Number of pre-hospital medications and ICU outcome – a potential measure of frailty?

Short, A*., Gardner, J., Taylor, C., Yan, R. and Docking, R.
Queen Elizabeth University Hospital, Glasgow. *Abigail.short2@nhs.scot

Introduction

Intensive care is a series of management strategies that put significant demands on the patient. Determining frailty is important in considering appropriate escalation planning.

Frailty is a multi-dimensional problem, which can be seen as a "decreased ability to withstand illness without loss of function"[1,2].

Rockwood published the Clinical Frailty Scale (CFS) in 2005[1], which is widely adopted as a triage tool for clinical decision making. It's strength lies in the quality of the history taken and verification from family members and carers and extrapolation as a tool for ICU is debated[2,3]. Number of medications pre-hospital admission does not feature as part of the CFS but could be a surrogate for comorbidities which does significantly influence physiological and psychological reserve.

Aim

We hypothesised that the number of pre-hospital medications a patient is prescribed prior to ICU admission is associated to ICU outcome and potentially has a role as a frailty indicator.

We were also interested to see if there were specific groups of medications that had a higher odds ratio in an outcome of death.

Method

Local information governance approval was granted and ethical review discussed. Full ethics board review was not required for this project. All data was anonymised pre-analysis.

All patients admitted to a general, adult ICU between 2015 – 2020 were eligibile for inclusion in this study. Data recorded in the 'medication reconciliation' of individual patient's Careview recorded was extracted using SQL programme. Number and type of medication per patient was analysed.

Medications were classified into broad groups. Those with a significant of $p<0.1$ on univariable analysis were subject to multivariable analysis. Outcome from ICU was either alive or died.

Statistical analysis was performed using R software package. Significance level $p<0.05$.

Results

Total number of patients analysed was 3393 for the 5-year period.

- 2686 (79.2) survived ICU, 707 (20.8) died.
- Median (IQR) number of medications:
  - ICU alive = 5 (2 to 9)
  - ICU died = 6 (3 to 10). $p< 0.001$.
- Percentage of patient on 10+ medications = 22.7%
  - ICU death if 10+ medications = 24.16%

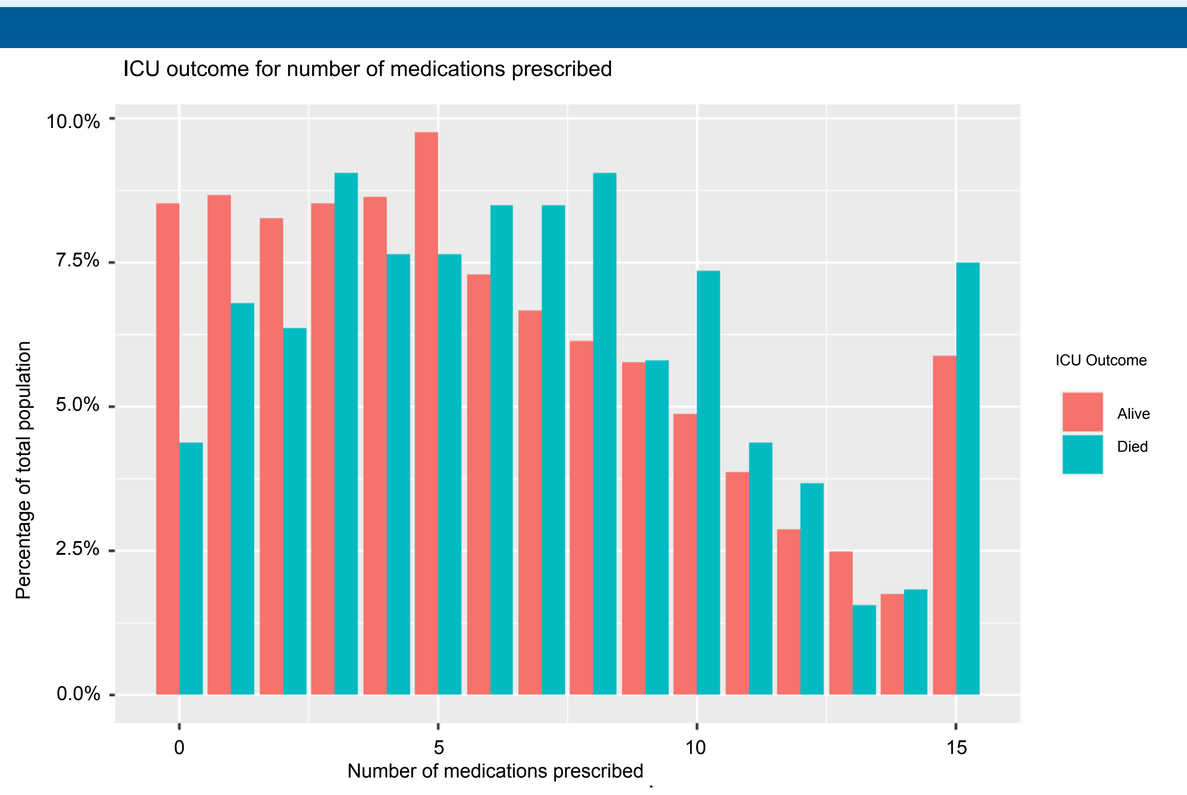

Figure 1.

Number of medications prescribed and ICU outcome as percentage of total population.

Dependent: died		Alive	Died	OR (univariable)	OR (multivariable)
NIL	FALSE	2457 (78.4)	676 (21.6)	-	-
	TRUE	229 (88.1)	31 (11.9)	0.49 (0.33-0.71, p<0.001)	0.59 (0.38-0.87, p=0.011)
Antiarrhythmic	FALSE	2616 (79.5)	673 (20.5)	-	-
	TRUE	70 (67.3)	34 (32.7)	1.89 (1.23-2.85, p=0.003)	1.16 (0.72-1.83, p=0.528)
Anticoagulant	FALSE	2487 (79.9)	626 (20.1)	-	-
	TRUE	199 (71.1)	81 (28.9)	1.62 (1.23-2.12, p=0.001)	1.15 (0.83-1.57, p=0.400)
Antidepressant	FALSE	1785 (77.8)	509 (22.2)	-	-
	TRUE	901 (82.0)	198 (18.0)	0.77 (0.64-0.92, p=0.005)	0.84 (0.69-1.03, p=0.090)
Antihypertensive	FALSE	1840 (81.7)	412 (18.3)	-	-
	TRUE	846 (74.1)	295 (25.9)	1.56 (1.31-1.85, p<0.001)	1.00 (0.82-1.23, p=0.978)
Antiplatelet	FALSE	2163 (81.3)	499 (18.7)	-	-
	TRUE	523 (71.5)	208 (28.5)	1.72 (1.43-2.08, p<0.001)	1.17 (0.91-1.49, p=0.225)
Antipsychotic	FALSE	2445 (78.4)	675 (21.6)	-	-
	TRUE	241 (88.3)	32 (11.7)	0.48 (0.32-0.69, p<0.001)	0.59 (0.39-0.86, p=0.009)
Anxiolytic	FALSE	2302 (78.5)	632 (21.5)	-	-
	TRUE	384 (83.7)	75 (16.3)	0.71 (0.54-0.92, p=0.011)	0.85 (0.64-1.12, p=0.255)
Betablocker	FALSE	2099 (81.2)	485 (18.8)	-	-
	TRUE	587 (72.6)	222 (27.4)	1.64 (1.36-1.96, p<0.001)	1.15 (0.93-1.42, p=0.202)
Bisphosphonate	FALSE	2610 (79.4)	678 (20.6)	-	-
	TRUE	76 (72.4)	29 (27.6)	1.47 (0.94-2.25, p=0.084)	1.04 (0.64-1.67, p=0.859)
Cardiac	FALSE	2489 (80.3)	609 (19.7)	-	-
	TRUE	197 (66.8)	98 (33.2)	2.03 (1.57-2.62, p<0.001)	1.31 (0.97-1.77, p=0.078)
Diabetes	FALSE	2314 (79.7)	588 (20.3)	-	-
	TRUE	372 (75.8)	119 (24.2)	1.26 (1.00-1.57, p=0.045)	0.95 (0.74-1.21, p=0.669)
Diuretic	FALSE	2277 (80.6)	547 (19.4)	-	-
	TRUE	409 (71.9)	160 (28.1)	1.63 (1.32-2.00, p<0.001)	1.19 (0.95-1.49, p=0.130)
Endocrine	FALSE	2396 (79.7)	612 (20.3)	-	-
	TRUE	290 (75.3)	95 (24.7)	1.28 (1.00-1.64, p=0.049)	1.10 (0.84-1.42, p=0.489)
Eye	FALSE	2530 (79.6)	647 (20.4)	-	-
	TRUE	156 (72.2)	60 (27.8)	1.50 (1.10-2.04, p=0.010)	1.24 (0.89-1.70, p=0.187)
Immunosuppressant	FALSE	2447 (79.6)	626 (20.4)	-	-
	TRUE	239 (74.7)	81 (25.3)	1.32 (1.01-1.72, p=0.039)	1.09 (0.82-1.44, p=0.557)
MSK	FALSE	2558 (79.7)	653 (20.3)	-	-
	TRUE	128 (70.3)	54 (29.7)	1.65 (1.18-2.28, p=0.003)	1.33 (0.93-1.86, p=0.107)
Neurology	FALSE	2360 (78.7)	638 (21.3)	-	-
	TRUE	326 (82.5)	69 (17.5)	0.78 (0.59-1.02, p=0.080)	0.84 (0.63-1.11, p=0.223)
Oncology	FALSE	2658 (79.4)	690 (20.6)	-	-
	TRUE	28 (62.2)	17 (37.8)	2.34 (1.25-4.25, p=0.006)	2.03 (1.07-3.76, p=0.026)
Opiate	FALSE	2327 (78.1)	652 (21.9)	-	-
	TRUE	359 (86.7)	55 (13.3)	0.55 (0.40-0.73, p<0.001)	0.59 (0.43-0.79, p=0.001)
Respiratory	FALSE	2021 (79.9)	507 (20.1)	-	-
	TRUE	665 (76.9)	200 (23.1)	1.20 (0.99-1.44, p=0.056)	1.16 (0.95-1.41, p=0.136)
Statin	FALSE	1895 (82.4)	405 (17.6)	-	-
	TRUE	791 (72.4)	302 (27.6)	1.79 (1.51-2.12, p<0.001)	1.26 (1.00-1.59, p=0.051)
VitaminD	FALSE	2418 (79.7)	615 (20.3)	-	-
	TRUE	268 (74.4)	92 (25.6)	1.35 (1.04-1.73, p=0.020)	1.12 (0.84-1.48, p=0.444)

Table 1: Univariable and multivariable analysis of medication groups. Medication groups reaching significance level for ICU outcome of death highlighted in boxes.
Red box – oncology medications – multivariable analysis OR 2.03 for ICU outcome = died
Blue box – Nil medications, antipsychotic and opiate – multivariable analysis OR < 1 for ICU outcome = died

Conclusion

The number of pre-hospital medications that patients are prescribed prior to an admission to ICU has a significant association to ICU outcome.

This is a large data series, which gives strength to the statistical findings.

Patients with no prior medications have a lower odds ratio of death. Interestingly the same finding is associated with prescription of antipsychotic medications and opiates. This may reflect the reason for admission, the patient age or may have a protective effect – these are conclusions that cannot be made from this study.

Further work to develop a risk calculator for number and 'type' of medication and predicted ICU outcome could be the next stages from these findings.

Acknowledgements

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