

diagnosis, pediatric trauma score(PTS), analgesia, numeric rate scale(NRS), drugs administered. Quantitative variables: central and dispersion measures. Inferential statistical analysis: relationship quantitative variables, Student's t test and categorical variables, Chi square. 95% confidence intervals, $p < 0.05$. SPSS 20.

Results Total of 725 patients. Median age was 13 years(IQR 8–15). 70.9% males (514). Critically ill patients constitute 5.8% (42). Children received analgesia: 43.6%(316); <4 years: 17.3% (14), 5 to 11: 36.7% (80) and 12 to 18: 52.1% (222). IV route: 70.8% (240), intranasal: 21.4%(74). Fentanyl was used in 73.4% (232), Paracetamol 23.1%(73), Ketorolac 22.8%(72). IV mean doses: 1.9 μ gr/Kg, 15.1mg/Kg, 0.34mg/Kg respectively. Analgesia with PTS <9: 76.5% and PTS \geq 9: 42.8%. NRS used in 12.5%(91); median initial: 8(IQR 7–9) and after analgesia: 3(IQR 2–4).

Conclusion IV opioids are the most widely used. Doses administered by weight are correct. The use of analgesia predominates in critically ill patients although not as high as indicated in international guidelines. We observed undertreatment in the groups of younger children, possibly due to a higher incidence of TBI. Alternative routes to IV administration could increase the use. Although pain scales were seldom used, the results show notable reduction of pain.

Conflict of interest None.

Funding None.

Cardiac arrest

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MATHEMATICALLY OPTIMISED PUBLIC ACCESS DEFIBRILLATOR PLACEMENT – FAIRNESS OR ACCESSIBILITY?

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Background Mathematical optimisation can be used to maximise public access defibrillator (PAD) accessibility for out-of-hospital cardiac arrests (OHCA). It is unclear whether enforcing 'fairness' (defined as parity of PAD accessibility) across city wards would impact resulting PAD accessibility compared to an unconstrained approach.

Method We included all suspected OHCA responses to by the Scottish Ambulance Service (SAS) in the cities of Glasgow, Edinburgh, Aberdeen, and Dundee between Jan. 2011 – Sept. 2017, and PADs registered with SAS as of Feb. 2020. We computed the accessibility (defined as within 100 m of OHCA) for existing PADs and developed a mathematical model to select locations for additional PADs under two scenarios: (1) select optimal locations across whole cities, and (2) select optimal locations distributed equally between city wards. Up to 20 additional PAD locations per ward were considered. For both scenarios, we compared PAD accessibility on out-of-sample OHCA using McNemar's test and fairness across wards using the Nash social welfare function.

Results We identified 14,674 OHCA responses and 424 existing PADs. Existing PADs were within range of 1.1% of OHCA (0.4–2.0% per city). Optimising new PAD locations per city, regardless of wards, increased PAD accessibility to 15.4% of OHCA (14.9–17.9% per city). Constraining an

equal number of PADs in each ward resulted in accessibility loss of 0.2–1.4 percentage points depending on the quantity of PADs placed ($P < 0.05$ for 18 of 20 cases) but improved fairness values by up to 89% for smaller quantities of PADs.

Conclusion Enforcing ward-level parity when selecting optimal new PAD locations results in fairer but less accessible PADs for OHCA.

Conflict of interest None.

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Cardiac arrest

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OPTIMIZING RESIDENTIAL AUTOMATED EXTERNAL DEFIBRILLATOR COVERAGE BY TARGETING SOCIAL HOUSING AREAS

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Background Strategies for deployment of automated external defibrillators (AEDs) in residential areas are warranted. Social housing is widespread in Europe, has a high frequency of socio-economic predictors for out-of-hospital cardiac arrest, and consists of well-defined units with local leadership^{1,2}. We aimed to optimize AED placement by targeting social housing in Vienna and Copenhagen.

Method Population density was obtained from Urban Atlas³; AED and social housing data from Vienna through City of Vienna, and from Copenhagen through the Danish AED Network and the National Building Foundation, respectively. From April 2020, all 24-hour accessible AEDs in residential areas were included. AED coverage was defined as number of inhabitants within 100 meters of an AED. AEDs were randomly distributed in social housing accounting for current AEDs and a density of 0.5 AED/hectare. Current vs. optimized AED coverage were compared in Vienna and Copenhagen.

Results In Vienna vs. Copenhagen, respectively, 25% (n=492,752) vs. 31% (n=304,966) of the population live in social housing areas, characterized by a high average population density: 361 inhabitants/hectare (all residential areas 173) vs. 142 inhabitants/hectare (all residential areas 71). AED density was 0.02 AED/hectare (271 AEDs) vs. 0.12 AED/hectare (1,641 AEDs) for Vienna vs. Copenhagen, and AED coverage was 358 (95%CI:309;414) inhabitants/AED vs. 119 (95%CI:114;128) inhabitants/AED, respectively. Application of the AED optimization model in social housing increased population coverage by nearly 2-fold: Vienna to 661 (95%CI:628;695, p-value<0.0001) inhabitants/AED; Copenhagen to 243 (95%CI:231;255, p-value<0.0001) inhabitants/AED.

Conclusion AED deployment targeting social housing may be a feasible strategy for optimizing coverage of residential out-of-hospital cardiac arrest.