Stroke Audit Machine Learning (SAMueL) Project Meeting

November 2022

Outline

Stakeholder Engagement

Sally Evans, Senior Project Manager, National Stroke Programme

- Will be useful to use SAMueL output for thrombolysis Communities of Practice (COP) - trial in spring 2023?
- Produce 'hospital profiles' summarising hospital (and in comparison with others).

RD&E stroke physicians

- Consider including patient age in our simplified model, as the docs said they used that, in combination with time elapsed, in their decision-making (and it was only just outside the reduced list of features we use in the simplified model). *ACTION TAKEN*: Simplified model has been re-run to include 10 features (#10 is age). We will re-run all SHAP work.
- Show hospitals where they are in comparison to other hospitals regarding the groups of patients we have identified where decision-making varies between hospitals.
- Reverse *Waterfall* plots.
- A reason was given why thrombolysis use may fall with increasing pre-stroke disability. The possible benefit (such as mRS improvement) is reduced, so that changed the perceived risk-benefit 'calculation' a doc is making.

SAMueL advisory group meeting

SAMueL advisory group meeting

For slides see:
`https://github.com/samuel-book/samuel-2-reference/blob/main/advisory_group_meetings/advisory_group_nov_2022.pdf`

- Enthusiastic reception, especially around results and target thrombolysis rates being targeted to hospitals.
- Discussion around the care needed to share hospital-level results (and, for example, should some output anonymise hospitals?).
- Discussion about how to select hospitals for qualitative work and 'AI Development' workshops. There may be most value by biasing sample to lower thrombolysing hospitals, or when there is a significant gap between actiual thrombolysis rate and predicted 'optimised' thrombolysis rate.

Patient and carers involvement

Patient and carers involvement

- Presented overall view of project, which helped to shape our lay presentation of results.
- Reverse *Waterfall* plots.
- What relevant information is available from Stroke Association (reports, or data held by Stroke Association).
- Proposed qual recommendation that team consider how to make sure they are not an unwelcome presence, from the perspective of the patient.

(Very) Synthetic Patients

Investigating how hospitals differ in thrombolysis decision-making: Synthetic patients

Base patient:

- Onset to arrival = 80 mins
- Arrival to scan = 20 mins
- Infarction = Yes
- NIHSS = 15
- Prior disability level = 0
- *Precise onset time = Yes*
- Use of AF anticoagulents = No

Proportion of hospitals predicted to give thrombolysis:

- Base patient: 99%
- NIHSS = 4: 73%
- Pre-stroke mRS=3: 86%
- Estimated stroke onset time: 64%

Health Economics

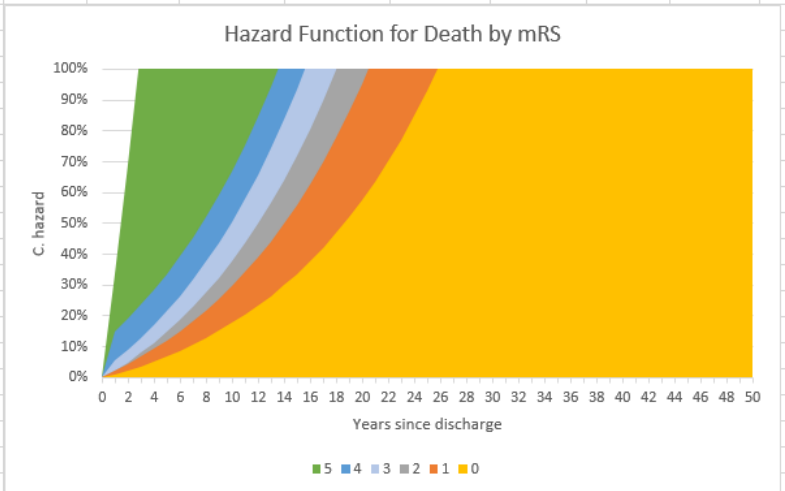
Long term outcome model

Peter and team have been developing a long term outcome model. Currently in R and Excel, and being written for Python.

2	INPUTS													
3		Age	60	60		-13.7324	-1836.4668	discount factor QALY	3.50%		Cost A&E		£	170.46
4		Sex	Female	0				discount factor costs	3.50%		Cost Elective bed day		£	443.80
5		mRS	Zero	0				WTP QALY	£ 20,000		Cost Non-elective bed day		£	532.56
6											Cost Residential day		£	102.71
7					-7.09161	-7.98058	-12.85753	-16.4884	-18.56029	-20.91837				
8	MORTALITY													

Probability of Death

Yr	pDeath	Yr	pDeath
1	0.90%	8	2.29%
2	1.32%	9	2.48%
3	1.42%	10	2.68%
4	1.54%	11	2.90%
5	1.67%	12	3.13%
6	1.81%	13	3.39%
7	1.95%	14	3.66%



Median Survival / IQR (years) / Life expectancy (age)

mRS	Median Sur	IQR	Life Expectancy
0	18.46	12.41 to 22.52	78.46
1	13.67	8.60 to 17.27	73.67
2	11.73	7.25 to 15.02	71.73
3	9.25	5.29 to 12.25	69.25
4	6.26	2.73 to 9.02	66.26
5	3.39	0.70 to 6.35	63.39

Public Document Repository

Public document repository

`https://github.com/samuel-book/samuel-2-reference`