that this will have an operational impact on the emergency ambulance service, due to the increased activity. Further work is required to understand the impact of any similar service changes on a national basis.

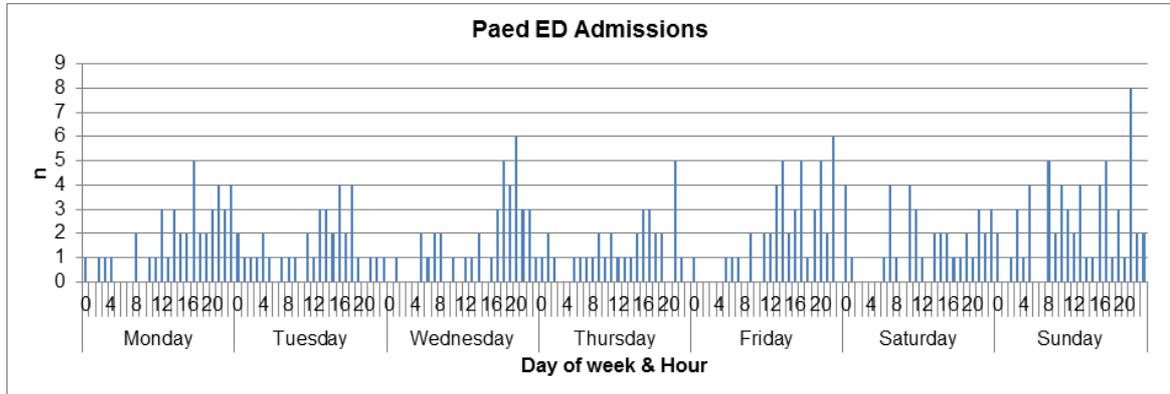
### 6.3 DCH Status

6.3.1 For the purposes of the model, it was assumed that DCH ED would continue to manage the full spectrum of paediatric conditions that it currently does. However, the model did examine the potential impact on ambulance admissions of the Kingfisher Children's Ward no longer admitting patients.

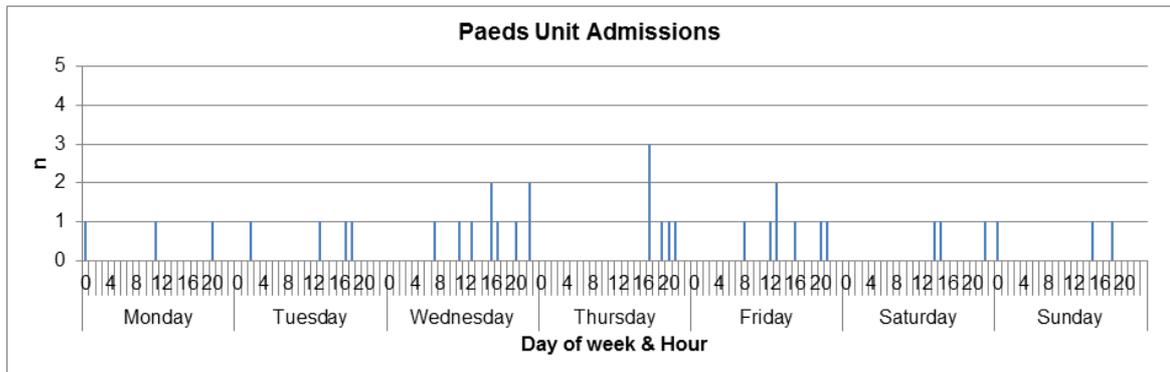
6.3.2 The majority of paediatric patients are currently conveyed to the Emergency Department, with the day and time of week of the presentation detailed in Figure 8. During the four month sample, a total of 35 patients were conveyed directly to the Kingfisher Ward, with the day and time of week of the presentation detailed in Figure 9.



6.3.3 Figure 8 - Paediatric Patients Conveyed to DCH ED by Hour/Day of Week



6.3.4 Figure 9 - Paediatric Patients Conveyed to Kingfisher Ward DCH by Hour/Day of Week



6.3.5 Based on the assumption that patients could still be conveyed directly to the Kingfisher Ward Monday-Friday between the hours of 09:00-17:00, 15 patients could still benefit from direct admission.



## 6.4 Predicted Operational Impact

6.4.1 The predicted total operational impact during the 4 month sample period detailed in Table 17, indicates that the CSR changes would reduce ambulance operational minutes utilised by 4,797. Please refer to section 9 for the overall operational impact calculation.

### 6.4.2 Table 17 - Predicted Emergency Paediatric Operational Impact

| Journey Type             | Description  | Total Time Gain/Loss (mins) |
|--------------------------|--|-----------------------------|
| Hospital admissions      | PGH ED change to an Urgent Care Centre (additional travel times due to bypass).  | +3391                       |
| Hospital admissions      | RBH accepting paediatric patients (reducing travel times for local patients).  | -2516                       |
| Inter-hospital transfers | Inter-hospital transfers where the booking location is RBH ED ceasing, due to change to the Major Emergency Hospital (resource time counted from time attending vehicle was allocated until vehicle booked clear). | -5527                       |
| Inter-facility transfers | Inter-facility transfers across PGH main site (calculated as for IHTs).  | -145                        |
| PGH Self-presenters      | Paediatric patients requiring a full ED who continue to self-present at PGH and require ambulance transfer to RBH ED .   | TBC                         |
|                          | <b>Total</b>   | <b>-4797</b>                |

## 6.5 Clinical Risk

6.5.1 The change of PGH from an ED to an UCC, will mean that some critically ill children from within the PGH catchment area will have to be transported further to the nearest ED. However, as the incident location of so many of the patients currently conveyed to PGH are actually closer to RBH, the average travel time will reduce from 19 to 18 minutes. The 95<sup>th</sup> percentile travel time will reduce from 44 to 38 minutes, whilst the maximum travel will reduce from 52 to 47 minutes. 832 patients had no difference in journey time, 214 had a shorter journey and 291 had to travel further.

6.5.2 In order to establish the potential clinical risk, the data for all 291 cases with an extended travel time was reviewed by the SWAST Clinical Director. The methodology used in the adult review could not be used, as a NEWS score was not consistently recorded. The exercise identified 22 cases, where the ePCR was then reviewed by the Quality Improvement Paramedic. The clinical review identified a total of 4 cases detailed in Table 18, where an extended journey time had the potential to impact on the patient. It is recommended that the cases are reviewed by a Consultant in Emergency Medicine to review the potential additional clinical risk.



6.5.3 Table 18 - Potential Paediatric Higher Risk Cases

| Diagnosis Code      | Details   | Additional Journey Time |
|---------------------|---|-------------------------|
| Multiple Convulsion | Patient remained GCS 3 throughout ambulance attendance.   | 9 min                   |
| Neurological        | Adrenal Crisis following seizure; although GCS improved would have required further medical intervention. | 8 min                   |
| Cardiac Arrest      | Post cardiac arrest.  | 4 min                   |
| Medical             | Very sick child.  | 4 min                   |

## 7. PGH Out-of-hours Deterioration Post Surgery

7.1 The situation regarding patients who deteriorate at PGH during the out of hour's period following day time surgery remains unclear. If a full surgical team is not on-call during the entire out-of-hours period, patients may require an emergency transfer to RBH. The modelling does not include these potential cases, as further work is required as part of the CSR to understand the on-site PGH model.

## 8. Seasonal Variation

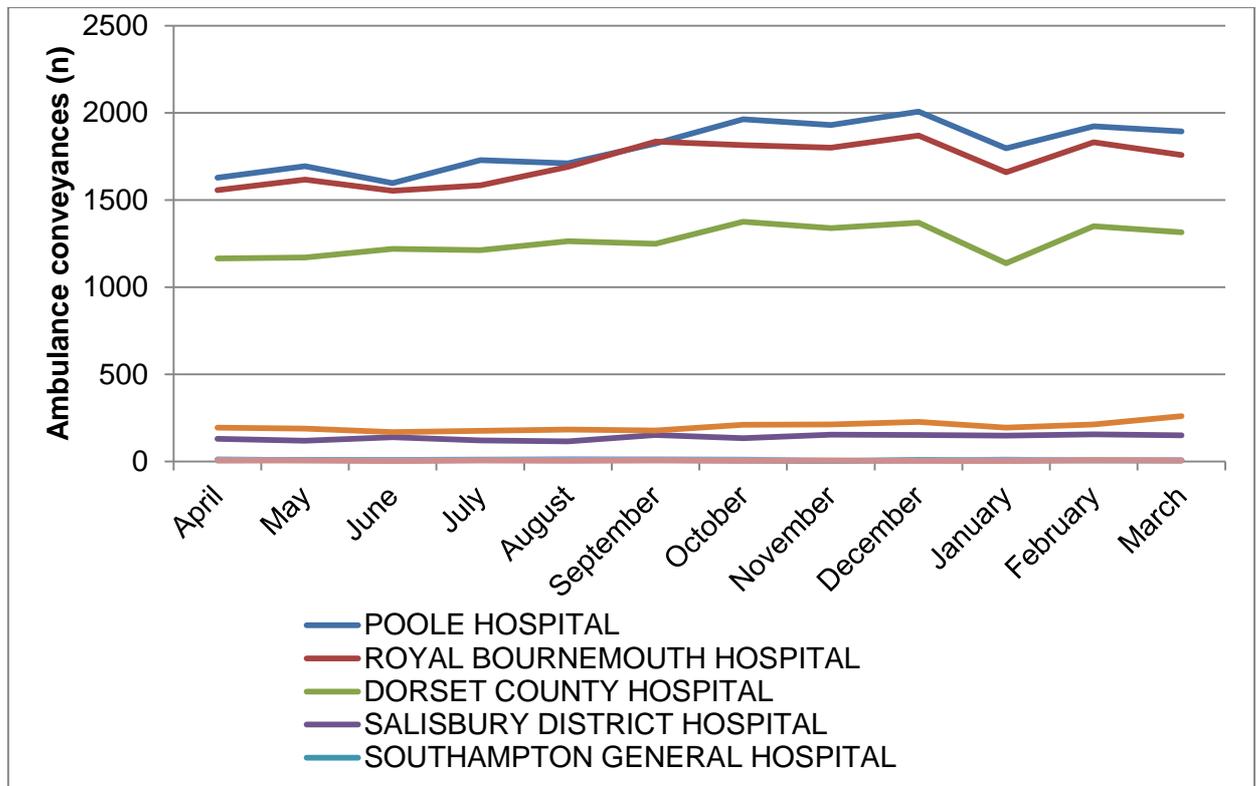
8.1 As Dorset is a popular tourist destination, the total number of ambulance conveyances to hospital each month was analysed during the year between 01/04/2016 and 31/03/2017 to better understand any seasonal variation. The results are detailed in Table 19 and Figure 11.

8.2 Table 19 - Total Ambulance Conveyances to Hospital by Month

| Destination Hospital           | April | May  | June | July | Aug  | Sept | Oct  | Nov  | Dec  | Jan  | Feb  | Mar  |
|--------------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|
| POOLE HOSPITAL                 | 1627  | 1693 | 1596 | 1728 | 1710 | 1824 | 1962 | 1930 | 2007 | 1796 | 1923 | 1893 |
| ROYAL BOURNEMOUTH HOSPITAL     | 1557  | 1617 | 1552 | 1584 | 1689 | 1835 | 1814 | 1800 | 1870 | 1659 | 1831 | 1757 |
| DORSET COUNTY HOSPITAL         | 1164  | 1170 | 1220 | 1212 | 1264 | 1248 | 1374 | 1339 | 1370 | 1137 | 1349 | 1315 |
| SALISBURY DISTRICT HOSPITAL    | 129   | 119  | 138  | 120  | 115  | 152  | 133  | 153  | 152  | 148  | 155  | 149  |
| SOUTHAMPTON GENERAL HOSPITAL   | 7     | 8    | 8    | 11   | 10   | 8    | 6    | 2    | 8    | 6    | 7    | 6    |
| YEOVIL DISTRICT HOSPITAL       | 193   | 189  | 169  | 175  | 182  | 177  | 210  | 212  | 227  | 194  | 212  | 260  |
| ROYAL DEVON AND EXETER WONFORD | 13    | 7    | 9    | 9    | 12   | 12   | 11   | 6    | 5    | 11   | 5    | 7    |
| MUSGROVE PARK HOSPITAL         | 5     | 5    | 2    | 5    | 4    | 5    | 3    | 5    | 3    | 1    | 7    | 6    |



8.3 Figure 11 - Total Ambulance Conveyances to Hospital by Month



8.4 There was a small amount of seasonal variation, although this represents a rise in ambulance admissions in October-December, and a fall in April-July. The period which was modelled (January-April) is therefore representative of the average.

## 9. Overall Operational Impact

9.1 The total operational impact identified by the model is detailed in Table 20.

9.2 Table 20 - Overall Operational Impact

| Description             | Total Time Gain/Loss (mins) |
|-------------------------|-----------------------------|
| Maternity related cases | -3835                       |
| ED Adult                | 25,512                      |
| ED Paediatric           | -4797                       |
| <b>Total</b>            | <b>16,880</b>               |

9.3 The modelling predicted a total of 16,800 additional operational minutes over the four month sample period. Based on zero seasonal variation, this equates to 50,400 minutes (840 hours) per annum or 2:18 hours per day. As an unplanned emergency service, ambulance resources need to be profiled with an appropriate utilisation rate. For a 55% utilisation rate, this equates to 3:34 additional hours of DCA cover being required per day.



9.4 As the following key causes of operational impact were not included within the modelling, this result is therefore an underestimate:

- Patients continuing to present at PGH UCC with conditions which cannot be treated there, and require emergency ambulance transfer to RBH (new activity).
- PGH deterioration post-surgery (new activity).
- Potential for paediatric facilities to move from DCH to YDH. This change is potentially significant, and requires further modelling (extended journey times for existing activity).
- Potential for an increasing number of patients to call 999 for an ambulance due to perceived extended travel times by car to an ED further away (new activity).

9.5 Based on the average call cycle of actual current inter-hospital transfers, the following purely hypothetical examples are provided in Table 21 to illustrate the operational impact of small numbers of just two of these areas of new activity. Based on a total of 3 additional transfers per day, adjusted for utilisation, a total of 297 minutes or 5 hours of emergency ambulance capacity would be required each day. This highlights the importance of quantifying this additional activity at the earliest opportunity.

9.6 *Table 21 - Examples of Operational Impact due to Increased Activity*

| Incident Type  | Number per Day | Time per Incident (min) | Total (min) | Total (min) Adjusted for 55% Utilisation Rate |
|--|----------------|-------------------------|-------------|---|
| PGH to RBH ED transfer for patients who cannot be treated at UCC | 2              | 64                      | 128         | 198   |
| PGH OOHs deterioration post-surgery to RBH                       | 1              | 64                      | 64          | 99  |

9.7 The most significant change is likely to be the potential consolidation of paediatric and maternity services for West Dorset and East Somerset to either DCH or YDH. Unlike the East Dorset changes, there are currently no patient flows between the two locations to counteract any increased journey times.

9.8 In addition to basic operational impact, the significant change in patient flows, may mean that the base location of emergency ambulances and rapid response vehicles need to be reviewed to match the new profile of incidents.

9.9 Further work is required to better understand the profile by time and day of week, as peaks of activity will present further operational challenges.



## 10. Overall Clinical Impact

- 10.1 Further review by a wider range of clinicians is required to confirm the overall clinical impact of the proposed changes.

## 11. Conclusions

- 11.1 The model used to produce this analysis was developed using key assumptions and therefore is subject to the limitations already highlighted. No model can predict the future, and can only consider the potential impact of the Dorset CSR on historical data.
- 11.2 The model has successfully been able to identify the potential revised patient flows following the implementation of the proposed CSR changes, together with the associated operational impact on the emergency ambulance service. The clinical review has enabled the level of clinical risk to be explored, in order to quantify the potential impact to patients.
- 11.3 When read with the additional detail on patient presentations within the SWAST CSR preliminary report, this document hopefully provides a firm basis to further refine the model as more granular detail emerges regarding the proposed changes to hospital services.

## 12. Recommendations

- 12.1 The CSR team are asked to consider the following recommendations:
- Utilise the findings of the model and the additional information within the SWAST CSR preliminary report to support the CSR process.
  - Support the expert review of cases identified where extended journey times may increase the clinical risk.
  - Support additional modelling of the DCH/YDH consolidation of paediatric and maternity services.
  - Identify a national example of a change from an ED to UCC to provide information to enable the increased activity due to patients continuing to self-present at PGH with conditions which require an ED.
  - Consider the potential impact of the CSR on the emergency ambulance service, utilising the model to ensure that any changes are appropriately commissioned, and patients across Dorset continue to receive a timely response to 999 calls.



### **Modelling Exercise**

Jessica Lynde, Clinical Improvement Officer

Ellie Ferrari, Clinical Audit Officer

Adrian South, Clinical Director and Consultant Paramedic

### **ePCR Clinical Review**

Rhys Hancock, Lead Quality Improvement Paramedic

Sally Arnold-Jones, Consultant Paramedic (North)

Dave Boyle, Clinical Development Officer (East)



## Appendix A - Current Ambulance Admission Criteria for Royal Bournemouth and Poole General Hospital



### Transport considerations for Royal Bournemouth and Poole Hospitals

#### Exceptions in all cases:

**If clinician believes the patient's condition is such that they pose a risk of imminent cardiac arrest, they should be conveyed to the nearest Emergency Department.**

#### 1. Trauma

- All Major Trauma patients should be conveyed in line with the Wessex Trauma Triage Tool. Poole Hospital is the regional trauma unit, only those patients whose condition is considered to pose a risk of imminent cardiac arrest should be conveyed to RBH.

#### 2. Intermediate Trauma suitable for RBH all other patients should be conveyed to Poole

- Hip Pain with **no** rotation or shortening
- Neck pain with **no** neurology
- Single Limb injuries, not involving long bones.

#### 3. Burns

- All children with burns and all adults should be conveyed to Poole with the exception of minor extremity or torso burns and those <5%

#### 4. Cardiac Chest Pain

- All STEMI patients should be pre-alerted and conveyed as per the PCI protocol to RBH.
- All non STEMI ACS patients should be conveyed to the nearest appropriate ED.

#### 5. Paediatric Patients (<16 years)

- All children who request an ambulance should be conveyed to Poole

#### 6. Obstetric Patients

- Pregnant patients over 18/40 gestation presenting with abdominal pain and/or bleeding or fits should be taken directly to the Maternity Unit at Poole. Patients in normal labour should be taken to the unit where they have been booked. Post partum patients during working hours should be taken to the ED of the hospital where they received their care. Out of hours patients should be taken to the ED at Poole.

#### 7. Gynae Patients

- All patients presenting out of hours with gynaecological problems (e.g. PV bleed, abdominal pain in pregnancy less than 18 weeks) should be taken to Poole ED. Patients with above conditions presenting during normal working hours should go to the nearest hospital.

#### 8. Vascular – Indication for AAA

- All patients strong suspicion and symptomatic for AAA should be conveyed to RBH.

#### 9. Pre-existing Diseases

- All patients with pre-existing conditions causing the 999 call should, where operationally possible go to the hospital of their treating consultant.



## Appendix B - Admission Criteria for Tiverton UCC by Ambulance Provisional Diagnosis Code

| Provisional Diagnosis Category | Provisional Diagnosis             | Eligible for UCC? |   |
|--------------------------------|-----------------------------------|-------------------|---|
| Cardiac                        | Acute Coronary Syndrome           | N                 |   |
|                                | Atrial Fibrillation               | N                 |   |
|                                | Bradycardia                       | N                 |   |
|                                | Cardiac - Other                   | N                 |   |
|                                | Cardiac Arrest After Amb Arrival  | N                 |   |
|                                | Cardiac Arrest Before Amb Arrival | N                 |   |
|                                | Chest Pain                        | Y (under 21s)     |   |
|                                | Chest Pain - ? Angina             | Y (under 21s)     |   |
|                                | Chest Pain ?NSTEMI                | Y (under 21s)     |   |
|                                | Chest Pain ?STEMI                 | N                 |   |
|                                | LVF/Congestive Coronary Failure   | N                 |   |
|                                | Pericarditis                      | N                 |   |
|                                | Tachycardia                       | N                 |   |
|                                | Respiratory                       | Asthma            | Y |
|                                |                                   | Chest Infection   | Y |
| Choking - Foreign Body         |                                   | Y                 |   |
| Choking - Other                |                                   | Y                 |   |
| COPD                           |                                   | Y                 |   |
| Croup/Epiglottitis             |                                   | Y                 |   |
| Haemoptysis                    |                                   | N                 |   |
| Hyperventilation               |                                   | Y                 |   |
| Pleurisy                       |                                   | Y                 |   |
| Pulmonary Embolism             |                                   | N                 |   |
| Respiratory Arrest             |                                   | N                 |   |
| Respiratory Other              |                                   | Y                 |   |
| Smoke Inhalation               |                                   | Y                 |   |
| Gastro-intestinal              | Acute Abdomen                     | Y                 |   |
|                                | Bowel Obstruction                 | N                 |   |
|                                | Catheter Problems                 | Y                 |   |
|                                | Diahorrea/Vomiting                | N                 |   |
|                                | Gastro-intestinal - Unspecified   | Y                 |   |
|                                | GI Haemorrhage                    | N                 |   |
|                                | Haematemesis                      | N                 |   |
|                                | Haematuria                        | Y                 |   |
|                                | PR Bleed                          | N                 |   |
|                                | PV Bleed                          | Y                 |   |
| Neurological                   | Febrile Convulsion                | N                 |   |
|                                | Meningitis                        | N                 |   |
|                                | Multiple Convulsion (Non-Trauma)  | N                 |   |



| Provisional Diagnosis Category  | Provisional Diagnosis                        | Eligible for UCC?    |
|---------------------------------|--|----------------------|
|                                 | Neurological Other                           | N                    |
|                                 | Paralysis/Numbness (Non-Trauma)              | N                    |
|                                 | Single Convulsion (Non-Trauma)               | N                    |
|                                 | Stroke                                       | N                    |
|                                 | TIA  | Y                    |
| Obs or Gynae                    | Abnormal Delivery Before Ambulance Arrival   | N                    |
|                                 | Ante-Partum Haemorrhage                      | N                    |
|                                 | Eclampsia                                    | N                    |
|                                 | Ectopic Pregnancy                            | N                    |
|                                 | Labour - No Delivery                         | N                    |
|                                 | Miscarriage                                  | Y                    |
|                                 | Normal Delivery Before Ambulance Arrival     | N                    |
|                                 | Normal Delivery in Ambulance                 | N                    |
|                                 | Obs/Gynae Other                              | N                    |
|                                 | Post-Partum Haemorrhage                      | N                    |
| Poisoning (accidental)          | Overdose - Unspecified                       | N                    |
|                                 | Poisoning - Alcohol                          | N                    |
|                                 | Poisoning - Non-Opiate                       | N                    |
|                                 | Poisoning - Opiate                           | N                    |
|                                 | Poisoning - Other                            | N                    |
| Other Medical                   | Allergic Reaction                            | Y                    |
|                                 | Anaphylaxis                                  | Y                    |
|                                 | Epistaxis                                    | Y                    |
|                                 | Hyperglycaemia                               | N                    |
|                                 | Hypoglycaemia - Diabetic                     | Y                    |
|                                 | Hypoglycaemia - Other Cause                  | Y                    |
|                                 | Medical Other                                | Y half (randomised)* |
|                                 | Sepsis                                       | N                    |
|                                 | Syncope (Faint)                              | Y                    |
|                                 | Urinary Tract Infection                      | Y                    |
| Environmental                   | Drowning / Near Drowning                     | N                    |
|                                 | Hypothermia - Dry                            | N                    |
| Psychiatric / Mental Health Act | Anxiety/Depression                           | Y                    |
|                                 | Psychiatric Other                            | N                    |
|                                 | Section 136 (place of safety order - public) | N                    |
| Deliberate Self Harm            | Hanging                                      | N                    |
|                                 | Overdose - Non-Opiate                        | N                    |
|                                 | Overdose - Opiate                            | N                    |
|                                 | Overdose - Unspecified                       | N                    |
|                                 | Self Wounding - Cut/Stab                     | N                    |



| Provisional Diagnosis Category | Provisional Diagnosis                  | Eligible for UCC?    |
|--------------------------------|--|----------------------|
|                                | Self Wounding - Unspecified            | N                    |
| Burns                          | Burn - Hand(s)                         | Y                    |
|                                | Burn - Head/Face                       | Y                    |
|                                | Burn - Multiple Site                   | Y                    |
|                                | Burn - Torso                           | Y                    |
|                                | Burn - Unspecified                     | Y                    |
| Trauma (excluding self harm)   | Abdo/Pelvic Injury - Blunt             | N                    |
|                                | Abdo/Pelvic Injury - Penetrating       | N                    |
|                                | Abdo/Pelvic Injury - Unspecified       | N                    |
|                                | Arm Fracture                           | Y                    |
|                                | Arm Injury                             | Y                    |
|                                | Back Pain                              | Y                    |
|                                | Chest Injury - Blunt                   | Y                    |
|                                | Chest Injury - Penetrating             | N                    |
|                                | Chest Injury - Unspecified             | Y                    |
|                                | Eye Injury                             | Y                    |
|                                | Foot / Ankle Injury                    | Y                    |
|                                | Hand/Wrist Injury                      | Y                    |
|                                | Head Injury - Closed                   | Y half (randomised)* |
|                                | Head Injury - Open                     | N                    |
|                                | Head Injury - Other                    | Y half (randomised)* |
|                                | Head Wound                             | Y                    |
|                                | Knee Injury                            | Y                    |
|                                | Laceration/Incision - Deep             | Y                    |
|                                | Laceration/Incision - Superficial      | Y                    |
|                                | Leg Fracture                           | Y if below knee      |
|                                | Leg Injury                             | Y                    |
|                                | Major Trauma Criteria Met              | N                    |
|                                | Maxillofacial Injuries                 | N                    |
|                                | Neck of Femur                          | N                    |
|                                | Neck Pain                              | Y                    |
|                                | Sexual Assault                         | N                    |
|                                | Shoulder Injury                        | Y                    |
|                                | Skin Flap Laceration                   | Y                    |
|                                | Spinal Injury - Cervical               | N                    |
|                                | Spinal Injury - Thoracic/Lumbar/Sacral | N                    |
|                                | Trauma - Cardiac Arrest                | N                    |
|                                | Trauma - Multisystem                   | N                    |
|                                | Trauma - Other                         | N                    |



| <b>Provisional Diagnosis Category</b> | <b>Provisional Diagnosis</b>      | <b>Eligible for UCC?</b> |
|---------------------------------------|-----------------------------------|--------------------------|
| Social                                | Assist/Put to Bed                 | Y                        |
|                                       | Fall Non-Injury                   | Y                        |
|                                       | Personal Alarm - Social Need Only | Y                        |
|                                       | Social Need - Unspecified         | Y                        |

\* Where provisional diagnosis codes were very broad and contained a large number of patients, it was decided to randomise and split the code group equally between UCC eligible and UCC not eligible.

It was also assumed that emergency IHTs between acute hospitals would not be eligible for the UCC.