

## Supplementary materials

**Table S1** Estimates of transition probabilities & distributions used in analysis<sup>a</sup>

Disease presentation, model arm and description of probability	Prob. [r, n] <sup>b</sup>
<b>ACUTE CHEST PAIN<sup>c</sup></b>	
<i>Point-of-care testing Arm</i>	
Probability of having a single cTnI test ( <i>Prob_SinglecTnI_test</i> )	0.755 [r=111, n =147]
Probability of having a positive result from a single cTnI test ( <i>Prob_SinglecTnI_test_Positive</i> )	0.027 [r=3, n =111]
Probability of having a negative result from a single cTnI test ( <i>1 - Prob_SinglecTnI_test_Positive</i> )	0.973 [r=108, n =111]
Probability of being evacuated following a negative result from a single cTnI test ( <i>ProbMedEvacAfterSingleNegTest</i> )	0.102 [r=11, n =108]
Probability of not being evacuated following a negative result from a single cTnI test ( <i>1 - ProbMedEvacAfterSingleNegTest</i> )	0.898 [r=97, n =108]
Probability of having a repeat cTnI test ( <i>1 - Prob_SinglecTnI_test</i> )	0.245 [r=36, n =147]
Probability of having a positive result from the first of repeat cTnI tests ( <i>Prob_RepeatcTnI_test_FirstPositive</i> )	0.028 [r=1, n =36]
Probability of having a negative result from the first of repeat cTnI tests ( <i>1 - Prob_RepeatcTnI_test_FirstPositive</i> )	0.972 [r=35, n =36]
Probability of having a two positive results from the repeat cTnI tests ( <i>Prob_RepeatcTnI_test_FirstPositive_SecondPositive</i> )	1.000 [r=1, n =1]
Probability of having a positive and then a negative result from repeat cTnI tests ( <i>1 - Prob_RepeatcTnI_test_FirstPositive_SecondPositive</i> )	0.000 [r=0, n =1]
Probability of having a negative and then a positive result from repeat cTnI tests ( <i>Prob_RepeatcTnI_test_FirstNegative_SecondPositive</i> )	0.086 [r=3, n =35]
Probability of having a two negative results from the repeat cTnI tests ( <i>1 - Prob_RepeatcTnI_test_FirstNegative_SecondPositive</i> )	0.914 [r=32, n =35]
Probability of being evacuated following a positive and then a negative result from repeat cTnI tests ( <i>ProbMedEvac_FirstPositive_SecondNegativeTest</i> )	0.000 [r=0, n =0]
Probability of not being evacuated following a positive and then a negative result from repeat cTnI tests ( <i>1 - ProbMedEvac_FirstPositive_SecondNegativeTest</i> )	0.000 [r=0, n =0]
Probability of being evacuated following two negative results from repeat cTnI tests ( <i>ProbMedEvac_FirstNegative_SecondNegativeTest</i> )	0.094 [r=3, n =32]
Probability of NOT being evacuated following two negative results from repeat cTnI tests ( <i>1 - ProbMedEvac_FirstNegative_SecondNegativeTest</i> )	0.906 [r=29, n =32]
<i>Usual Care Arm</i>	
Probability of being evacuated in the usual care arm ( <i>ProbMedEvac_UsualCare_Chest</i> )	0.354 [r=52, n =147]
Probability of not being evacuated in the usual care arm ( <i>1 - ProbMedEvac_UsualCare_Chest</i> )	0.646 [r=95, n =147]
<b>ACUTE DIARRHOEA</b>	
<i>Point-of-care testing Arm</i>	
Probability of having rehydration failure ( <i>ProbMedEvac_POCT_Diarrhoea</i> )	0.400 [r=10, n =25]
Probability of having rehydration success ( <i>1 - ProbMedEvac_POCT_Diarrhoea</i> )	0.600 [r=15, n =25]
<i>Usual Care Arm</i>	
Probability of being evacuated in the usual care arm ( <i>ProbMedEvac_UsualCare_Diarrhoea</i> )	0.440 [r=11, n =25]

<b>Disease presentation, model arm and description of probability</b>	<b>Prob. [r, n]<sup>b</sup></b>
Probability of not being evacuated in the usual care arm ( <i>1 - ProbMedEvac_UsualCare_Diarrhoea</i> )	0.560 [r=14, n =25]
<b>MISSED DIALYSIS</b>	
<i>Point-of-care testing Arm</i>	
Probability of being evacuated following a positive Potassium assay test result ( <i>ProbMedEvac_KplusGreaterThanSixPointFive_Dialysis</i> )	0.143 [r=4, n =28]
Probability of having a negative Potassium assay test result ( <i>1 - ProbMedEvac_KplusGreaterThanSixPointFive_Dialysis</i> )	0.857 [r=24, n =28]
Probability of being evacuated following a negative Potassium assay test result ( <i>ProbMedEvac_KplusLessThanSixPointFive_Dialysis</i> )	0.542 [r=13, n =24]
Probability of not being evacuated following a negative Potassium assay test result ( <i>1 - ProbMedEvac_KplusLessThanSixPointFive_Dialysis</i> )	0.458 [r=11, n =24]
<i>Usual Care Arm</i>	
Probability of being evacuated in the usual care arm ( <i>ProbMedEvac_UsualCare_Dialysis</i> )	0.964 [r=27, n =28]
Probability of not being evacuated in the usual care arm ( <i>1 - ProbMedEvac_UsualCare_Dialysis</i> )	0.036 [r=1, n =28]

<sup>a</sup> The source of all data on probabilities was the Northern Territory Data Warehouse. The Beta distribution was used to model all probabilities in the probabilistic sensitivity analysis (PSA)

<sup>b</sup> Figures are Probability [occurrences(r), population size (n)]. These figures were actual occurrences and population sizes observed in each of the pathways for the three acute presentations and as recorded in the Northern Territory Data Warehouse. Variable names used in the model for the probabilities and shown in the model structures (Figure 1) are presented in italics besides respective descriptions of these probabilities. Note that '1 – probability' in the model structures is represented by '#' within the model structures.

<sup>c</sup> cTnl = Troponin I test

**Table S2** Estimates costs & distributions used in the base case

Description	Estimate (AU \$)	Distribution <sup>b</sup>	Source
<b>ACUTE CHEST PAIN</b>			
<i>Point-of-care testing Arm</i>			
<b>cTnl test<sup>a</sup> Negative</b>			
Nurses - general care	\$76.22	Gamma	Time and Motion study
District Medical Officer	\$26.79	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$76.00	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$1.13	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$237.71	Gamma	Time and Motion study
<b>cTnl test<sup>a</sup> Positive</b>			
Nurses - general care	\$39.42	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$32.15	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$98.34	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$10.48	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$264.25	Gamma	Time and Motion study
<i>Usual care arm</i>			
Nurses - general care	\$39.42	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$32.15	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$174.17	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$1.54	Gamma	Time and Motion study
Total	\$273.56	Gamma	Time and Motion study
<b>MISSED DIALYSIS</b>			
<i>Point-of-care testing Arm</i>			
<b>K+ test<sup>a</sup> normal (not evacuated)</b>			
Nurses - general care	\$96.19	Gamma	Time and Motion study
District Medical Officer	\$35.37	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$49.79	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$2.86	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$241.78	Gamma	Time and Motion study
<b>K+ test<sup>a</sup> high (evacuated)</b>			
Nurses - general care	\$131.41	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$26.79	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$49.79	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$11.15	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$131.41	Gamma	Time and Motion study
<i>Usual Care arm</i>			
Nurses - general care	\$131.94	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$43.94	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$68.75	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$3.67	Gamma	Time and Motion study

Total	\$274.58	Gamma	Time and Motion study
<b>ACUTE DIARRHOEA</b>			
<i>Point-of-care testing Arm</i>			
<b>Na+/K+ test<sup>a</sup> negative</b>			
Nurses - general care	\$139.82	Gamma	Time and Motion study
District Medical Officer	\$26.79	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$17.87	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$4.19	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$246.24	Gamma	Time and Motion study
<b>Na+/K+ test<sup>a</sup> positive</b>			
Nurses - general care	\$139.82	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$26.79	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$17.87	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$4.19	Gamma	Time and Motion study
Cost of i-STAT <sup>e</sup> and training <sup>f</sup>	\$57.57	Gamma	Time and Motion study
Total	\$272.52	Gamma	Time and Motion study
<i>Usual care arm</i>			
Nurses - general care	\$144.55	Gamma	Time and Motion study
Nurses - Evacuation monitoring	\$26.28	Gamma	Time and Motion study
District Medical Officer	\$35.37	Gamma	Time and Motion study
Supplies and consumables <sup>c</sup>	\$4.36	Gamma	Time and Motion study
Drugs and other treatment <sup>d</sup>	\$5.02	Gamma	Time and Motion study
Total	\$215.58	Gamma	Time and Motion study

<sup>a</sup> cTnl = Troponin test; Na+/K+ test = Sodium/Potassium test; K+ test = Potassium test

<sup>b</sup> Distributions used in probabilistic sensitivity analysis

<sup>c</sup> Costs of supplies and consumables include those associated with conducting an electrocardiography (ECG), oxygen, syringes for blood sampling, gloves and protective equipment

<sup>d</sup> Costs of drugs or other treatment included expenditure on morphine, aspirin, glyceryl trinitrate spray, oral rehydration solution, saline

<sup>e</sup> Costs of i-STAT included costs of i-STAT cartridges, gloves, syringes for blood sampling

<sup>f</sup> Cost associated with i-STAT training, quality testing processes and program management

**Table S3** Costs of Medical Evacuation per patient

Description	Estimates	Source
<b><i>Evacuation by air</i></b>		
Number of services covered (out of 72)	66	CA LAPT; TE LAPT
Weight contribution to total evacuation cost	0.92	Calculated
<i>Total for the Northern Territory</i>		
Average duration of evacuation in minutes (round trip)	164	CA LAPT; TE LAPT
Cost per minute	\$136	NT F&C Manual
Round trip total evacuation cost	\$23,220	Calculated
Weighted Round trip total evacuation cost	\$21,285	Calculated
<i>Top End (n=40)<sup>a</sup></i>		
Average duration of evacuation in minutes (round trip)	186	TE LAPT
Cost per minute	\$136	NT F&C Manual
Round trip total evacuation cost	\$28,318	Calculated
Weighted Round trip total evacuation cost	\$25,958	Calculated
<i>Central Australian services (n=32)</i>		
Average duration of evacuation in minutes (round trip)	126	CA LAPT
Cost per minute	\$136	NT F&C Manual
Round trip total evacuation cost	\$17,840	Calculated
Weighted Round trip total evacuation cost	\$16,354	Calculated
<b><i>Evacuation by road<sup>b</sup></i></b>		
Number of services covered (out of 72)	6	CA LAPT; TE LAPT
Weight contribution to total evacuation cost	0.08	Calculated
<i>Total for the Northern Territory</i>		
Average kilometres (round trip)	180	CA LAPT; TE LAPT
Cost first 10 kilometres	\$727	NT F&C Manual
Cost for subsequent kilometres	5	NT F&C Manual
Round trip total evacuation cost	\$15,291	Calculated
Weighted Round trip total evacuation cost	\$1,275	Calculated
<i>Top End</i>		
Average kilometres (round trip)	226	TE LAPT
Cost first 10 kilometres	700	NT F&C Manual
Cost for subsequent kilometres	5	NT F&C Manual
Round trip total evacuation cost	\$15,506	Calculated
Weighted Round trip total evacuation cost	\$1,292	Calculated
<i>Central Australian services</i>		
Average kilometres (round trip)	134	CA LAPT
Cost first 10 kilometres	700	NT F&C Manual
Cost for subsequent kilometres	5	NT F&C Manual
Round trip total evacuation cost	\$15,076	Calculated
Weighted Round trip total evacuation cost	\$1,256	Calculated

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***Evacuation by air and/or road***

*Total for the Northern Territory*

\$ 22,560                      Calculated

Weighted Round trip total evacuation cost

*Top End*

\$ 25,491                      Calculated

Weighted Round trip total evacuation cost

*Central Australian services*

\$ 17,610                      Calculated

**Weighted Round trip total evacuation cost**

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<sup>a</sup> More weight was given to three large health centres as determined by the number of evacuations in this calculation (which were 175, 250 and 250).

<sup>b</sup> An assumption was made that the same cost/kilometre for the road ambulance applies to St John Ambulance in cases where the road ambulance was met half way by St John Ambulance during evacuations.

CA LAPT= Central Australian Low Acuity Patient Transfer Logistics Coordinators

TE LAPT=Top End Low Acuity Patient Transfer Logistics Coordinators

NT F&C Manual = Northern Territory Department of Health Fees and Charges Manual

## **Supplementary Material: Resource use data estimates and sources**

### *Pre-evacuation*

Resource use relating to staff activity, supplies and consumables, equipment, and drugs was determined through a time and motion study to provide reliable estimates of resource use and activity time as this information is not routinely collected or available. Several experienced clinical staff within the remote health care network documented the occurrence and duration of activities along each pathway in all three medical presentations as well as the personnel involved using the 'work sampling' approach. Activities documented included transit time, preparation, testing and medication.

### *Evacuation*

The Directors of Medical Services, Primary Health Care, for both Central Australia and Top End were contacted to source information about the number of medical evacuations at remote health centres across the Territory. The Central Australian Director of Medical Services provided monthly summaries of the number of Central Australian medical retrievals from July 2014 to June 2015 which averaged 200 (range 125-275) evacuations per month (2,400 per annum) [C Edgell 2015, pers. com. 29 September]. The same information was not able to be sourced from the Top End Director of Medical Services. Information was therefore sought from CareFlight which services the Top End of the NT. Figures were obtained from the CareFlight 2014/15 Annual Report which documented a total of 2789 emergency evacuations for the Top End during the corresponding 12-month period (111 [4%] of which were via helicopter).<sup>5</sup> A significant proportion of the evacuations in the Top End (over 20%) originated from the three large health centres participating in this study.<sup>5</sup>

The Northern Territory Department of Health Fees and Charges Manual quotes a cost of \$141.59 per minute for fixed-wing intrastate aeromedical transport which equates to a total cost of \$8,495 per one-hour flight time.<sup>3</sup> This figure is consistent with published data from rural and remote Queensland aero-evacuations of \$8,520 per one-hour inter-hospital transfer.<sup>4</sup> The

NT DoH Fees and Charges Manual cites a cost for a road ambulance of \$727 for the first 10 kms and then \$4.67 per km greater than 10 kms and a cost of \$269.51 per minute (\$16,171 per hour) for a helicopter evacuation.<sup>3</sup> The cost of these evacuations is borne by the NT Department of Health.

Resource use relating to mode and duration of an evacuation was obtained from Central Australian and Top End Low Acuity Patient Transfer Logistics Coordinators. Sixty six of the 72 remote health centres evacuate by air and the remaining six primarily use road ambulance due to their close proximity to the major centres (Alice Springs and Darwin). The average return flight time (point estimate) was 164 minutes for the Northern Territory as a whole and 126 minutes and 186 minutes for Central Australia and the Top End respectively. For the remaining 6 remote health services the average road ambulance time and distance was determined and factored in to overall calculations for NT as a whole and for each jurisdiction. See supplementary Table 3.

#### *Prevalence Estimates*

For each patient presentation type, data was sourced by the NTHDW from the PCIS used by the NT Department of Health Remote Health Centres. PCIS search terms used to calculate the prevalence of each presentation type were determined by a Senior Rural Medical Practitioner with significant experience working in the remote primary health care sector. The data search period was from 1 July 2014 to 30 June 2015, except for 'Missed Dialysis' which was sourced from 1 July 2015 to 31 December 2015 as the search term "Dialysis Session (Missed)" was not created until June 2015; the number of missed dialysis sessions was then doubled to reflect an annual estimate. The prevalence of each patient presentation type was then determined for the NT DoH Remote Health Services using population estimates from 2011 Census data from Australian Bureau of Statistics<sup>21</sup> and extrapolated Territory-wide.