The **P**aediatric **A**dmission **G**uidance in the **E**mergency Department (**PAGE**) score

1. What is PAGE?

PAGE[1] is an assessment tool to aid discharge and admission decision making in relation to children aged under 16 years of age in hospital urgent and emergency care facilities. The PAGE score can assist clinicians to predict the need for admission from the emergency department. PAGE is intended as a one-off score to predict this need – it is not a track and trigger early warning score or system (**Figure 1**).

Figure 1: PAGE

Variable	Category	Point(s)
Age (months)	≥ 6	0
	2-5	1
	0-1	2
Heart rate (beats per minute)	≤ 125 (ie 0-125)	0
	>125 (ie 126 and above)	1
Respiratory rate (breaths per minute)	0-25	0
	26-60	2
	>60	3
Temperature (°C)	<38	0
	38-39	1
	>39	2
Oxygen saturation (%)	>94	0
	90-94	4
	<90	5
Requires supplementary oxygen?	No	0
	Yes	2
Breathing	Normal	0
	Abnormal	2
Recession	No recession	0
	Any recession	1
Behaviour	Normal	0
	Agitated or Listless	1
	Floppy	2
Nurse judgement	No concern	0
	Low level concern	1
	High concern	3
Multi-morbidity? (ie any pre-existing condition?)	No	0
	Yes	2
Arrived by ambulance?	No	0
	Yes	3
Advised by medical professional to attend?	No	0
	Yes	2

2. Why is there just one PAGE tool and not several tools for different ages?

PAGE takes into account age as the first variable and our research has shown that as this is accounted for in the tool, the same tool can be used for all ages from 0 to 16 years of age.

3. How well does PAGE perform at predicting admission?

To answer this question we need to look at the C-Index which is a "goodness of fit" measure. In essence, the C-Index can range from 0 to 1 with 1 being a perfect predictor and 0 being no prediction whatsoever. Using a C-Index can help to compare how well different early warning scores perform. If the outcome measure is "admission" from the emergency department, the nearer the C-Index is to 1 the better the tool is at predicting that outcome measure. The C-Index for PAGE is **0.78** overall and there is reason to be 95% confident that the actual value (rather than this calculated value) lies between very narrow limits[2].

[1] Rowland AG, Cotterill S, Heal C, *et al*. Observational cohort study with internal and external validation of a predictive tool for identification of children in need of hospital admission from the emergency department: the **P**aediatric **A**dmission **G**uidance in the **E**mergency Department (PAGE) score. *BMJ Open* 2020; **10:**e043864. doi: 10.1136/bmjopen-2020-043864**.** Available from https://bmjopen.bmj.com/content/10/12/e043864.info

[2] 95% confidence interval 0.77 to 0.79

4. What cut-off point should we use to help guide an admission decision?
Cut-off points refer to the threshold at which a score should mandate admission. This needs to be adjusted to local circumstances taking into consideration things such as what community follow-up services are available, for example a children's community nursing team. To determine what PAGE cut-point to choose it is necessary to understand a little about sensitivity and specificity. The sensitivity of the tool is how well a particular score correctly identifies those children who need to be admitted. The specificity of the tool is how well a particular score correctly identifies those children who should be discharged. It is impossible to prioritise both at once.

In order to ensure that every child who *should* be admitted *is* admitted, all of those who should have been discharged must also be admitted. This is not practicable or desirable and therefore a balanced risk of some error either in unnecessary admission or in incorrect discharge has to be accepted. This is why cut-off points require consideration. For PAGE the sensitivities and specificities of scores 0-23 are shown in **Figure 2**.

Figure 2: Sensitivity and specificity of PAGE scores 0-23

PAGE score	Sensitivity (correct admission)	Specificity (correct discharge)
≥ 0	100%	0%
≥ 1	96.83%	15.80%
≥ 2	91.13%	36.34%
≥ 3	87.70%	45.84%
≥ 4	78.87%	61.03%
≥ 5	68.61%	73.69%
≥ 6	59.47%	80.86%
≥ 7	48.56%	87.89%
≥ 8	38.88%	92.20%
≥ 9	29.84%	95.34%
≥ 10	22.11%	97.43%
≥ 11	16.36%	98.56%
≥ 12	12.03%	99.28%
≥ 13	8.33%	99.60%
≥ 14	5.49%	99.79%
≥ 15	3.25%	99.85%
≥ 16	2.14%	99.90%
≥ 17	1.12%	99.97%
≥ 18	0.65%	100%
≥ 19	0.34%	100%
≥ 20	0.12%	100%
≥ 21	0.04%	100%
≥ 22	0.02%	100%
≥ 23	0%	100%

95% confidence intervals are shown in the research paper in BMJ Open.

In our research we held a consensus group meeting with a number of children's emergency care clinicians from the North West of England. Based on the preferences of those at the consensus meeting the chosen cut-off for their organisations would be either 6 or 7 points. The consensus meeting attendees indicated a preference for giving more weight to higher specificity (ensuring the right children were discharged) than sensitivity (ensuring the right children were admitted).

A local clinical governance decision therefore needs to be taken about which PAGE scores should be used to recommend or require, for example:

1. Tier 2 (ST4+, middle grade doctor, or advanced paediatric nurse practitioner) review if discharge is being considered
2. Consultant or nurse consultant review if discharge is being considered
3. Referral to inpatient specialty (admission)

5. Where can I find more information?
You can find more information about PAGE on our website[3], in BMJ Open, or by contacting: Professor Andrew Rowland, Honorary Professor (Paediatrics), Children's Emergency Department, North Manchester General Hospital, Delaunays Road, Manchester, M8 5RB, UK | A.Rowland@salford.ac.uk

[3] http://hub.salford.ac.uk/health-and-society-research/tag/emergency-care/