**Supplementary S1.** Mortality summary of the overall study and regional referral pathways

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Regional referral pathways | | | Study total  13977 |
| Intraregional  3536 | OUT of region  7776 | INTO region  2665 |
| Death after flight | | | | |
| Total n(% of total) | 304(9) | 949(12) | 675(25) | 1928(14)\*\*\* |
| Time post-flight to death  0-7 days n(%) | 55(18) | 118(12) | 60(9) | 233(12)\*\*\* |
| 7-31 days n(%) | 32(11) | 104(11) | 115(17) | 251(13) |
| 1-6months n(%) | 46(15) | 176(19) | 182(27) | 404(21) |
| 6-12month n(%) | 23(8) | 102(11) | 65(10) | 190(10) |
| >1 year n(%) | 145(48) | 443(47) | 250(37) | 838(44) |
| Death All Cause top three | | | | |
| Cancer n(%) | 74(24) | 332(35) | 319(47) | 725(38) |
| Circulatory n(%) | 75(25) | 263(28) | 138(20) | 476(25) |
| Respiratory n(%) | 33(11) | 61(6) | 53(8) | 147(8) |
| Death **0-7days** after flight | | | | |
| Most frequent category of death 0-7daysafter flight | | | | |
| Cardiology n(%)  flight priority(P1-P5)(%)  sending ARIA+ (%) | 18(33)  P1(38)  Rural(63) | 51(43)  P4a(39)  Inner  Regional(51) | 11(18)  P4(45)  Rural(73) | 80(34)  P4a(34)  Inner  Regional(36) |
| Second most frequent category of death 0-7daysafter flight | | | | |
| Cancer n(%)  flight priority(P1-P5) (%)  sending ARIA+ (%) | 8(15)  P4(50)  Rural(75) | 23(19)  P4(43)  Inner regional(74) | 34(57)  P4(94)  Major city(94) | 65(28)  P4(71)  Major  city(49) |

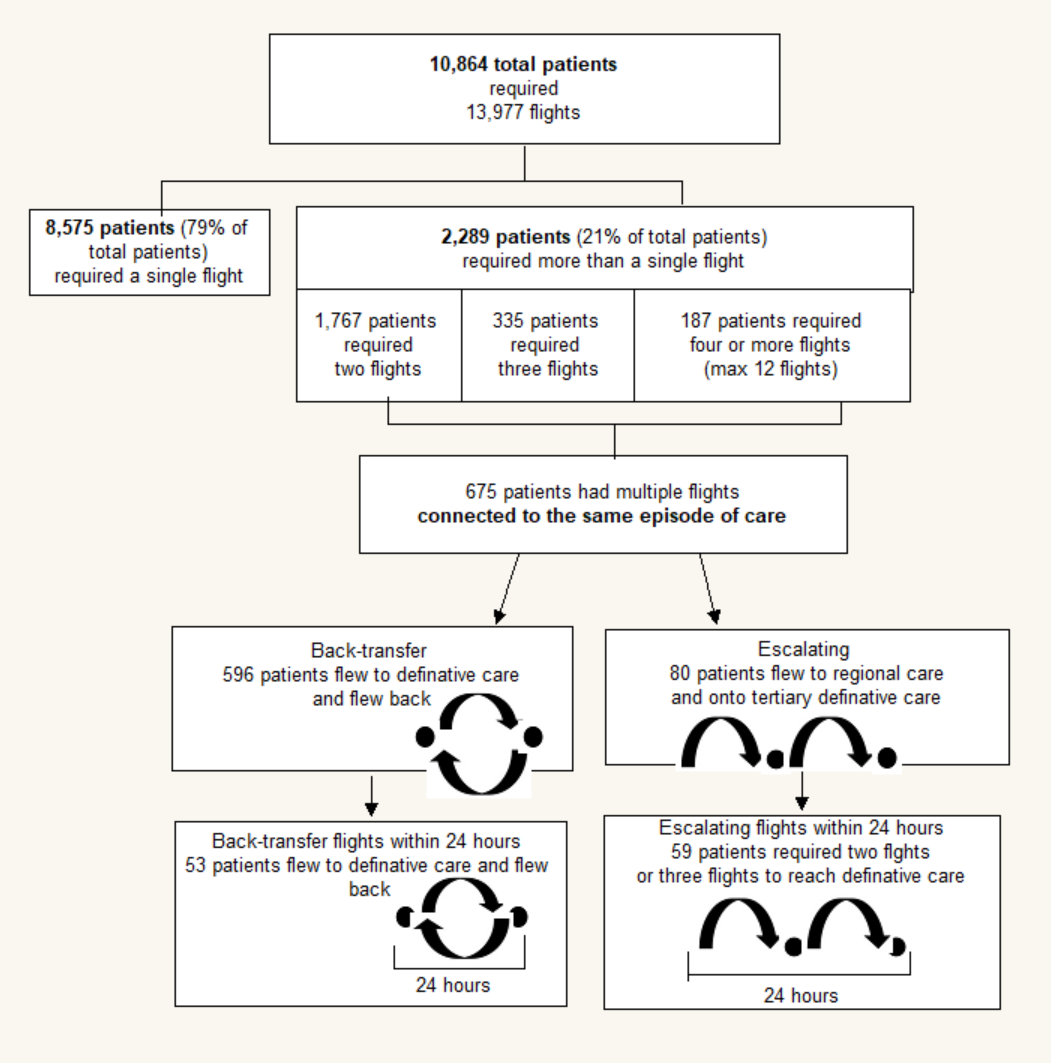
*Statistical significance codes: \*\*\*<0.001*; Cohen’s h=.20 (small effect). *Abbreviations: ARIA+: Accessibility/Remoteness Index of Australia, P1: priority category 1 (most urgent); P5 priority category 5:(lower urgency). a.)One (<1%) missing priority category.*

**Supplementary S2**. Patient and service summary of the overall study and regional referral pathways

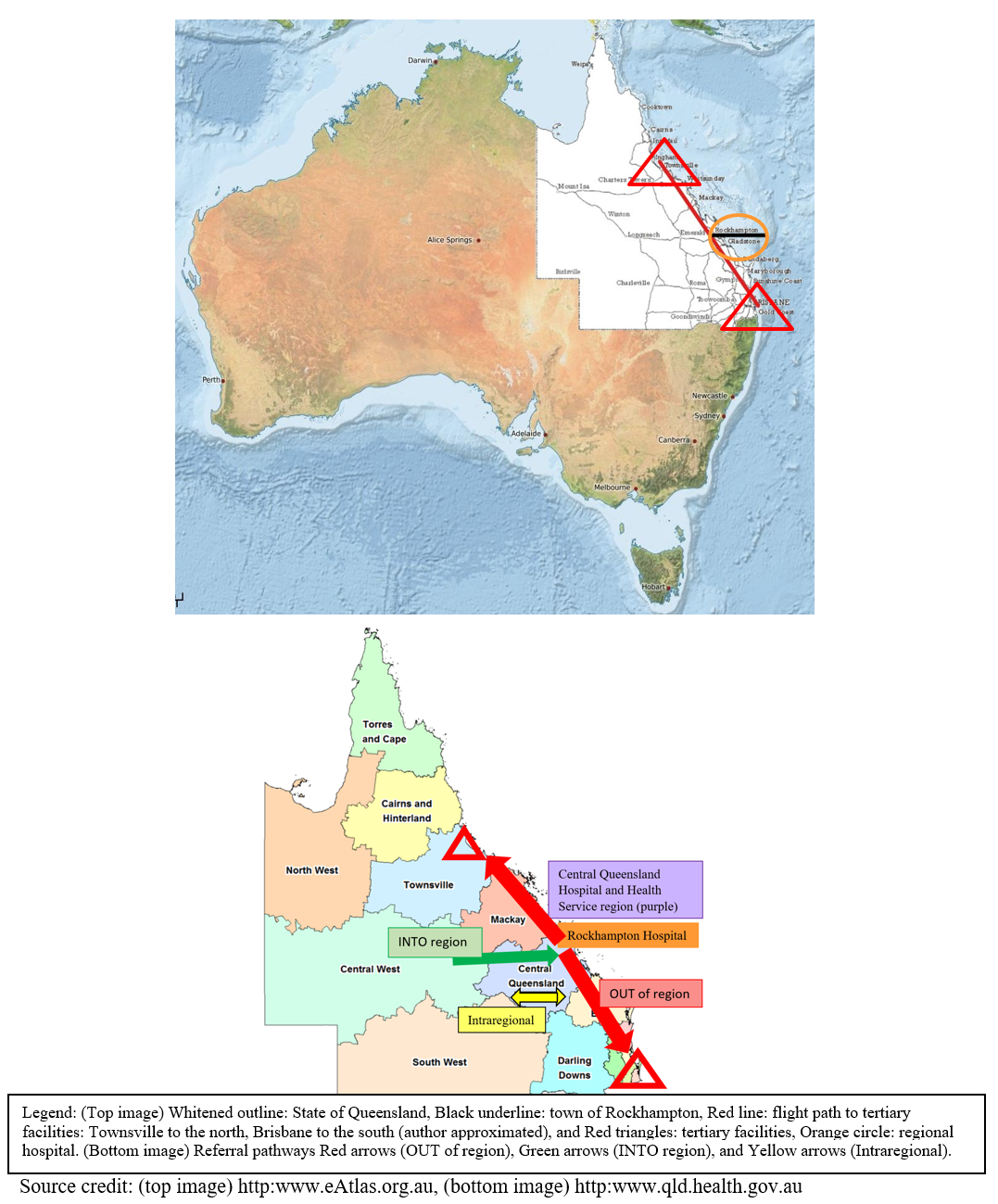
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Regional referral pathways | | | Study total  N=13977 |
| Intraregional  n=3536 | OUT of region  n=7776 | INTO region  n=2665 |
| *Patient* | | | | | |
| Age years mean(sd) | 41.1(23.8) | 52.2(24.1) | 51.1(28.2) | 49.1(25.3)\*\*\* |
| Female n(%) | 1437(41) | 3044(39) | 1154(43) | 5635(40)\*\*\* |
| *Aeromedical* | | | | | |
| Task: IHT n(%) | 2901(82) | 7470(96) | 2440(92) | 12811(92) \*\*\* |
| primary n(%) | 599(17) | 176(2) | 170(6) | 945(7) |
| non-hospital return n(%) | 36(1) | 130(2) | 55(2) | 221(2) |
| Asset: Fixed Wing n(%) | 2345(66) | 7453(96) | 2444(92) | 12242(87)\*\*\* |
| Asset: Rotor Wing n(%) | 1002(28) | 26(<1) | 31(1) | 1059(8) |
| Priority: P4 & P5 n(%) | 1123(32) | 5334(69) | 2011(75) | 8468(61)\* |
| P4 & P5 Request-activation interval(hours) mean(sd)  median(min-max) | 10.1(18.0)  4(0-158) | 22.1(25.1)  16(0-259) | 27.8(32.6)  17(0-374) | 21.9(26.7)\*\*\*  15(0-374) |
| *Sending location/ department* | | | | | |
| ARIA+ most common  n(%) | Rural  3316(94) | Inner regional 6566(84) | Major City 1575(59) | Inner regional  6957(50) |
| Sending ED n(%) | 166(5) | 539(7) | 69(3) | 774(6)\*\*\* |
| most common ICD  n(%) | Appendicitis  25(15) | Myocardial Infarct  112(21) | Appendicitis  6(9) | - |
| LOS (hours) mean(sd) | 2.9(2.2) | 4.8(3.6) | 3.1(3.0) | 4.3(3.4)\*\*\* |
| Sending hospital n(%) | 2768(78) | 7056(91) | 2426(91) | 12250(88)\*\*\* |
| DRG most common  n(%) | Digestive  271(10) | MI  1527(22) | Injuries  95(4) | - |
| LOS (days) mean(sd) | 1.1(3.0) | 3.2(5.9) | 10.3(16.3) | 4.1(9.2) \*\*\* |
| *Receiving location/ department* | | | | |
| ARIA+ most common  n(%) | Inner regional  3401(96) | Major City  7484(96) | Inner regional  2522(95) | Major City  7449(53) |
| ReceivingED n(%) | 2738(77) | 2017(26) | 1752(66) | 6507(47)\*\*\* |
| ICD most common  n(%) | Appendicitis  172(6) | Myocardial Infarct  77(4) | Stroke  53(3) | - |
| LOS (hours) mean(sd) | 4.3(3.1) | 1.7(1.8) | 4.6(4.0) | 3.6(3.3)\*\*\* |
| Disposition:  discharged n(%) | 290(11) | 79(4) | 131(7) | 500(8) \*\*\* |
| admit to hospital n(%) | 2302(84) | 1916(95) | 1562(89) | 5780(89) |
| transferred n(%) | 131(5) | 20(1) | 47(3) | 198(3) |
| LAMA n(%) | n.p | nil | 12(1) | 21(<1) |
| died in ED n(%) | n.p | n.p | nil | n.p |
| Direct hospital admissionn(%) | 759(21) | 5621(72) | 851(32) | 7231(52)\*\*\* |
| DRG most frequent  n(%) | Vaginal birth  39(5) | Interventional cardiology  529(9) | Surgical followup  70(8) | - |
| LOS (days**)** mean(sd) | 4.6(8.3) | 8.8(12.7) | 8.9(12.1) | 8.4(12.3)\*\*\* |
| Disposition:  home n(%) | 412(54) | 4319(77) | 560(66) | 5291(73) \*\*\* |
| transferred n(%) | 298(39) | 857(15) | 154(18) | 1309(18) |
| died in hospital n(%) | 17(2) | 109(2) | 62(7) | 188(3) |
| other n(%) | 32(4) | 335(6) | 75(9) | 442(6) |

Statistical significance codes: \*<0.05, \*\*\*<0.001; Cohen’s d/h=.20 (small effect), d/h=.50 (medium effect), d/h=.80 or higher (large effect). Abbreviations: ARIA+: Accessibility/Remoteness Index of Australia; d: Cohen’s d; ED: emergency department; h: Cohen’s h; LOS: length of stay; LAMA: left against medical advice; MI: myocardial infarct, n.p: not presented (for patient sums <10), P4 & P5: least urgent priority categories. Missing data was subtracted from denominators (for missing data see supplementary file S8).

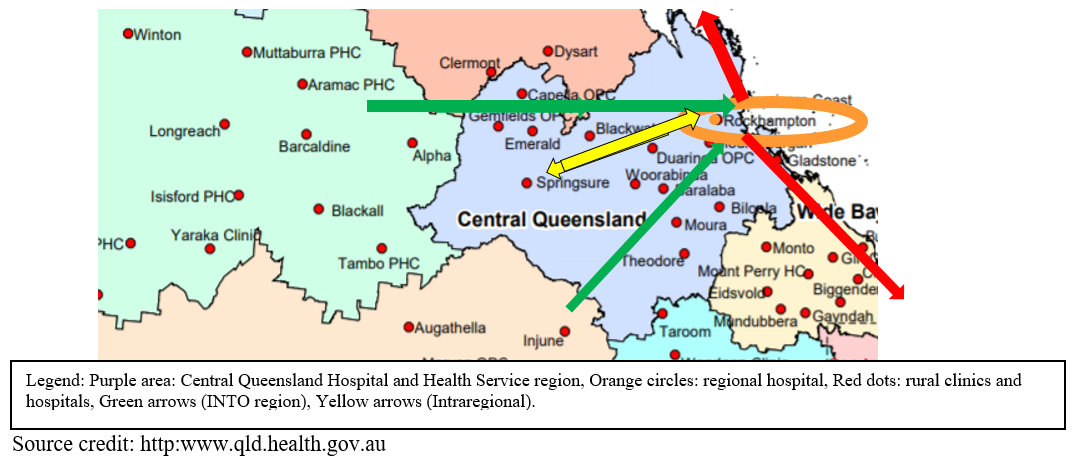
**Supplementary S3.** Multiple flights per person during the study period



**Supplementary S4.** Map of study region



**Supplementary S5.** Map of Central Queensland Hospital and Health Service region

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**Supplementary S6.**Queensland air ambulance priority categories (P1-P5)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Asset type | Priority 1 | Priority 2 | Priority 3 | Priority 4 | Priority 5 |
| Fixed wing (FW):  Rotor wing (RW) | FW:  30 minutes during 0800-2000,  45 minutes during 2000-0800  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  RW:  15 minutes during 0800-2000,  30 minutes during 2000-0800. | 1-3 hours  All aircraft  Day or night | 3-6 hours  All aircraft  Day or night | 6-24 hours  All aircraft  Day or night | 24 hours  All aircraft  Day or night |

Queensland Emergency Helicopter Network Tasking Guidelines (2011)17

**Supplementary S7**. STROBE Statement

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Item No | Recommendation | | Page  No |
| **Title and abstract** | | 1 | (*a*) Indicate the study’s design with a commonly used term in the title or the abstract | | 1 |
| (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | | 2 |
| Introduction | | | | | |
| Background/rationale | | 2 | Explain the scientific background and rationale for the investigation being reported | | 4,5 |
| Objectives | | 3 | State specific objectives, including any prespecified hypotheses | | 1,5 |
| Methods | | | | | |
| Study design | | 4 | Present key elements of study design early in the paper | | 5 |
| Setting | | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | | 5,6 |
| Participants | | 6 | (*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants | | 1,13 |
|  | |  |
| Variables | | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | | 7,8 |
| Data sources/ measurement | | 8\* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | | *7,8* |
| Bias | | 9 | Describe any efforts to address potential sources of bias | | 10 |
| Study size | | 10 | Explain how the study size was arrived at | | 12 |
| Quantitative variables | | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | | 8,9,10 |
| Statistical methods | | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | | 14 |
| (*b*) Describe any methods used to examine subgroups and interactions | | 14 |
| (*c*) Explain how missing data were addressed | | 14 |
| (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed  *Case-control study*—If applicable, explain how matching of cases and controls was addressed  *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | |  |
| (*e*) Describe any sensitivity analyses | |  |
| Results | | | | | |
| Participants | 13\* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | | 12,15,16 | |
| (b) Give reasons for non-participation at each stage | | 12 | |
| (c) Consider use of a flow diagram | | 12 | |
| Descriptive data | 14\* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | | 15,16 | |
| (b) Indicate number of participants with missing data for each variable of interest | | 36,37 | |
| (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) | |  | |
| Outcome data | 15\* | *Cohort study*—Report numbers of outcome events or summary measures over time | | 15,16 | |
| *Case-control study—*Report numbers in each exposure category, or summary measures of exposure | | *NA* | |
| *Cross-sectional study—*Report numbers of outcome events or summary measures | | *NA* | |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | | NA | |
| (*b*) Report category boundaries when continuous variables were categorized | | 15,16 | |
| (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | | NA | |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | | NA | |
| Discussion | | | | | |
| Key results | 18 | Summarise key results with reference to study objectives | | 21,22 | |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | | 23 | |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | | 23 | |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | | 23 | |
| Other information | | | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | | 24 | |

**Supplementary S8.** Missing values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MISSING**  Variable | **MISSING**  Referral pathway | | | Study total  N=13977 |
| Intraregional  n=3536 | OUT of region  n=7776 | INTO region  n=2665 |
| Aircraft type (e.g., FW, RW) n(%) | 189(5) | 297(4) | 190(7) | 676(5) |
| Aeromedical priority categories | 14(<1) | 41(<1) | 8(<1) | 63(<1) |
| P4 Request-activation interval | 99(9) | 208(4) | 117(7) | 424(6) |
| P5 Request-activation interval | 5(13) | 48(7) | 86(32) | 139(14) |