Supplementary material for

Effect of a 24/7 nursing presence in a police watch house on police presentations to the emergency department

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Text S1: A description of the WHEN model

Each watch house has its own local arrangement with respect to health care. In this pilot, the WHEN model involved 24/7 nursing presence in the watch house: 19 of the 24 hours (13:00 – 08:00) were covered by emergency department (ED) registered nurses, and the other five hours were covered by community nurses. The aim of the WHEN model was to provide assessment and management (under forensic medical officer supervision) for detainees in the watch house, to provide continuity of care, reduce the need for transfer to the ED, and reduce the potential risks associated with the early police detention period. This model was operational for the 66 days of the pilot. Prior to and post the pilot period, only the community nurses were operational in the watch house (i.e. no ED nurses and thus no 24/7 nursing presence).

Table S1. Data source and data collected

Data Source	Data provided / extracted
EDIS	Medical unit record number, name, date of birth, sex, post code, reason for ED presentation, mode of arrival, Australasian Triage Scale (ATS) category, date and time of presentation, date and time of ED triage, date and time seen by clinician, date and time of departure from ED, ED ICD-10 Australian Modification code and description, and discharge destination from ED.
Health care log	Observations performed (e.g. blood pressure, heart rate, respiration rate, blood sugar level, GCS, oxygen saturations), what procedures/tests undertaken in WH (e.g. pathology, blood alcohol test), how and who nurses communicated with in relation to the encounter (e.g. speaking with QPS staff, telephone consult with FMO, speaking with ATODS, calling QAS), what outcomes resulted for the client (e.g. stayed in WH, transfer to ED via QPS, transferred to ED via QAS, FMO order for medication/ treatment/ observation) and identifying with QPS or FMO staff what they would have done if the WHEN was not present in the watch house (e.g. called QAS, transferred client to ED, called FMO).

EDIS: Emergency Department Information System; ED: Emergency Department; ATS: Australasian Triage Scale; ICD 10: International Statistical Classification of Diseases and Related health Problems – 10th Revision; GCS: Glasgow Coma Score; WH: watch house; QPS: Queensland Police Service; ATODS: Alcohol, Tobacco and Other Drug Services; QAS: Queensland Ambulance Service; FMO: Forensic Medical Officer; WHEN: Watch House Emergency Nurse.

Note: EDIS data were provided retrospectively to the researchers by a member of the Hospital Informatics Division. Within the EDIS, only one option was possible to indicate mode of arrival. Clarification of police source (brought in by police from watch house or brought in by police from community) was undertaken with police as well as with ambulance (for those police presentations brought in by ambulance from watch house). This checking process helped identify those cases transported from the watch house by ambulance in police custody but coded as mode of arrival by ambulance.

Text S2: Detail informing cost effectiveness economic analysis

The total cost per shift was estimated by multiplying the distribution of presentations (defined as the proportion of presentations by day of the week, shift, mode of arrival (police only or police and ambulance), triage priority and whether the presentation subsequently led to a hospital admission) by the cost per presentation (as defined by the same characteristics) plus the incremental cost per shift of providing a nurse in the watch house compared to usual practice.

The cost per ED presentation included: ambulance patient transport costs, police transport costs, police wages for accompanying a patient, and the cost of providing hospital services (emergency and admission costs). Ambulance patient transport costs were based on the average per incident cost of ambulatory services for the Gold Coast Hospital and Health Services area.[1] The police vehicle costs associated with patient transport was estimated based on the distance (in kms) from the watch house to the hospital (multiplied by two for the return trip) and the estimated cost per km for a police escort.[2] The cost for police staff time (Constable, level 3) was estimated based on: travel time between watch house and the hospital, the estimated ED length of stay per presentation and the average length of stay for presentations subsequently admitted to hospital. The time associated with patient transport between the watch house and the hospital was based on google maps estimates for a passenger vehicle. Whilst this may overestimate the travelling time where police may be afforded additional road privileges that may reduce the travel time, this estimate may also be underestimated as it doesn't take into account any administrative tasks associated with transporting someone in custody to the ED or moving the person from a cell into the vehicle. A forward stepwise (significance value for inclusion of 0.15) non-linear regression was used to build a predictive model of ED length of stay (poison-family log-link generalised linear model). The final model included triage priority and whether or not the patient was admitted as predictive variables. Predicted mean estimates of ED length of stay per presentation (as characterised by those independent variables within the length of stay model) were then multiplied by the per minute cost of police based on existing employment agreements accounting for additional hourly rates for late and night shifts and those on a Saturday and Sunday and dependent on when the presentation to ED occurred. The length of stay per hospital admission was estimated based on the national average length of stay adjusted for the increased length of stay associated with police presentation hospital admissions.[3] Specifically, it has been previously identified that hospital admissions for

those brought in by police had a length of stay 1.91 times longer than average. This multiplier was then applied to a national average length of stay of 2.7 days for an estimated length of stay per admission of 5.15 days for those brought in by police. For each ED presentation that was subsequently admitted to hospital, the average per day cost of a police officer (multiplied by two for two officers, as would be routine practice) was multiplied by the estimated average admitted length of stay of 5.15 days. A forward stepwise (significance value for inclusion of 0.15) non-linear regression was used to estimate the ED cost per presentation (gamma-family log-link generalised linear model). The final model included triage priority and whether or not the patient was admitted as predictive variables. Predicted mean estimates of ED cost per presentation (as characterised by those independent variables within the model) were then multiplied by the distribution of presentations as defined by day of the week, shift, if transported by ambulance, triage priority and whether the patient was admitted or not. For those patients subsequently admitted to hospital the average, weighted by acute and sub-acute admissions, cost per admission for the Gold Coast Hospital was used.[4]

The per shift cost of employing a registered nurse (level 6, step 1) to staff the watch house under the WHEN model was estimated based on existing employment agreements accounting for additional hourly rates for late and night shifts and all shifts on either a Saturday or Sunday. The cost of nurse care provided at the watch house during the pre and post periods was based on a nurse at the equivalent level being staffed for one shift (the early shift) every day of the week.

As the observation periods included a dis-similar number of shifts (and distribution of shifts across days), an average cost per week (three shifts per day, seven days per week) is used for comparative purposes. The incremental cost effect of the WHEN model is estimated as the cost difference between the pre, during and post periods. Uncertainty in the cost estimates and difference between periods were estimated using Monte Carlo simulation of 1,000 draws to provide a 95% credible intervals. All cost estimates are reported in 2018 Australian dollars with estimates inflated.[5]

References for Text S2

1. Department of Health, 2017. Queensland ambulance services: Public performance indicators financial year to date – July 2017 to September 2017. QLD: Queensland Government. Available from: https://www.ambulance.qld.gov.au/docs/QAS-QTR-1-Public-Performance-Indicators-FY17-18.pdf [verified 28 June 2019]

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3. Australian Institute of Health and Welfare 2015. Admitted patient care 2013–14: Australian hospital statistics. Health services series no. 60. Cat. no. HSE 156. Canberra: AIHW.

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