OG006.v1 Key Performance Indicators (KPIs)

1. Key Recommendations		
1	Principles	• KPIs should provide drivers for continuous improvement in clinical care. • KPIs should provide the source for information which will ultimately enter the public domain. • KPIs should be based on high quality clinical evidence. • KPIs should have a non-compliance margin of <10% and preferably <5%. • KPIs which have a non-compliance margin greater than zero should have a sufficient sampling interval that two episodes of non-compliance will still allow the KPI to remain in the compliance range (Appendix 1). • KPI Compliance Rates should be reported as both raw values for a reported period and displayed on a suitable control chart.
2	Data Handling & Distribution	• Episodes of non-compliance identified on raw data analysis should be returned to each team for validation. • Values verified by individual teams should become available to proceed to Divisional Reporting. • Divisional KPI values should be calculated from verified individual team data. • Divisional values should be verified by an organisation's General Manager (GM) and Associate Medical Director (AMD) before distribution outwith an organisation or progression to external reporting. • Values verified by an organisation's GM and AMD should become available to proceed to external reporting. • External KPI values should be verified by the relevant organisational management group and ambulance service director / CE before being entered into the public domain. • External KPIs should be published via the organisation's Annual Report as the primary route.
3	Progression & Development	• Collaborative KPIs should be considered, where possible. • Initial collaboration should focus on equivalent performance indicators. (Identical definitions / standards are not necessarily required at this stage.) • Progression of KPIs should consider aligning definitions between services with a view to creating a single Scotland-wide KPI (where applicable) to drive equity of critical care provision nationally.
4	Data Definitions	• Proposals to change, add or remove KPIs should be submitted to the KPI steering group (Appendix 2). • Current KPI specifications should be held in a single, managed definitions document. (see Appendix 3 for data source documents).
5	Exclusions	• Data which are unsuitable, particularly those which cannot have an associated clinical driver, should not be a KPI. Such data could be considered as service information. • Consider maintaining Service Information not suitable for KPI inclusion in a single, managed definitions document.

OG006.v1 Key Performance Indicators (KPIs)

2. Document History			
Reference Number	OG006		
Version	1		
Writing group (Chair in bold)	Katy Barclay	Information Manager	SAS
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Date issued	24th August 2018		
2. Distribution	ScotSTAR	EMRS	✓
		Paediatric	✓
		Neonatal	✓
	Referring centres via service websites		✓
	BASICS Scotland		X
	Medic 1		X
	Tayside Trauma Team		X
	Rural GPs Association of Scotland		X
	SAS Air Ambulance Division		✓

3. Scope and purpose

- Overall objectives:
  - This guideline describes the process for development, implementation and management of Key Performance Indicators (KPIs).
  - The aim is to provide a process which ensures the maintenance of high quality KPIs which accurately convey the safety, efficacy and reliability of critical care delivered by prehospital and retrieval medical teams.
  - The process is designed to ensure a valid, representative and robust KPI system by reference to relevant quality improvement, systems analysis and statistical validity principles.
  - The guideline aims to ensure data quality and accountability is maintained at all stages in the reporting process right through to, ultimately, information release to the public domain.
  - This guideline does not specifically state or define individual KPIs and is designed to be used in conjunction with an appropriate managed data definitions document.
  - Where defined, KPIs will maximise the transfer of information out of the clinical domain for the purpose of performance monitoring and continuous quality improvement. KPIs will be based on available data and a high quality evidence base. They should not be assumed to reflect the foremost clinical priorities of any given service: which may lack data or the evidence base to be considered as a KPI.

- Feedback:

Comments on this guideline can be sent to: scotamb.CPG@nhs.net

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.

4. Explanatory Statements

4.1 Principles

- *KPIs should provide drivers for continuous improvement in clinical care.*

Topic, source and supporting evidence should be such that an improving trend in the KPI should indicate delivery of improved clinical care.

- *KPIs should provide the source for information which will ultimately enter the public domain.*

The output from the KPI process should be considered as the conduit by which patients and their families can be informed on the safety, efficacy and reliability of delivered clinical care.

- *KPIs should be based on high quality clinical evidence.*

In order to produce an effective driver for continuous improvement in clinical care, the underlying evidence should be of sufficient quality as to clearly demonstrate patient benefit by compliance with a given KPI.

- *KPIs should have a non-compliance margin of <10% and preferably <5%.*

A margin of >10% allows excess variation to enter the system, with a corresponding degradation in the quality, interpretability and accountability of information which the KPI provides.[1]

- *KPIs which have a non-compliance margin greater than zero should have a sufficient sampling interval that two episodes of non-compliance will still allow the KPI to remain in the compliance range. (Appendix 1)*

If any episodes of non-compliance are accepted then they must be considered to be unpredictable, but acceptable, unplanned events. In this case, the probability of one vs two episodes of non-compliance within a given reporting period are not different by a statistically significant margin. Thus, the possibility of two non-compliance episodes must be accounted for without the system being considered to be non-compliant in that period.[2]

- *Key Performance Indicator Compliance Rates should be reported as both raw values for a reported period and displayed on a control chart.*
  - A simple check of data quality can be made from the numerator and denominator for a given reporting period.
  - A control chart displays data with statistically-derived performance limits vs time; thereby allowing optimal visualisation of the data trend and stability over time.
  - A 'p' type chart (Shewart p-chart) standardises information to a percentage of compliance / non-compliance and therefore fits best with the intended output of percentage compliance with KPIs. Other control-charts may be appropriate (e.g X-mr charts) depending on circumstances.[3,4]

4.2 Data Handling and Distribution

- *Episodes of non-compliance identified on raw data analysis should be returned to each team for validation.*

A simple error or omission may have recorded data in a non-standard location or a non-standard format which is not interpretable by normal electronic record interrogation, but which should not in itself be considered an episode of non-compliance. Returning information on such non-compliance episodes to a team will allow an expert cross-check to exclude a simple error and educate to improve documentation.

- *Values verified by individual teams should become available to proceed to Divisional Reporting.*

Once verified, the data should be considered to be an accurate representation of that individual team's performance with respect to the given KPIs and of sufficient data quality to allow subsequent analysis of divisional performance as a whole.

- *Divisional KPI values should be calculated from verified individual team data.*

Ensures quality, transparency and accountability of data by ensuring that the qualities outlined above have been met.

- *Divisional values should be verified by an organisation's General Manager (GM)) and Associate Medical Director (AMD) before distribution outwith an organisation or progression to external reporting.*

Appropriate consideration should be given to the organisational hierarchy in order to ensure data quality, transparency and accountability.

- *Values verified by an organisation's GM and AMD should become available to proceed to external reporting.*

Once verified, the data should be considered to be an accurate representation of the organisation's performance with respect to the given KPIs and is therefore able to accurately inform, where appropriate, on such performance to persons outside the immediate ScotSTAR & Air Ambulance divisions.

- *External KPI values should be verified by the relevant organisational management group and ambulance service director / CE before being entered into the public domain.*

Appropriate consideration should be given to the organisational hierarchy in order to ensure data quality, transparency and accountability.

- *External KPIs should be published via the organisation's Annual Report as the primary route.*

A defined target publication route should encourage structured, timely reporting and reduce the requirement for ad-hoc information requests.

4.3 Progression and Development

- *Collaborative KPIs should be considered, where possible.*

Reduces duplication of work and encourages sharing of good clinical practice.

- *Initial collaboration should consider developing equivalent performance indicators. (Identical definitions / standards are not necessarily required at this stage.)*

Services may operate in a similar but not identical system which have minor variations tailored to specific, local needs or capability – in which circumstances a generalised KPI may be considered to be inappropriate.

- *Progression of KPIs should consider aligning definitions between services with a view to creating a single Scotland-wide KPI (where applicable) to drive equity of critical care provision nationally.*

4.4 Data Definitions

- *Current KPI specifications should be held in a single, managed definitions document. (See Appendix 3 for source documents / locations)*

Ensures accountability, repeatability and maintenance of data quality; an acceptable governance chain – and reduces potential for inappropriate addition or removal of KPIs.

- *Changes, addition or removal of KPIs should be managed by a KPI steering group.*

Ensures appropriateness of KPI, adequate peer review, guidance and adherence to guideline principles prior to formal adoption. An example form for submissions to a steering group is included in Appendix 2.

4.5 Excluded Data

- *Data which are unsuitable, particularly those which cannot have an associated clinical driver, should not be a KPI. Such data could be considered as service information.*

Encourages adherence to quality improvement principles, but on the understanding that such data may be valuable to a given service, just not in the KPI domain.

- *Consider maintaining Service Information not suitable for KPI inclusion in a single, managed definitions document.*
  - Encourages the same principles of data quality, accountability and transparency with a governance chain and the reduction of inappropriate addition or removal – as this data will also be valuable to a service.
  - The same principles for data resilience (i.e. non-compliance margins, reporting intervals) should be considered to apply to Service Information. Ensures appropriateness of KPI, adequate peer review, guidance and adherence to guideline principles prior to formal adoption.
  - An example form for submissions to a steering group is included in Appendix 2.
  - A list of current services' data definitions documents and associated contacts are listed in Appendix 3.

5. References

1. Shewart, WA. Economic Control of Quality of Manufactured Product. D. Van Nostrand Co, New York. 1931.
2. Haight, Fa. Handbook of the Poisson Distribution. Wiley & Sons, New York. 1967.
3. Tague ,N R et al. The Quality Toolbox, 2nd Ed. ASQ Quality Press, 2005. via http://asq.org (American Society for Quality).
4. NIST/SECMATECH e-Handbook of Statistical Methods. U.S. Department of Commerce. http://www.itl.nist.gov./div898/handbook/pmc/section3/pmc332.htm

Appendix 1 – Reporting Interval Matrix

		Compliance Margin (%)										
		10	8	7	6	5	4	3	2.5	2	1	
Average number undertaken per month (λ = number per year / 12)	1	33	42	48	56	67	84	112	134	167	334	Minimum reporting interval (months)
	2	25	31	36	42	50	63	84	100	125	250	
	3	20	25	29	34	40	50	67	80	100	200	
	4	10	13	15	17	20	25	34	40	50	100	
	5	10	13	15	17	20	25	34	40	50	100	
	6	7	9	10	12	14	17	23	27	34	67	
	7	5	7	8	9	10	13	17	20	25	50	
	8	4	5	6	7	8	10	14	16	20	40	
	9	4	5	6	7	8	10	14	16	20	40	
	10	4	5	5	6	7	9	12	14	17	34	
	11	3	4	5	5	6	8	10	12	15	29	
	12	3	4	4	5	5	7	9	10	13	25	
	13	3	3	4	4	5	6	8	9	12	23	
	14	3	3	4	4	5	6	8	9	12	23	
	15	2	3	3	4	4	5	7	8	10	20	
	16	2	3	3	4	4	5	7	8	10	19	
	17	2	3	3	3	4	5	6	7	9	17	
	18	2	2	3	3	4	4	6	7	8	16	
	19	2	2	3	3	3	4	5	6	8	15	
	20	2	2	3	3	3	4	5	6	8	15	
	21	2	2	2	3	3	4	5	6	7	14	
	22	2	2	2	3	3	4	5	5	7	13	
	23	2	2	2	2	3	3	4	5	6	12	
	24	2	2	2	2	3	3	4	5	6	12	
	25	2	2	2	2	3	3	4	5	6	11	
	26	1	2	2	2	2	3	4	4	5	10	
	27	1	2	2	2	2	3	4	4	5	10	
	28	1	2	2	2	2	3	4	4	5	10	
	29	1	2	2	2	2	3	4	4	5	10	
	30	1	2	2	2	2	3	3	4	5	9	
	31	1	2	2	2	2	3	3	4	5	9	
	32	1	1	2	2	2	2	3	4	4	8	
	33	1	1	2	2	2	2	3	4	4	8	

	34	1	1	2	2	2	2	3	3	4	8
	35	1	1	2	2	2	2	3	3	4	8
	36	1	1	2	2	2	2	3	3	4	8
	37	1	1	1	2	2	2	3	3	4	7
	38	1	1	1	2	2	2	3	3	4	7
	39	1	1	1	2	2	2	3	3	4	7
	40	1	1	1	2	2	2	3	3	4	7
	41	1	1	1	2	2	2	3	3	4	7
	42	1	1	1	1	2	2	2	3	3	6
	43	1	1	1	1	2	2	2	3	3	6
	44	1	1	1	1	2	2	2	3	3	6
	45	1	1	1	1	2	2	2	3	3	6
	46	1	1	1	1	2	2	2	3	3	6
	47	1	1	1	1	2	2	2	3	3	6
	48	1	1	1	1	2	2	2	3	3	6
	49	1	1	1	1	1	2	2	2	3	5
	50	1	1	1	1	1	2	2	2	3	5
Selected other values (λ)											
	60	1	1	1	1	1	1	2	2	2	4
	78	1	1	1	1	1	1	1	2	2	3
	92	1	1	1	1	1	1	1	1	2	3
	114	1	1	1	1	1	1	1	1	1	2
	219	1	1	1	1	1	1	1	1	1	1

Correct use of matrix will result in a probability of erroneous non-compliance due to random variation ≤ 1.3%

Appendix 1 – continued…

The above table demonstrates the exact minimum reporting interval in months / the minimum data collection period.

For simplicity, it is recommended that the reporting intervals are fixed at intervals according to the colour coding of the chart as follows:

Minimum Reporting Interval (Months)	Colour	Recommended Reporting Interval
1		1 Month (Monthly)
2 – 3		3 Months (Quarterly)
4 – 6		6 Months (Biannually)
6 – 12		12 Months (Yearly)
12 – 24		2 years (Biennially)
24+		As available. No specific time frame recommended.

Appendix 2

ScotSTAR - Key Performance Indicator Submission Form

KPI Standard / Title:	

Type of submission (circle):	New Submission	Amend existing KPI	Remove existing KPI

Reason / need:

Only required for new / amended

Plain-text overview of KPI:

Data / Evidence Source:	

Proposed KPI type (circle):	
Control KPI	Limit KPI

For Limit KPIs: Proposed compliance level (circle):									
1%	2%	2.5%	3%	4%	5%	6%	7%	8%	10%
99%	98%	97.5%	97%	96%	95%	94%	93%	92%	90%

Plain text processing definition (numerator / denominator etc):

Return to: ScotSTAR KPI Steering Group. c/o Dr Chris Moultrie (chris.moultrie@nhs.net)

For Clinical Standards / KPI Steering Group use only:

Date received: _____ Decision date: _____

Accept □

Amend □ Details: _____

Reject □ Reason: _____

Appendix 3

KPI Source / Data Definitions Documents		
Organisation	***KPI Source Document***	***Holder / Contact***
ScotSTAR EMRS	ScotSTAR Key Performance Indicators: Standards and Data Definitions	ScotSTAR KPI Steering Group Dr Chris Moultrie chris.moultrie@nhs.net
ScotSTAR SPRS		
ScotSTAR SNTS		
Air Wing	TBC	TBC