Queensland Government
Queensland Health

Data quality issues impacting on reporting on presentations to emergency departments in Queensland hospitals:

Quality of vital signs data in the EDIS database

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Key findings

This report provides information about the frequency and variation in recording of vital signs information in emergency department patient data collected centrally by Queensland Health in the EDIS database in 2006/07. Key findings of this analysis are:

- Data on vital signs was only recorded 81,401 times in 2006/07. In the same year there were 556,310 emergency department presentations, but more than one set of vital signs could be recorded for any one emergency department presentation. These 81,401 sets of vital signs were used as the denominator for all analyses such that results reflect the availability of specific vital signs information for patients who had some vital signs recorded.
- Of those 81,401 instances where some vital signs data was recorded, patient temperature was missing on 17.8%. The frequency of reporting for this vital sign was lowest at The Prince Charles and Royal Brisbane and Women's Hospitals where over 55% of temperatures were missing.
- Patient pulse was missing on 22% of records.
- Respiratory rate was missing for 40% of vital signs records with wide variation in reporting frequency by hospital.
- 48% of records had no blood pressure or only one measure of blood pressure (systolic or diastolic) recorded. Blood pressure was the worst recorded sign of the major signs of vitality. The rate of recording was lowest at the Royal Brisbane and Women's Hospital (RBWH; 6%), followed by The Prince Charles Hospital (17%).
- All four major vital signs were available on only 37% of records.

Further investigation is needed to determine the reasons for poor recording of this information in the Queensland Health centralised emergency department data collection. If other systems are being used at individual hospitals to record this information, the potential for coordination of this process across sites could be investigated to allow this information to be available for state-wide surveillance and other analysis purposes.

1.0 Background and purpose of the report

The purpose of this report is to ascertain the completeness of vital signs data collected in Queensland public hospital emergency departments and to identify if this will be a viable source of data for analysing the vital signs of patients. This document quantifies the availability of vital signs data collected in Queensland

emergency departments. Vital signs data were only available from hospitals using the Enterprise version of EDIS, so this report is limited to that subset of hospital emergency departments.

Although most patients will have their vital signs taken in the emergency department, the recording of these vital signs in EDIS is not mandatory. Instead, they are optionally recorded based on a decision by the triage nurse as to whether vital signs are necessary for the allocation of a triage ranking (Personal communication, Adrian Horth, Health Systems Development Unit (HSDU)). This report examines frequency and variation of recording of vital signs information across Queensland hospital emergency departments.

2.0 Methodology

Analyses were conducted by the Health Statistics Centre (HSC), Queensland Health. The data set analysed contained all vital signs records collected at emergency departments (EDs) of hospitals using the Enterprise version of EDIS for data collection for the 2006/2007 financial year. Vital signs records are collected independently of the main EDIS data set and thus were provided to the HSC in an extract which was not linked to any other details of the patients' presentation to the Emergency Department.

Vital signs records can be recorded more than once during an ED presentation. **Thus, one presentation at an ED may correspond to several records in the vital signs data set.** From the vital signs (VS) data extract alone, not enough information was available to accurately determine whether patients with multiple VS records had these recorded on one presentation to the ED or upon multiple presentations. As the purpose of this report was to ascertain the completeness of the vital signs data, no linkage to the main presentation data was performed, and **all results are presented in terms of vital signs records rather than presentations, unless specifically stated.**

Vital signs which can be recorded into EDIS include:

- Temperature
- Pulse
- Respiratory rate
- Systolic blood pressure
- Diastolic blood pressure
- Height
- Weight
- Head circumference
- Oxygen saturation (SaO_2)
- Peak flow
- Blood glucose level
- Urinalysis
- Visual acuity (right eye)
- Visual acuity (left eye)
- Glasgow coma scale (GCS)

These variables have fixed ranges built into EDIS based on recommended clinical parameters so that non-sensible values can not be recorded. Each record in the VS data can contain values for all of the vital signs listed above and does not correspond to the value of only one vital sign.

Across hospital EDs in Queensland during 2006/2007, data on vital signs was sparsely recorded. Over the year there were 556,310 presentations to EDs, but there were only 81,401 sets of vital signs data recorded (<14.6%; table 2.1).

The remainder of this report documents the level of recording of individual vital signs among the 81,401 sets of vital signs available. All percentages therefore are expressed as percentages of the 81,401 sets (or the respective number at an individual hospital) and not of the total number of presentations to emergency departments.

Table 2.1. Number of sets of vital signs recorded in emergency departments expressed as a percentage of all emergency department presentations, by hospital, Queensland, 2006/07

Emergency department	No. ED presentations	No. vital signs sets recorded	Percentage
Bundaberg	24,431	7,624	31.21
Caboolture	26,918	10,677	39.66
Cairns	30,839	4	0.01
Caloundra	1,342	326	24.29
Gold Coast	68,630	2,387	3.48
Gympie	188	77	40.96
Hervey Bay	11,142	5,302	47.59
Ipswich	29,923	527	1.76
Mackay	34,491	6,143	17.81
Maryborough	7,549	4,652	61.62
Mount Isa	36,297	15,360	42.32
Nambour	1,077	20	1.86
Princess Alexandra	44,171	3,736	8.46
Queen Elizabeth II	32,059	1,353	4.22
Redland	22,252	4,702	21.13
Rockhampton	10,856	165	1.52
Royal Brisbane and Women's	73,208	18	0.02
The Prince Charles	2,587	109	4.21
Toowoomba	41,820	2,045	4.89
Townsville	56,530	16,174	28.61
Total	**556,310**	**81,401**	**14.63**

3.0 Results

3.1 Availability of Vital Signs Items

The frequency of missing data is shown below for each vital sign. Information is provided by hospital for major vital signs (temperature, pulse, respiration rate and blood pressure) which are measured routinely for all patients. For these major vital signs we have reported the proportion of records with missing observations since ideally these vital signs would be reported for all patients. For the other vital signs, we have recorded the proportion of records that include this information since the measurement of these vital signs would largely depend on the nature of the patient and their problem/reason for presentation.

Temperature

Patient temperature was missing on 17.8% of VS records (table 3.1.1). The frequency of reporting for this vital sign was lowest at The Prince Charles and Royal Brisbane and Women's Hospitals where over 55% of temperatures were missing.

Table 3.1.1. Number of vital signs records with missing temperature, by hospital, Queensland, 2006/07

Emergency department	No. vital signs records	No. temperatures missing	Percentage
Bundaberg	7,624	930	12.2
Caboolture	10,677	2,966	27.8
Cairns	4	1	25.0
Caloundra	326	64	19.6
Gold Coast	2,387	404	16.9
Gympie	77	13	16.9
Hervey Bay	5,302	1,249	23.6
Ipswich	527	58	11.0
Mackay	6,143	616	10.0
Maryborough	4,652	450	9.7
Mount Isa	15,360	2,607	17.0
Nambour	20	3	15.0
Princess Alexandra	3,736	1,292	34.6
Queen Elizabeth II	1,353	83	6.1
Redland	4,702	867	18.4
Rockhampton	165	21	12.7
Royal Brisbane and Women's	18	10	55.6
The Prince Charles	109	72	66.1
Toowoomba	2,045	178	8.7
Townsville	16,174	2,573	15.9
Total	**81,401**	**14,457**	**17.8**

Pulse

Patient pulse was missing on 22% of records (table 3.1.2).

Table 3.1.2 Number of vital signs records with missing pulse, by hospital, Queensland, 2006/07

Emergency department	No. vital signs records	No. pulses missing	Percentage
Bundaberg	7,624	1,207	15.8
Caboolture	10,677	1,372	12.9
Cairns	4	0	0.0
Caloundra	326	33	10.1
Gold Coast	2,387	355	14.9
Gympie	77	4	5.2
Hervey Bay	5,302	1,967	37.1
Ipswich	527	43	8.2
Mackay	6,143	919	15.0
Maryborough	4,652	412	8.9
Mount Isa	15,360	5,461	35.6
Nambour	20	1	5.0
Princess Alexandra	3,736	396	10.6
Queen Elizabeth II	1,353	351	25.9
Redland	4,702	1,508	32.1
Rockhampton	165	33	20.0
Royal Brisbane and Women's	18	3	16.7
The Prince Charles	109	26	23.9
Toowoomba	2,045	159	7.8
Townsville	16,174	4,132	25.5
Total	**81,401**	**18,382**	**22.6**

Respiratory rate

Respiratory rate was missing for 40% of vital signs records with wide variation by hospital (table 3.1.3). The lowest frequency of respiratory rate data was at Hervey Bay and Mount Isa Hospitals with more than 52% of respiratory rates missing. A further 6 emergency departments had more than 40% of records with missing respiratory rate data.

Table 3.1.3. Number of vital signs records without a respiratory rate, by hospital, Queensland, 2006/07

Emergency department	No. vital signs records	No. rates missing	Percentage
Bundaberg	7,624	2,560	33.6
Caboolture	10,677	2,171	20.3
Cairns	4	0	0.0
Caloundra	326	57	17.5
Gold Coast	2,387	732	30.7
Gympie	77	10	13.0
Hervey Bay	5,302	3,130	59.0
Ipswich	527	67	12.7
Mackay	6,143	2,887	47.0
Maryborough	4,652	663	14.3
Mount Isa	15,360	8,025	52.2
Nambour	20	2	10.0
Princess Alexandra	3,736	1,535	41.1
Queen Elizabeth II	1,353	382	28.2
Redland	4,702	2,290	48.7
Rockhampton	165	45	27.3
Royal Brisbane and Women's	18	8	44.4
The Prince Charles	109	46	42.2
Toowoomba	2,045	229	11.2
Townsville	16,174	7,472	46.2
Total	**81,401**	**32,311**	**39.7**

Blood Pressure (BP)

Blood pressure is calculated using two measures: systolic and diastolic blood pressure. In order to calculate a patient's blood pressure from the vital signs data, both of these variables must be recorded.

For 2006/07 52% of vital signs records had both measures of blood pressure recorded (table 5). That is, for 48% of records no blood pressure or only one measure of blood pressure was recorded. This makes blood pressure the worst recorded sign of the major signs of vitality (i.e. worse than temperature, pulse and respiratory rate). The rate of recording was the lowest at the Royal Brisbane and Women's Hospital (6%), followed by The Prince Charles Hospital (17%).

Table 3.1.4. Number of vital signs records with both systolic and diastolic blood pressure recorded, by hospital, Queensland, 2006/07

Emergency department	No. vital signs records	Both systolic and diastolic BP recorded	Percentage
Bundaberg	7,624	4,070	53.4
Caboolture	10,677	6,280	58.8
Cairns	4	3	75.0
Caloundra	326	193	59.2
Gold Coast	2,387	1,395	58.4
Gympie	77	46	59.7
Hervey Bay	5,302	2,310	43.6
Ipswich	527	314	59.6
Mackay	6,143	3,752	61.1
Maryborough	4,652	3,237	69.6
Mount Isa	15,360	6,579	42.8
Nambour	20	10	50.0
Princess Alexandra	3,736	1,360	36.4
Queen Elizabeth II	1,353	851	62.9
Redland	4,702	2,439	51.9
Rockhampton	165	76	46.1
Royal Brisbane and Women's	18	1	5.6
The Prince Charles	109	19	17.4
Toowoomba	2,045	1,234	60.3
Townsville	16,174	8,308	51.4
Total	**81,401**	**2,439**	**51.9**

Oxygen Saturation (SaO_2)

Oxygen saturation was recorded on 71% of occasions. It should be noted for future analysis of this dataset that in the extract supplied, this variable was misleadingly named PO_2 rather than SaO_2. The term PO_2 is used to refer to a measure of arterial oxygen pressure (measured in mmHg) which differs from SaO_2, which is a measure of oxygen saturation (measured in %).

Blood Glucose Level

Blood glucose level (or blood sugar level) was recorded on 5% of vital signs records. The highest recording rate was at Ipswich Hospital (8%), while Cairns Base, Nambour and Royal Brisbane and Women's Hospitals did not record any blood glucose levels.

Height

Height was only recorded on 2% of vital signs records. Townsville Hospital recorded the most heights (9%) and The Prince Charles Hospital recorded 1.8%. All other hospitals recorded height for less than 1% of records. Emergency departments at Caloundra, Cairns Base, Gympie, Nambour, Princess Alexandra, Queen Elizabeth II Jubilee, Royal Brisbane and Women's and Rockhampton Base Hospitals did not record any patient heights.

Weight

Patient weight was recorded more frequently (30%) than patient height. It was most frequently recorded at Hervey Bay Hospital (59%) but least at The Prince Charles (2%), Princess Alexandra (0.2%) and Royal Brisbane and Women's (0.0%) Hospitals.

Glasgow Coma Scale (GCS)

The GCS is a measure of the level of consciousness of a patient. It was recorded on 11% of VS records. The only emergency department not recording any GCS scores was Cairns Base Hospital.

Visual acuity

Visual acuity (either right eye or left eye) was recorded on 0.5% of occasions. Emergency departments that did not record any visual acuities were Cairns Base, Nambour, The Prince Charles, Royal Brisbane and Women's, Toowoomba and Townsville Hospitals.

Head Circumference

There were only three records in the vital signs data with a head circumference measurement. All of these were taken at the Caboolture Hospital emergency department.

Peak Flow

A peak flow measurement was included on 0.3% of records. Emergency departments that recorded no peak flow measurements were Cairns Base, Ipswich, Nambour, The Prince Charles, Royal Brisbane and Women's and Rockhampton Base Hospitals.

Urinalysis

One percent of vital signs records had information in the urinalysis field. Emergency departments that recorded no urinalysis information were Cairns Base, Nambour, The Prince Charles, Royal Brisbane and Women's and Rockhampton Base Hospitals.

3.2 Number of vital signs present on each record

The number of vital signs present on each record were summarised in two ways. Firstly, we calculated the total number of major vital signs recorded (out of 4). The major vital signs were temperature, pulse, respiratory rate and blood pressure (both systolic and diastolic recorded). In addition we calculated the number of other (minor) vital signs recorded (out of 9).

Number of major vital signs

All four major vital signs were recorded for 37% of patients (table 6). 7% of records did not contain any information about the major vital signs but had at least one other vital sign recorded.

Table 3.2.1. Number of major vital signs recorded per set, Queensland, 2006/07

No. Major vital signs recorded	Number of sets	Percentage
0	5,645	6.9
1	13,164	16.1
2	9,137	11.2
3	23,728	29.2
4	29,727	36.5

Number of other vital signs

Most sets of vital signs had only one vital sign recorded apart from the four major vital signs (59%, table 7). Twelve percent had no additional vital signs. No record had more than 6 minor vital signs recorded.

Table 3.2.2. Number of other vital signs recorded per set, Queensland, 2006/07

No. other vital signs recorded	Number of sets	Percentage
0	10,033	12.3
1	48,033	59.0
2	19,991	24.6
3	3,090	3.8
4	226	0.3
5	26	0.0
6	2	0.0

4.0 Conclusions

Data on vital signs is only sparsely recorded in the EDIS system with less than 14% of presentations having any form of vital signs recorded. Personal communication with Adrian Horth (HSDU) reveals that 'as (vital signs are) an optional component of a patients record (they do) not lend (themselves) to any degree of analysis, particularly when (EDIS) is only one of many ways this data may be gathered'. This suggests that the vital signs data in EDIS is not a suitable data source for analysing the vital signs of patients in Queensland hospitals.