



DETECTION AND MANAGEMENT OF OUTLIERS

Version 11 August 2020

Document Contributors

Version	Date	Author/Reviewer	Change Description
V1.0	08/01/16	Maralyn Woodford	
V2.0	07/03/16	Maralyn Woodford, Tim Coats, Fiona Lecky, Dhushy Surendra Kumar, Antoinette Edwards	
V3.0	16/05/16	Maralyn Woodford, Tim Coat, Fiona Lecky, Dhushy Surendra Kumar, Antoinette Edwards	
V4.0	25/05/16	Maralyn Woodford, Tim Coats, Fiona Lecky, Antoinette Edwards	
V5.0	24/08/16	Maralyn Woodford, Fiona Lecky	
V6.0	30/11/16	Maralyn Woodford, Fiona Lecky	
V7.0	30/07/18	Fiona Lecky, Research Director	
V8.0	01/07/19	Laura White, Operations Director	Introduction of left and full censorship
V9.0	24/09/19	Laura White, Operations Director	Update to censorship diagram
V9.1	11/10/19	Laura White, Operations Director	Update to Alert classification to include Case ascertainment
V9.2	07/11/19	Laura White, Operations Director	Update to statistical censorship wording.
V10	15/05/20	Laura White, Operations Director	Exclusion of IP fallers as agreed by the TARN Executive
V11	21/08/20	Laura White, Operations Director	Amendments highlighted by * as discussed by Executive committee July 2020 & agreed TARN Board Aug 2020

Contact Address

Manchester Medical Academic Health Sciences Centre
Institute of Population Health
University of Manchester
3rd Floor, The Mayo Building
Salford Royal NHS Foundation Trust, Stott Lane, Salford
M6 8HD

telephone: 00 44 (0) 161 206 4397

Table of Contents

PROJECT DEFINITION	5
BACKGROUND	5
PERFORMANCE INDICATOR	5
CASE-MIX (RISK) ADJUSTMENT	5
DATA QUALITY & MONITORING	6
INCLUSION	6
DEFINITION OF POTENTIAL OUTLIER	6
STATISTICAL CENSORSHIP	7
IDENTIFICATION OF A POTENTIAL OUTLIER	8
OUTLIER ALARMS	8
OUTLIER ALERTS	9
MANAGEMENT OF A POTENTIAL OUTLIER: ALARM	10
MANAGEMENT OF A POTENTIAL OUTLIER: ALERT	11
CHANGES AGREED BY TARN BOARD: AUGUST 2020	11
OTHER CONSIDERATIONS	11

Project Definition

To develop a policy for the management of outlying Trusts.

Background

These recommendations are based on management protocols used by national clinical audits as advised by HQIP (Healthcare Quality Improvement Partnership)

Performance indicator

Performance indicators should deliver a *valid* measure of a provider's quality of care in that there is a clear relationship between the indicator and quality of care, and relate to frequently occurring events to provide sufficient statistical power.

The Ws statistic compares actual and predicted outcomes and is adjusted for case mix (Bouamra et al EMJ 2015).

Case-mix (risk) adjustment

Comparison of providers takes account of differences in the mix of patients between providers by adjusting for known, measurable factors that are associated with the performance indicator. These include age, gender, injury severity and co-morbidity. Adjustments are carried out using the most current statistical model. The model has been rigorously tested as regards its power of discrimination (area under the ROC) and its calibration. The details of the model are publicly reported. On the TARN website at (<https://www.tarn.ac.uk/Content.aspx?ca=4&c=3515>)

Data quality & monitoring

Data quality is considered and reported when reviewing potential outlier Trusts.

Case ascertainment: The number of patients submitted to the TARN electronic data collection and reporting system compared to the number of eligible patients derived from a HES data source that has been analysed with respect to the TARN inclusion algorithm. The survivor/death ratio is also calculated.

Data accreditation: Performance indicator data and data on patient characteristics required for case mix adjustment is particularly reviewed.

Inclusion

- Outlier review includes all UK and Republic of Ireland Hospitals.
- Outlier review excludes Inpatient fallers.

Definition of potential outlier

Statistically derived limits around the target (expected) performance are used to define if a provider is a potential outlier:

Outlier Alert:

- More than 2 standard deviations from the target or
- Case ascertainment is <50% for the current outlier period, regardless of Ws (outcome).

Outlier Alarm:

- More than 3 standard deviations from the target or
- Case ascertainment is <50% and has remained in this position for 2 outlier review periods, regardless of Ws (outcome).

Note that these are definitions of statistically significant differences from expected performance. These differences may not be clinically significant if the number of patients reviewed is based on a small numbers.

Statistical Censorship

Historically patients who are transferred out of a Trust for ongoing acute care have been excluded from the transferring Trusts' Ws statistic, this is referred to as: "right statistical censorship".

However, to account for the differing number of transfers a Trust may treat compared to their peers and the potential impact of transfers in, out or both on the outcome statistic, the following groups are now all considered as part of the outlier process.

- Right statistical censorship: Exclusion of transfers out
- Left statistical censorship: Exclusion of transfers in
- Full statistical censorship: Exclusion of all transfers

Note: Right statistical censorship remains the prominent consideration as this is the basis of TARN publicly available outcome reporting.

Figure 1

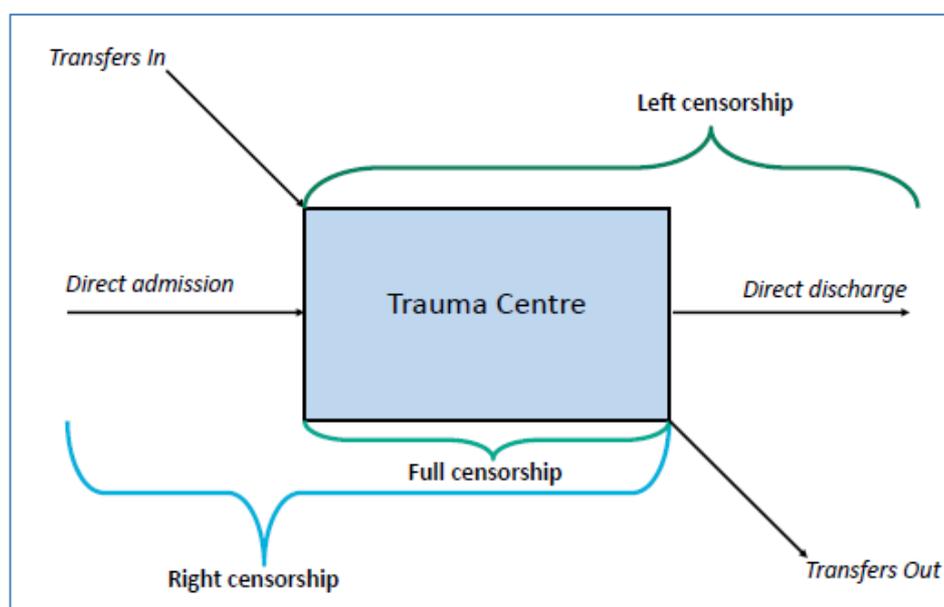


Figure 1: Statistical Censorship models:

- Right, full and left statistical censorship models used to examine the outcome statistic, Ws.
- Right statistical censorship includes direct admissions, transfers in, and direct discharges, and excludes transfers out.
- Full statistical censorship includes direct admissions and discharges, and excludes all transfers.
- Left statistical censorship includes direct admissions, direct discharges and transfers out, and excludes transfers in.

Identification of a potential outlier

The TARN Research Committee reviews the case mix standardised outcome (Ws) and the standard deviations together with the data quality for all trauma receiving Trusts at the Research Committee meeting each month. Outliers will be reviewed once per annum.

The TARN Research Committee includes:

- Fiona Lecky, Research Director. Professor of Emergency Medicine
- Antoinette Edwards, Executive Director, TARN
- Laura White, Operations Director, TARN
- David Yates, Professor Emeritus
- Omar Bouamra, Medical Statistician, TARN
- Sophie Jones, Registry Manager, TARN
- Richard Stephenson, Data Analyst, TARN
- Peter Jones, Data Analyst, TARN
- Catherine Doyle, Executive Assistant, TARN
- Rachel Bentley, Research Support Officer, TARN

The Research Committee identifies:

Outlier Alarms

Trusts with a Ws that is 3 Standard Deviations from the mean, where the 95% confidence intervals do not cross zero, and have:

- Two or more “Alarms” triggered out of the three models; right, left or full statistical censorship: see diagram below:

Right censorship	Left censorship	Full censorship	Status
Alarm →	Alarm →	Alert or Nil →	Alarm
Alarm →	Alarm →	Alarm →	Alarm
Alert or Nil →	Alarm →	Alarm →	Alarm
Alarm →	Alert or Nil →	Alarm →	Alarm

- Or any Trust whose Case ascertainment is <50% and has remained in this position for 2 outlier review periods, regardless of Ws (outcome).

Outlier Alerts

Trusts with a Ws that is 2 Standard Deviations from the mean, where the 95% confidence intervals do not cross zero and are either:

- An “Alarm” trigger under the right statistical censorship model and no “Alarm” trigger in other models.
- An “Alarm” trigger under the left or full statistical censorship model and an “Alert” trigger in either or both of the other models.
- Two or more “Alerts” triggered, involving right statistical censorship and one of the other models.

Right censorship	Left censorship	Full censorship	Status
Alarm	Alert or Nil	Alert or Nil	Alert
Alert	Alert	Nil	Alert
Alert	Nil	Alert	Alert
Alert	Alert	Alert	Alert
Alert	Alarm	Alert	Alert
Nil	Alert	Alarm	Alert

- Or any Trust whose Case ascertainment is <50% for the current outlier period, regardless of Ws (outcome).

A distinction is made between “outlier positive” and “outlier negative”.

Data quality is reviewed in relation to the Ws and assessed in conjunction with Alerts and Alarms

Management of a potential outlier: Alarm

The process indicates the stages that may be needed in managing a potential outlier Alarm, the actions that need to be taken and the time scale. It aims to be both feasible for those involved, fair to providers identified as potential outliers and sufficiently rapid so as not to unduly delay the disclosure of comparative information to the public.

1. Once an outlier Alarm has been identified according to the agreed definitions, staff at TARN will review the data and:
 - Identify any potential errors in internal analyses of the data
 - Assess case ascertainment
 - Assess the differential survivor: death ratio.
 - Review data quality
2. Once completed, the TARN Clinical Lead/CEO/MD will be approached with the relevant information including the case mix standardised outcome (Ws) and standard deviation.
3. If the percentage of case ascertainment is low or the ratio of survivors: deaths submitted is outside the accepted range of: 0.8 to 1.2, then recommendations for data quantity improvement are discussed, with a requirement for these to be implemented within 3 months by the Trust.
4. If the percentage of case ascertainment and the ratio of survivors: deaths submitted is within the accepted range, a data quality review will be undertaken with a requirement for this to be completed within 3 months.
5. In either case: (3) or (4) once the data review is complete and the case ascertainment and survivor: death ratio of submitted cases is acceptable, TARN staff will undertake reanalysis within 3 months confirming (or not) the outlier status, with the Trust concerned (normally completed by July).
6. If the data improves and the outlier status is no longer valid then the Trust will be notified of this and no further action is required.
7. If positive outlier status is confirmed then TARN will write to the TARN Clinical Lead/CEO/MD to confirm better than expected survival rates and suggest system review to learn positive lessons.
8. If negative outlier status is confirmed, TARN will perform a profile of deaths and summarise their findings in writing to the TARN Clinical Lead/CEO/MD.
9. At this point the Trust will be invited to discuss the next steps with TARN, which may result in a further review.
10. If no further review is required, the Trust will be asked to confirm that they are informing their commissioning Network and The Care Quality Commission (CQC) of their outlier status.

If the Trust does not engage in reviewing their data within 3 months of the first Alarm a reminder will be sent. If the Trust still fails to comply then TARN will notify the regulators (CQC) and commissioning Network directly.

Management of a potential outlier: Alert

TARN staff will notify the TARN Clinical Lead/CEO/MD of their confirmed outlier Alert status with advice on any limitations of the data but with the expectation that local data quality review is undertaken to ensure any quality of care issues are addressed.

The results of the alert review will be communicated to the TARN Clinical Lead/CEO/MD. This may result in a trust becoming an alarm outlier at which point the process will move to alarm outlier management.

Changes agreed by TARN BOARD: August 2020

- If a Trust is highlighted as either Alarm or Alert in one review period and fails to actively engage in a data quality review and is not flagged as an Outlier in the following review period; TARN will pass this information onto the regulator (CQC) for discussion, anonymously at first.
- If a Trust remains an Alert for 2 consecutive review periods and TARN has highlighted data quality concerns, but the Trust has failed to actively engage in a data quality review; TARN will pass this information onto the regulator (CQC) and the Network concerned. The Trust will then be classed as an Alarm for the 2nd review period. This applies to both Negative and Positive Alerts.
- If a Trust remains a positive Alert or Alarm for 2 consecutive review periods and TARN has no data quality concerns (Case ascertainment, Data accreditation and Survivor/Death ratio are all within accepted range); TARN will verify with the Trauma National Clinical Director (NCD) that there are no known concerns associated with the Trust and if not, they will be offered an 'Outstanding Trauma Hospital' award by TARN and asked to present their pathway to improvement at a Trauma conference.

Other considerations

- The case mix standardised outcome measure (Ws) is published on the TARN public-facing website with refreshed information three times each year.
- TARN provides the CQC with the Ws and 95% confidence intervals of each Hospital **for use in Trust reviews.**
- **TARN provides the Clinical Outcomes Publication (HQIP)** with the Ws and 95% confidence intervals of each Hospital for publication on MyNHS and NHS Choices.
- **All the above published figures reflect Ws with right statistical censorship.**