Supplementary File 1: Fields for Scoring investigations

Demographic data

Information Required	Field
1. Record/investigation number (original from jurisdiction)	Free Text
2. The investigation method	Drop Down Menu: • RCA • RCA2 • London Protocol • Accimaps/SEIPS • Cluster Map • HEAPS • Other
1. State/ Territory	Drop Down: • Australian Capital Territory (ACT) • New South Wales • Queensland • Victoria
2. Health Service or Location	Free Text
3. Hospital Peer Grouping	**Peer Grouping** Principal referral hospital Public acute group A hospital Public acute group B hospital Public acute group C hospital Public actue group D hospital

	Very small hospital Specialised hospitals group Women's and children's hospitals Psychiatric hospitals Drug and alcohol hospitals Same day hospitals Other Acute Specialised Sub-acute and non-acute hospitals Outpatient hospitals Unpeered hospital Early Parenting Centre Unknown Insufficient information to assess
4. Facility Rurality	Drop down: • Major City • Inner Regional • Outer Regional • Remote • Very Remote • Insufficient information to assess
5. Admission Type	Elective Emergency Unknown NA
6. Admitting Specialty (1)	**Lookup Medical Specialty** **Medical Specialties** Anaesthetics

	Cardiology Critical care Emergency General Ward Imaging Intensive Laboratory Medicine (non-surgical) Mental health/Psychiatry Obstetrics/Gynaecology Oncology Orthopaedics Paediatrics Pharmacy Perioperative Radiology Recovery Surgery Other (Please Specify)
Medical Specialty related to the incident (2)	**Lookup Medical Specialty** **Medical Specialties** Anaesthetics Cardiology Critical care Emergency General Ward Imaging

	Intensive Laboratory Medicine (non-surgical) Mental health/Psychiatry Obstetrics/Gynaecology Oncology Orthopaedics Paediatrics Pharmacy Perioperative Radiology Recovery Surgery Other (Please Specify)	
Medical Specialty related to the incident (3)	**Lookup Medical Specialty** **Medical Specialties** Anaesthetics Cardiology Critical care Emergency General Ward Imaging Intensive Laboratory Medicine (non-surgical) Mental health/Psychiatry Obstetrics/Gynaecology	

	Oncology Orthopaedics Paediatrics Pharmacy Perioperative Radiology Recovery Surgery Other (Please Specify)
7. Age of patient involved	• 0-4 • 5-9 • 10-14 • 15-19 • 20-24 • 25-29 • 30-34 • 35-39 • 40-44 • 45-50 • 50-54 • 55-59 • 60-64 • 65-69 • 70-74 • 75-79 • 80-84 • 85-89 • 90-94 • 95-99 • 100+

8. Gender of patient involved	• Male • Female • Non-binary/other
9. Incident location	• Operating theatre • General ward/patient's room • Emergency department • Intensive Care Unit • Birthing suite, labour room • Diagnostic procedures (e.g., CT or MRI scan, X-ray, imaging) • Day procedure, treatment room • Mental health, psychiatric unit • Transfer between hospitals or units • Outpatient clinic • Neonatal or paediatric ICU • High Dependence Unit • Long-term acute care, hospice • Coronary care or acute care unit • Nursery • Multiple • Not known • Other
	Other: Free Text
Notifiable Event	YES/NO Reason:
Sentinel Event	Yes/No If yes: **Surgical or other procedure:** **1.** Surgery or other invasive procedure performed on wrong site resulting in serious harm or death **2.** Surgery or other invasive procedure performed on the wrong patient resulting in serious harm or death **3.** Wrong surgical or other invasive procedure performed on a patient resulting in serious harm or death

	4. Unintended retention of a foreign object in a patient after surgery or other invasive procedure resulting in serious harm or death **5.** Haemolytic blood transfusion reaction resulting from ABO incompatibility resulting in serious harm or death **Mental Health** **6.** Suspected suicide of a patient within an acute psychiatric unit or acute psychiatric ward **Medication** **7.** Medication error resulting in serious harm or death **Care Management** **8.** Use of physical or mechanical restraint resulting in serious harm or death **9.** Discharge or release of a child to an unauthorised person **10.** Use of an incorrectly positioned oro- or naso-gastric tube resulting in serious harm or death **11.** Other – Catastrophic Note: Sentinel Events came from : Australian Sentinel Events List (version 2) Specifications 2020 - australian_sentinel_events_list_version_2_specifications_april_2020.pdf (safetyandquality.gov.au)
Is this multi-agency?	Yes/No
Length of Main report in pages	Free Text: # (number)

Modified International Classification for Patient Safety (ICPS)

The underlying incident involved in Investigation Report will be classified using the World Health Organisation's International Classification for Patient Safety (ICPS)[10] incident type domain, for example, clinical process/procedure, clinical administration, and problems associated with nutrition. These codes can classify how care was not delivered optimally, such as problems with assessment or diagnoses, observations not monitored, or escalated when abnormal, and treatment not indicated.

Assigned Study ID	
Description of Incident	Free Text
Incident Type 1	**Lookup Incident types** **Incident Types** Clinical Administration Clinical Process/Procedure Documentation Healthcare Associated Infection Medication/IV Fluids Blood/Blood Products Nutrition Oxygen/Gas/Vapour Medical Device/Equipment Behaviour Patient accidents Falls Infrastructure/Buildings/Fixtures Resources/Organizational Management

What went wrong 1

Lookup What went wrong

What went wrong
CA_Handover
CA_Appointment
CA_Waiting List
CA_Referral/Consultation
CA_Admission
CA_Discharge
CA_Transfer of Care
CA_patient Identification
CA_Consent
CPP_Screening/Prevention/Routine Check-up
CPP_Diagnosis/Assessment
CPP_Procedure/Treatment/Intervention
CPP_General Care/Management
CPP_Tests/Investigations
CPP_Specimens/Results
CPP_Detention/Restraint
CPP_Clinical Orders
CPP_Deterioration
DocInv_Orders/Requests
DocInv_Charts/Medical Records/Assessements/Consultations
DocInv_Check Lists
DocInv_Forms/Certificates
DocInv_Instructions/Information/Policies/Procedures/Guidelines
DocInv_Labels/Stickers/Identification Bands/Cards
DocInv_Letters/E-Mails/records of Communication

	DocInv_Investigations/incident reports
	DocInv_Reports/Results/Images
	HAISite_bloodstream
	HAISite_Surgical Site
	HAISite_Abscess
	HAISite_Respiratory
	HAISite_Intravascular Cannulae
	HAISite_Infected Prosthesis/Site
	HAISite_Urinary Drain/Tube
	HAISite_UTI
	HAISite_Cellulitis
	HAISite_Conjunctivitis
	HAISite_VRE
	HAISite_MRSA
	HAISite_Gastroenteritis
	HAISite_Wound
	Med_Prescribing
	Med_Preparation/Dispensing
	Med_Presentation/Packaging
	Med_Delivery
	Med_Administration
	Med_Supply/Ordering
	Med_Storage
	Med_Monitoring
	Bl_Pre-Transfusion Testing
	Bl_Prescribing
	Bl_Preparation/Dispensing

	Bl_Delivery
	Bl_Administration
	Bl_Storage
	Bl_Monitoring
	Bl_Presentation/Packaging
	Bl_Supply/Ordering
	Nut_Prescribing/Requesting
	Nut_preparation/Manufacturing/Cooking
	Nut_Supply/Ordering
	Nut_Presentation
	Nut_Dispensing/Allocation
	Nut_Delivery
	Nut_Administration
	Nut_Storage
	O2_Cylinder Labelling/Color Coding/PIN Indexing
	O2_Prescription
	O2_Administration
	O2_Delivery
	O2_Supply/Ordering
	O2_Storage
	Infra_Signage
	Device_medical device / equipment
	Beh staff/pt_Behaviour
	Acc_Pt accident
	Infra_Infrastructure / building fixture
	Resources / organisational management
	Fall__involving_Cot

	Fall__involving_Bed
	Fall__involving_Chair
	Fall__involving_Stretcher
	Fall__involving_Toilet
	Fall__involving_Therapeutic Equipment
	Fall__involving_Stairs/Steps
	Fall__involving_Being Carried/Supported by Another Individual
Why it went wrong 1	**Lookup Why it went wrong**
	Why it went wrong
	CA_Not Performed when Indicated
	CA_Incomplete/Inadequate
	CA_Unavailable
	CA_Wrong Patient
	CA_Wrong Process/Service
	CPP_Not Performed when Indicated
	CPP_Incomplete/Inadequate
	CPP_Unavailable
	CPP_Wrong Patient
	CPP_Wrong Process/Treatment/Procedure
	CPP_Wrong Body Part/Side/Site
	CPP_Not followed
	CPP_Actions not aligned with policy/procedure
	CPP_Actions not aligned with care plan
	CPP_Not done
	CPP_Not detected
	DocP_Document Missing or Unavailable
	DocP_Delay in Accessing Document

DocP_Document for Wrong Patient or Wrong Document
DocP_Absent/no information in Document
DocP_not done/actioned
DocP_Multiple versions
DocP_Unclear/Ambiguous/Illegible/Incomplete/Information in Document
HAIType_Bacteria
HAIType_Virus
HAIType_Fungus
HAIType_Parasite
HAIType_Protozoa
HAIType_Rickettsia
HAIType_Prion
Med_Not given when indicated
Med_Not indicated
Med_Not checked
Med_Wrong Patient
Med_Wrong Drug
Med_Wrong Dose/Strength of Frequency
Med_Wrong Formulation or Presentation
Med_Wrong Route
Med_Wrong Quantity
Med_Wrong Dispensing Label/Instruction
Med_Contraindication
Med_Wrong Storage
Bl_Wrong Patient
Bl_Wrong Blood/Blood Product
Bl_Wrong Dose/Frequency

	Bl_Wrong Quantity
	Bl_Wrong Dispensing Label/Instruction
	Bl_Contraindicated
	Bl_Wrong Storage
	Bl_Omitted Blood/Blood Product or Dose
	Bl_Expired Blood/Blood Product
	Nut_Wrong Patient
	Nut_Wrong Diet
	Nut_Wrong Quantity
	Nut_Wrong Frequency
	Nut_Wrong Consistency
	Nut_Wrong Storage
	Nut_Not given
	O2_Wrong patient
	O2_Wrong Gas/Vapor
	O2_Wrong Rate/Flow/Concentration
	O2_Wrong Delivery Mode
	O2_Contraindication
	Device_Poor Presentation/Packaging
	Device_Lack of Availability
	Device_Innapropriate for Task
	Device_Unclean/Unsterile
	Device_Failure/Malfunction
	Device_Dislodgement/Misconnection/Removal
	Device_Use Error
	BehStaff_Noncompliant/Uncooperative/Obstructive
	BehStaff_Inconsiderate/Rude/Hostile/Inappropriate

	BehStaff_Risky/Reckless/Dangerous
	BehStaff_Problem with Substance Use/Abuse
	BehStaff_Harassment
	BehStaff_Discrimination/Prejudice
	BehStaff_Wandering/Absconding
	BehStaff_Intended Self Harm/Suicide
	BehStaff_Verbal Aggression
	BehPatient_Noncompliant/Uncooperative/Obstructive
	BehPatient_Inconsiderate/Rude/Hostile/Inappropriate
	BehPatient_Risky/Reckless/Dangerous
	BehPatient_Problem with Substance Use/Abuse
	BehPatient_Harassment
	BehPatient_Discrimination/Prejudice
	BehPatient_Wandering/Absconding
	BehPatient_Intended Self Harm/Suicide
	BehPatient_Verbal Aggression
	Acc_Contact with Object or Animal
	Acc_Contact with Person
	Acc_Crushing
	Acc_Abrading/Rubbing
	Acc_Scratching/Cutting/Tearing/Severing
	Acc_Puncturing/Stabbing
	Acc_Biting/Stinging/Invenomating
	Acc_Other Specified Piercing/Penetrating Force
	Patient Accidents - Other Mechanical Force
	Acc_Struck by Explosive Blast
	Acc_contact with machinery

	Acc_Excessive Heat/Fire
	Acc_Excessive Cooling/Freezing
	Acc_Mechanical Threat to Breathing
	Acc_Drowning/Near Drowning
	Acc_Confinement to Oxygen-Deficient Place
	Acc_Poisoning by Chemical or Other Substance
	Acc_Corrosion by Chemical or Other Substance
	Acc_Exposure to Electricity/Radiation
	Acc_Exposure to Sound/Vibration
	Acc_Exposure to Air Pressure
	Acc_Exposure to Low Gravity
	Acc_Exposure to (effect of) Weather, Natural Disaster, or Other Force of Nature
	Fall_Trip/Stumble
	Fall_Slip
	Fall_Collapse
	Fall_Loss of Balance
	Infra_Non-Existent/Inadequate
	Infra_Damaged/Faulty/Worn
	Reso_Staff not avaliable
	Reso_Knowlegde and skills
	Reso_Matchinng of workload Management
	Reso_Bed/Service Availability/Adequacy
	Reso_Human Resource/Staff Availability/Adequacy
	Reso_Organization of Teams/People
	Reso_Protocols/Policy/Procedure/Guideline Availability/Adequacy
Incident Type 2	As Incident type 1

What went wrong 2	As 1
Why it went wrong 2	As 1
Incident type 3	As incident type 1
What went wrong 3	As 1
Why it went wrong 3	As 1
Other comments	Free text

Contributing Factors

Assigned Study ID	
Number of contributing factors	Free Text: # (number)
Contributing Factor ID	Free Text (Number)
Contributing Factor Text	Free Text
SEIPS Parent Category	**Lookup SEIPS levels** **SEIPS Levels** External Influences Organisation of work factors Person factors Task factors Tool and technology Physical environment

SEIPS Category	**Lookup SEIPS categories** **SEIPS categories** Societal influence (External influences) Macro-economic funding influences (External influences) Policy regulations & targets (External influences) Organisational Structure and governance (Organisational Factors) Culture Leadership and communication (Organisational Factors) Policy and Procedures (Organisational Factors) Workforce management (Organisational Factors) Competency management systems (Organisational Factors) Administration systems (Organisational Factors) Non/Clinical central services (Organisational Factors) Staff factors (Work - Tasks, People and actions) Care team factors (Work - Tasks, People and actions) Patient/Family and Carers factors (Work - Tasks, People and actions) Task design factors (Work - Tasks, People and actions) Workload factors (Work - Tasks, People and actions) Local Procedures Job aids (Equipment and surroundings) Equipment (Equipment and surroundings) Workspace (Equipment and surroundings) Other (Please Specify)
Potential Contributing factors (implicated not further considered in report)	Free text

Recommendations

Assigned Study ID	
Number of recommendations	Free Text: # (number)
Recommendation ID	Free Text (Number)
Recommendation Type/Strength	**Lookup Rec Type (Strength)**

Rec Type
Architectural/physical plant changes (including checking for hanging points) (Strong)
Standardize on equipment or process including benchmarking against other organizations (Strong)
New devices with usability testing (Strong)
Engineering control (forcing function) (Strong)
Tangible involvement by leadership (including establishing clinical governance) (Strong)
Simplify Process (Strong)
Policy/guidelines/ documentation etc. review/enhancement (Medium)
Audit undertaken (Medium)
Enhanced documentation, communication (Medium)
Review rostering/appropriateness of staff mix (Medium)
Re-evaluate use/approriatness of equipment (Medium)
Checklist/cognitive aids (Medium)
Standardized communication tools (Medium)
Software enhancements, modifiction (Medium)

	Education using simulatio based training, with periodic refresher sessions/observations (Medium) Increase in staffing/decrease in workload (Medium) Implement a new team eg MET Team initiated (excludes high level teams such as formed clinical governance) (Medium) Eliminate/reduce distractions (Medium) Redundancy (Medium) Eliminate look- and sound alikes (Medium) Training and Education (including counselling) (Weak) New procedure/memorandum/policy (Weak) Formal discussion/taken to meeting (Weak) Informing/Notifying/Warning (Weak) Double Checks (Weak) Warning (Weak) Other (Please Specify) No recommendations
Recommendation General Comments	Free text

IGZ Tool

This assesses adherence to guidance for patient safety investigation methods (e.g., investigation process and team, incident reconstruction, analysis, conclusion, recommendations, aftercare, and Board responses). A set of questions are applied to judge the quality of an investigation report. The questions are used to judge the quality of event analysis report. Points can be scored with each question. Sometimes a question is irrelevant, for example, 'Was external expertise consulted?', when external expertise would not add anything of value to the analysis. The total amount of points is divided by the total amount of relevant questions, leading to a percentage. This percentage is the overall score of the sentinel event analysis report. Scores for all reports can be aggregated to provide overall average score for a facility or healthcare service that produces reports.

IGZ Question	Answer	Provide Details
1. How soon after the event was identified did the investigation start?	Free Text	NA
2. Is the investigating committee Multidisciplinary?	Yes/No /NA/Insufficient Information	NA
3. Were any members of the investigating committee involved in the incident?	Yes/No /NA/Insufficient Information	NA
4. Was input sought from all personnel directly involved	Yes/No /NA/Insufficient Information	NA
5. Was input sought from other staff with knowledge about the care process?	Yes/No /NA/Insufficient Information	NA
6. Was input sought from the patient/relatives?	Yes/No /NA/Insufficient Information	Free text
7. Does the description of the event give a complete picture of the relevant "scenes"?	**Dropdown:** Brief (basic info insufficient for picturing the event); Moderate (good overview by lacking in some details for full understanding); Extensive (allowing full understanding and reconstruction of event);Insufficient information to assess	Free text
8. Has the question "why" been asked extensively enough to analyse the underlying cause and effect?	Yes/Partially/No /NA/Insufficient Information	Free text

9. Have the investigators searched relevant scientific literature?	Yes/No /NA	Free text
10. Does the report state whether the applicable guidelines/protocols were followed?	Yes/Partially/No /NA/Insufficient Information	Free text
11. Was external expertise consulted?	Yes/No /NA/Insufficient Information	Free text
12. Does the report state whether the medical indication for the provided care was correct?	Yes/No /NA/Insufficient Information	Free text
13. Do the contributing factors it the reconstruction and analysis?	Yes/Partially/No /NA/Insufficient Information	Free text
14. Are contributing factors, not under the control of the hospital, considered and/or identified?	**Dropdown:** • Yes (factors external to hospital are considered and identified as contributory where appropriate) • Partial (some factors beyond the hospital are mentioned but not identifed as contributory) • No • NA • Insufficient information to assess	Free text
15. Does the report document recommendations for improving processes and systems?	Yes/Partially/No /NA/Insufficient Information	Free text
16. Do these corrective actions address the identified root causes?	Yes/Partially/No /NA/Insufficient Information	Free text
17. Have the corrective actions been formalised? (e.g., Specific, Measurable, Attainable, Realistic and Time-Sensitive (SMART)	Yes/Partially/No /NA/Insufficient Information	Free text
18. Does the hospital have an evaluation plan to determine if the recommendations are implemented?	Yes/Partially/No /NA/Insufficient Information	Free text
19. Will the impact of the recommendations be evaluated?	Yes/Partially/No /NA/Insufficient Information	Free text

Aftercare		
20. Is the aftercare for the patient/relatives described?	Yes/Partially/No /NA/Insufficient Information	Free text
21. Is the aftercare for the professionals involved described?	Yes/Partially/No /NA/Insufficient Information	Free text
22. Has the report been shared with the patient/relatives?	Yes/No /NA/Insufficient Information	Free text
23. Is the reaction of hospital board adequate?	Yes/No /NA/Insufficient Information	Free text
Any other notes	Free text	NA

Learning Response Review and Improvement Tool

The tool from NHS Education for Scotland studies[34, 35] critically reviews written reports. The tool was developed to (1) identify potential areas for improvement in existing reports to feed back to organisations; (2) Inform future learning response training and report writing practices; (3) Act as a potential quality assurance process for monitoring, evaluating and improving the standard of organisational learning response reports.

Area of Review (descriptor)	Rating Score (Dropdown)	Comments / examples of text quotes
1. People affected by incidents are meaningfully engaged and involved The report demonstrates evidence that all those affected by the incident such as staff, patients, families and carers have been actively listened to and emotionally supported where required (i.e., interviews and perspectives of those affected are included in the report).	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
2. The systems approach is applied The report demonstrates consideration of system-based performance influencing factors (e.g., task complexity, technology, work procedures, workplace design, information transfer, clinical condition of patient, stress, fatigue, culture, leadership/ management, policy/regulation) and how these interacted to contribute to the incident in question.	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
3. Human Error' is considered as a symptom of a system problem 'Human error' or similar (e.g., nurse error, medical error, loss of situation awareness) is not concluded to be the cause' of the incident. Instead, multiple contributory factors which influenced the event are explored.	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
4. Blame language is avoided Language does NOT directly or indirectly infer blame of individuals, teams, departments, or organisations and/or focus on human failure (i.e., the nurse failed to follow policy; the doctor lost situation awareness).	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text

5. Local rationality is considered The report clearly explains why the decisions and actions taken by individuals involved felt right at the time (i.e., the situation and context faced by those individuals is explored and described).	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
6. Counterfactual reasoning is avoided The report focuses on what happened and understanding why and NOT what people, departments or organisations 'could' or 'should' have done during or before the incident.	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
7. Safety actions/recommendations are effective Safety actions/recommendations proposed: • have been developed collaboratively with relevant staff/stakeholders and with consideration of wider organisation priorities and improvement work • focus on system elements (IT, equipment, care processes/pathways) not individuals • are specific, robust and actionable i.e., they don't add to 'safety clutter' • are accompanied by a plan to monitor progress over time • are demonstrably linked to the evidence and findings in the report	• Good evidence • Some/Partial Evidence • No evidence • NA • Insufficient information to assess	Free Text
8. The written report is clear, easy to read and anonymised The report is concise, written in plain English, uses inclusive language and anonymised i.e., it is written to 'inform rather than impress	• Good • Average • Poor • NA • Insufficient information to assess	Free Text
General comments: Is there anything else that can be improved or content that you thought worked well and should be used in other reports	Free Text	