

Using Data, To Make Workflows Smarter

Streamlining Healthcare Associated Surgical Site Infection (SSI) Surveillance Reporting

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Infectious Disease Data Team**



the**Alfred**

No conflict of interest

Part of **AlfredHealth**

The Impact of Surgical Infections

- SSIs are one of the most common complications related to surgery
- **3%** of surgical patients in Australia may experience an SSI
- Diagnosis of SSI contributes to length of hospital stay and mortality
- Estimated more than **16,500** cases of SSI in Australia annually
- Average cost per patient when diagnosed is more than **\$18,800**

(Royle et al., 2023)

Surgical Site **Infections** **and Surveillance**

- Includes review and reporting of surgical infections
 - Application of specific assessment definitions
 - Monitoring period is between 30-90 days
 - Allows benchmarking between organisations
 - Review of local practice

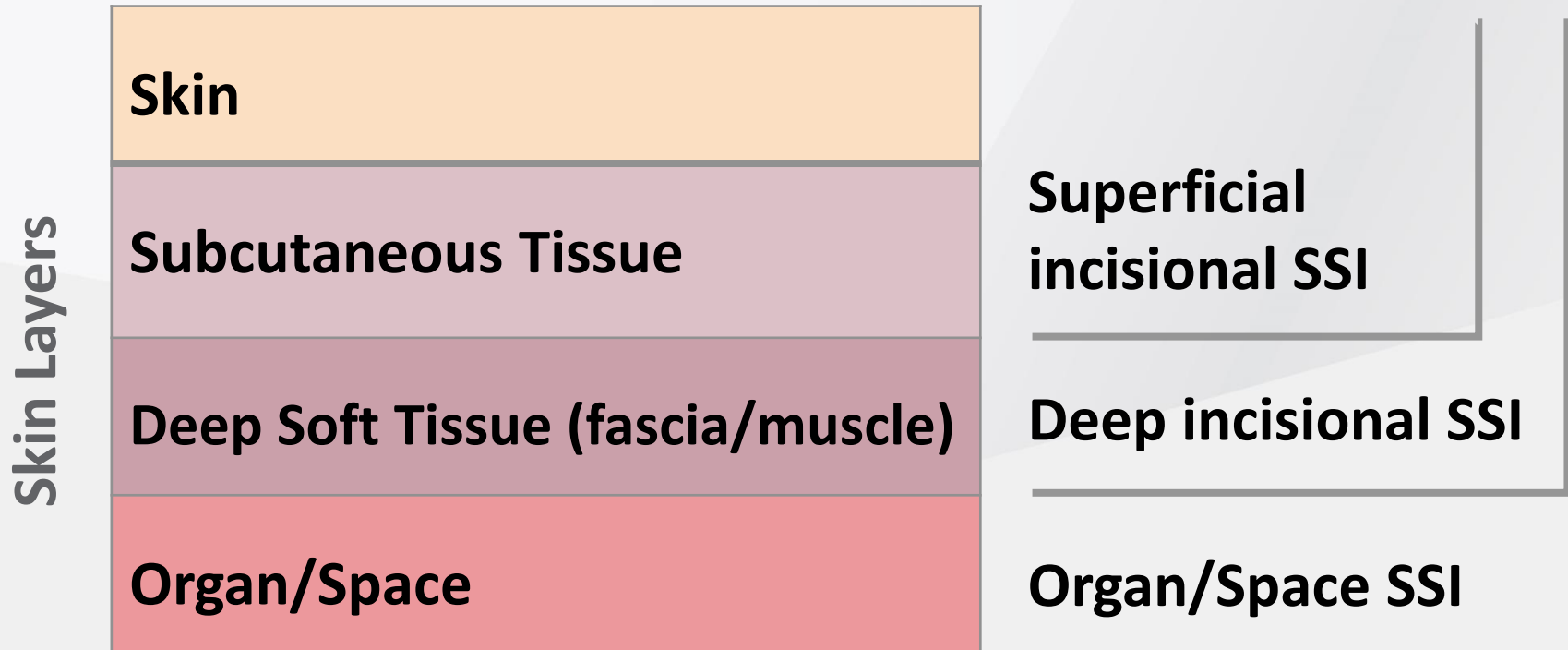


The Surveillance Data

- Surveillance reviews occur in hospitals with >100 beds
- Public and Private Hospitals are required to participate
- Data submitted to an independent state-wide centre (VICNISS)
- Data is risk adjusted to allow benchmarking

(VICNISS, 2023)

The Classification Criteria



The Alfred

- One of Australia's busiest Emergency and Trauma centres
- Victoria's largest Intensive Care Unit
- 18 state-wide services
- Elective & Emergency surgery
- 3 Operating Suite sites



The Analysis

- Cardiothoracic, Orthopaedic and Colorectal SSI reviews
- Surgical Site Infection appraisals are often time-consuming
- Reviews require inspection of large volumes of documentation
- Each assessment requires risk identification and appraisal
- Streamlining systems became a priority for our service

The **Modifications**

- Collaboration with our in-house data team at Alfred Health
- Development of an electronic database
- Automation and auto population of surveillance forms
- Funding for full-time role, with primary focus on Surveillance

Denominator form

Surgical Procedure (Denominator)

THIS DATA MUST BE SUBMITTED ONLINE USING A VICNISS WEBFORM

Patient & Procedure Details		Hospital name:		MRN (UR No.):	
Sex:	<input type="checkbox"/> M <input type="checkbox"/> F <input type="checkbox"/> O	DOB:	Admit Date:	Discharge Date:	
Procedure Group:	<input type="checkbox"/> AAA <input type="checkbox"/> BRST <input type="checkbox"/> CBGB <input type="checkbox"/> CHOL <input type="checkbox"/> CRAN <input type="checkbox"/> FPOP <input type="checkbox"/> GAST <input type="checkbox"/> HPRO <input type="checkbox"/> KPRO <input type="checkbox"/> PACE <input type="checkbox"/> VHYS <input type="checkbox"/> APPY <input type="checkbox"/> CARD <input type="checkbox"/> CBGC <input type="checkbox"/> COLO <input type="checkbox"/> CSEC <input type="checkbox"/> FUSN <input type="checkbox"/> HERN <input type="checkbox"/> HYST <input type="checkbox"/> LAM <input type="checkbox"/> SB <input type="checkbox"/> VSHN				
ACHI codes/s:		OR MBS Code/s:		OR Name of Procedure:	
Procedure Date:	Start Time ¹ :	<input type="checkbox"/> NA	Finish Time ¹ :	<input type="checkbox"/> NA	Surgeon (coded):
ASA Score: 1 2 3 4 5 NA	Wound Class: C CC CO D NA	Height (metres):	<input type="checkbox"/> NA	Weight (kg):	<input type="checkbox"/> NA
General Anaesthesia:	<input type="checkbox"/> Y <input type="checkbox"/> N	Emergency:	<input type="checkbox"/> Y <input type="checkbox"/> N	Diabetes Mellitus:	<input type="checkbox"/> Y <input type="checkbox"/> N
Closure Technique:	<input type="checkbox"/> Primary <input type="checkbox"/> Non-primary	Laparoscope:	<input type="checkbox"/> Y <input type="checkbox"/> N	Robotic Assist:	<input type="checkbox"/> Y <input type="checkbox"/> N
HPRO/KPRO/BRST/HERN:		<input type="checkbox"/> Left <input type="checkbox"/> Right	Bilateral/2 Incisions ²	CSEC: Duration of Labour (hours):	_____ or <input type="checkbox"/> No labour
HPRO/KPRO: (select one) <input type="checkbox"/> Total <input type="checkbox"/> Partial <input type="checkbox"/> Resurfacing (HPRO only)					
(select one) <input type="checkbox"/> Primary <input type="checkbox"/> Revision – if revision, was it associated with prior infection at index joint? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA					
FUSN: Approach/Technique: <input type="checkbox"/> Anterior <input type="checkbox"/> Posterior <input type="checkbox"/> Anterior & Posterior <input type="checkbox"/> NA					
Spinal Level: <input type="checkbox"/> Atlas-axis <input type="checkbox"/> Atlas-axis/Cervical <input type="checkbox"/> Cervical <input type="checkbox"/> Cervical/Dorsal/Dorsolumbar <input type="checkbox"/> Dorsal/Dorsolumbar <input type="checkbox"/> Lumbar/Lumbosacral <input type="checkbox"/> NA					
Surgical Antimicrobial Prophylaxis (SAP)		Prophylactic Antibiotic Administered: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			
Antibiotic (Generic name)	Dose (mg)	Route	Time of Administration		Antibiotic Continued:
			Time Given	If exact time not given, tick box below	Beyond end of surgery <input type="checkbox"/> If yes, >24hrs post-op <input type="checkbox"/>
1 st Dose:					
			<input type="checkbox"/> >1hr prior to incision <input type="checkbox"/> Within 1hr prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
			<input type="checkbox"/> >1hr prior to incision <input type="checkbox"/> Within 1hr prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
			<input type="checkbox"/> >1hr prior to incision <input type="checkbox"/> Within 1hr prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
Vancomycin ³	<input type="checkbox"/> Y <input type="checkbox"/> N		<input type="checkbox"/> >120min prior to incision <input type="checkbox"/> >15 to <120mins prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> <15mins prior to incision <input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
Clindamycin ³	<input type="checkbox"/> Y <input type="checkbox"/> N		<input type="checkbox"/> >120min prior to incision <input type="checkbox"/> >15 to <120mins prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
Gentamycin ³	<input type="checkbox"/> Y <input type="checkbox"/> N		<input type="checkbox"/> >120min prior to incision <input type="checkbox"/> >15 to <120mins prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
Metronidazole ³	<input type="checkbox"/> Y <input type="checkbox"/> N		<input type="checkbox"/> >120min prior to incision <input type="checkbox"/> >15 to <120mins prior to incision <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> On induction <input type="checkbox"/> After incision <input type="checkbox"/> NA	
2 nd Dose:					
Did the surgery continue >4hrs after initial antibiotic pre-operative dose? <input type="checkbox"/> Yes <input type="checkbox"/> No					
If yes, was the redosing of Cephazolin 4hrs from the initial preoperative dose? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required ⁴ <input type="checkbox"/> NA					
Other Antibiotic		In addition to SAP (listed above), was the patient receiving antibiotics prior to surgery (last 24hrs)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA			
Antibiotic (Generic name)	Dose (mg)	Route	Time of Administration		
			Time Given (last dose before surgery)	If exact time not available, tick a box below	
			<input type="checkbox"/> <1hr prior to incision <input type="checkbox"/> >4 - <12hrs prior to incision		
			<input type="checkbox"/> >1- <4hrs prior to incision <input type="checkbox"/> >12 hr prior to incision		
			<input type="checkbox"/> <1hr prior to incision <input type="checkbox"/> >4 - <12hrs prior to incision		
			<input type="checkbox"/> >1- <4hrs prior to incision <input type="checkbox"/> >12 hr prior to incision		
Outcome		Infection Detected: <input type="checkbox"/> Yes <input type="checkbox"/> No		Date of Event (Infection Date):	
CBGB Only:		Infection Site (s) ⁵ : <input type="checkbox"/> Chest <input type="checkbox"/> R Radial <input type="checkbox"/> L Radial <input type="checkbox"/> R saphenous <input type="checkbox"/> L saphenous			

- If bilateral/2 incisions HPRO/KPRO/BRST/HERN procedures are performed concurrently, duration of procedure should be inclusive of both procedures e.g., left and right procedures. If performed sequentially and there are two procedure durations documented, submit the longest duration or if only one procedure duration divide by two and record half the entire duration.
- Tick if two procedures (from the same procedure group) requiring 2 incisions were performed at the same time, e.g., left and right KPRO, umbilical and femoral HERN
- Vancomycin, clindamycin, gentamicin & metronidazole – to accurately assess administration compliance the estimated start time intervals are specific to these antibiotics
- Select 'Not Required' in settings where creatinine clearance <10ml/min (or eGFR <10) and antibiotic re-dosing is not required.
- For CBGB procedures only – indicate all infection sites and complete a separate Surgical Site Infection (Numerator) Form for each infection.



Numerator form

Surgical Site Infection (Numerator)

THIS DATA MUST BE SUBMITTED ONLINE USING A VICNISS WEBFORM

Patient & Procedure Details		Hospital name:	
MRN (UR No.):	DOB:	Procedure Date:	
Procedure Group: <input type="checkbox"/> AAA <input type="checkbox"/> CARD <input type="checkbox"/> CHOL <input type="checkbox"/> CSEC <input type="checkbox"/> GAST <input type="checkbox"/> HYST <input type="checkbox"/> PACE <input type="checkbox"/> VHSN <input type="checkbox"/> APPY <input type="checkbox"/> CBGB <input type="checkbox"/> COLO <input type="checkbox"/> FPOP <input type="checkbox"/> HERN <input type="checkbox"/> KPRO <input type="checkbox"/> SB <input type="checkbox"/> BRST <input type="checkbox"/> CBGC <input type="checkbox"/> CRAN <input type="checkbox"/> FUNS <input type="checkbox"/> HPRO <input type="checkbox"/> LAM <input type="checkbox"/> VHYS			
Infection Details and Outcome		Date of Event (Infection Date):	
Infection Detected: <input type="checkbox"/> During admission <input type="checkbox"/> Readmission (where procedure performed) <input type="checkbox"/> Readmission to other facility <input type="checkbox"/> Post discharge surveillance <input type="checkbox"/> HITH			
Infection Type: <input type="checkbox"/> Superficial incisional <input type="checkbox"/> Deep incisional <input type="checkbox"/> Organ/Space			
If yes for Organ/Space infection, what was the Organ/Space Site: <input type="checkbox"/> Arterial or venous infection (VASC) <input type="checkbox"/> Myocarditis or pericarditis (CARD) <input type="checkbox"/> Breast abscess or mastitis (BRST) <input type="checkbox"/> Other infections of the lower respiratory tract (LUNG) <input type="checkbox"/> Disc space infection (DISC) <input type="checkbox"/> Osteomyelitis (BONE) <input type="checkbox"/> Endocarditis (ENDO) <input type="checkbox"/> Other infection of the male or female reproductive tract (OREP) <input type="checkbox"/> Endometritis (EMET) <input type="checkbox"/> Periprosthetic joint infection (PJI) <input type="checkbox"/> Gastrointestinal tract (GIT) <input type="checkbox"/> Sinusitis (SINU) <input type="checkbox"/> Intracranial infection (IC) <input type="checkbox"/> Spinal abscess without meningitis (SA) <input type="checkbox"/> Intraabdominal, not specified elsewhere (IAB) <input type="checkbox"/> Urinary system infection (USI) <input type="checkbox"/> Mediastinitis (MED) <input type="checkbox"/> Vaginal cuff infection (VCUF) <input type="checkbox"/> Meningitis or ventriculitis (MEN)			
Infection Present at time of surgery (PATOS): <input type="checkbox"/> Yes <input type="checkbox"/> No			
CBGB only: Infection Site(s): <input type="checkbox"/> Chest <input type="checkbox"/> L Radial <input type="checkbox"/> R Radial <input type="checkbox"/> L Saphenous <input type="checkbox"/> R Saphenous			
Bilateral/2 Incision Procedures Only: Location of Infection: <input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Other (specify): _____			
Pathogen Details			
Pathogen Isolated: <input type="checkbox"/> Yes <input type="checkbox"/> No		Name of pathogen/s: 1. _____ If listed below, complete antimicrobial susceptibility. 2. _____ 3. _____	
Antimicrobial Susceptibility – see over page			

Surgical Site Infection (Numerator)

Antimicrobial Susceptibility - Record: S=Susceptible, I=Intermediate, R=Resistant*, or U=Unknown														
Gram Positive Organisms	Cefazolin	Ciprofloxacin	Clindamycin	Daptomycin	Doxycycline	Flucloxacillin	Gentamicin - high level test	Linezolid	Mertiolin	Minocycline	Moxifloxacin	Oxacillin	Penicillin	Trimethoprim/Sulfamethoxazole
CNS (all species)														
Enterococcus faecium														
Enterococcus faecalis														
Enterococcus spp.														
Staphylococcus aureus														
Antimicrobial Susceptibility - Record: S=Susceptible, I=Intermediate, R=Resistant*, or U=Unknown														
Gram Negative Organisms	Ampicillin	Amoxicillin-Clavulanic Acid	Ampicillin	Aztreonam	Cefepime	Ceftriaxone	Ceftazidime	Ceftiofur	Ceftiofur	Cefuroxime	Colistin	Doxycycline	Ertapenem	Gentamicin
Acinetobacter spp.														
Escherichia coli														
Enterobacter spp.														
Klebsiella spp.														
Pseudomonas aeruginosa														
Serratia marcescens														
Antimicrobial Susceptibility - Record: S=Susceptible, R=Resistant, I=Intermediate, U=Unknown, or S-DD= Susceptible-dose dependent*														
Candida Species (specify name of organism if available)	Amphotericin	Capofungin	Fluconazole	Itraconazole	Miconazole	Posaconazole	Voriconazole							
Candida _____														
Candida _____														


Note:

(VICNISS, 2023)




theAlfred

REDCap Database

Actions:  Download PDF of instrument(s) ▾


 [Video: Basic data entry](#)

Procedure Details







 Editing existing Record ID 621343.

Record ID 621343

Patient Details

Case number	<input type="text" value="1"/>	MRN	<input type="text"/>
Surname	<input type="text"/>	Gender	<input type="radio"/> M <input type="radio"/> F
Date of Birth	<input type="text"/>  D-M-Y		
Height	<input type="text"/>	Weight	<input type="text"/>
BMI	<input type="text"/>		

Hospital Details

Hospital ID	<input type="radio"/> 495 (Sandringham) <input type="radio"/> 705 (Alfred) <input type="radio"/> 999 (Other Location)		
Admission Date	<input type="text"/>  D-M-Y	Discharge Date	<input type="text"/>  D-M-Y
Procedure Start Date Time	<input type="text"/>   D-M-Y H:M	Procedure Finish Date Time	<input type="text"/>   D-M-Y H:M
Procedure Group Name	<input type="radio"/> CBGB <input type="radio"/> HPRO <input type="radio"/> KPRO <input type="radio"/> COLO <input type="radio"/> Incorrect MBS code/does not meet criteria	MBS Item Number	<input type="text"/>
Procedure Description	<div></div>		
Wound Class	<input type="text"/>	ASA Score	<input type="text"/>
Has Diabetes Mellitus?	<input type="radio"/> Yes <input type="radio"/> No	Is laparoscopic	<input type="radio"/> Yes <input type="radio"/> No
Is a Robotic Assisted Surgery?	<input type="radio"/> Yes <input type="radio"/> No	Is a Trauma Patient?	<input type="radio"/> Yes <input type="radio"/> No
General Anaesthesia Used	<input type="radio"/> Yes <input type="radio"/> No	Is an Emergency Procedure?	<input type="radio"/> Yes <input type="radio"/> No
Closure Technique	<input type="text"/>		

Unit



Antibiotic Prophylaxis

Is Prophylactic Antibiotic Given?



☐ Yes ☐ No

reset

Part of **AlfredHealth**

Record ID	
Procedure Details	Hospital Name:
MRN:	Date of Birth:
Procedure Group:	CBGB
Infection Details and Outcome	Date of Event (Infection Date):
	D-M-Y
Infection Detected: <input checked="" type="radio"/> During admission <input type="radio"/> Readmission (where procedure performed) <input type="radio"/> Readmission to other facility	
Infection Type: <input checked="" type="radio"/> Superficial incisional <input type="radio"/> Deep incisional <input type="radio"/> Organ/Space	
If "Yes" for Organ/Space infection, what was the Organ/Space Site:	
Infection present at the time of surgery (PATOS):	<input type="radio"/> Yes <input checked="" type="radio"/> No
CBGB only: Infection Site (s): <input checked="" type="radio"/> Chest <input type="radio"/> L Radial <input type="radio"/> R Radial <input type="radio"/> L Saphenous <input type="radio"/> R Saphenous	
Note: Indicate infection site this form relates to. Complete a separate Surgical Site Infection (Numerator) form for each infection site.	
Bilateral/ 2 Incision procedures only: Location of Infection: <input type="radio"/> Left <input type="radio"/> Right <input type="radio"/> Other	
If Other- specify: <input type="text"/>	
Pathogen Details	
Pathogen Details	
Pathogen isolated:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Form Status	
Complete?	<input type="button" value="Complete"/> <input type="button" value="Cancel"/>

REDCap Database

Incident Details

Identify the Incident Wound Swab

Incident Date/Collection Date 31 D-M-Y

Completed Date 31 D-M-Y

Wound swab: Site Sternum

Wound swab: Result Positive

Investigated?

Investigation details

Investigation Date

Investigation Comments

IS HA infection detected? Y

Confirmation Date

Save your changes?

Are you sure you wish to leave this page? **If you have made any data changes on this page, they will be lost if you leave without saving them.** Below you may choose to 1) save your changes and leave the page, 2) abandon your changes and leave the page, or 3) stay on the current page.

[Save changes and leave](#) [Leave without saving changes](#) [Stay on page](#)

Expand

The Notification Process

Data
team run
report



New
laboratory
specimens
identified



Alert
email sent
to
clinicians

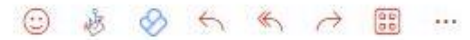


Email Notification – Patient Requiring Review

Potential CBGB Infection - Please Review



SSI Incident Alert <datateam-idunit@alfred.org.au>



To: Infection Prevention - All Staff

Cc: Infectious Diseases Data Team

Dear IP

An incident has occurred that could be a marker for a surgical site infection - please review the following patient and the incident by accessing and documenting the review in the link below. Once reviewed document either the absence or presence of infection.

Please only select yes for the field "infection identified" if it meets the SSI definition and not for unrelated/unsurveilled infections.

MRN	Facility	Procedure Type	Procedure Start Date Time	Incident Type	Incident Date
		CBGB		Wound Swab	

Please review using this link: [SSI Review](#)

Kind regards,
Data Team

The Outcomes

- Development of electronic database
- Timely laboratory specimen notification
- Streamlining data submission to Victorian Coordinating Centre
- Tailored workflows based on hospital specific surveillance
- Maintenance of patient confidentiality and privacy



Pexels

The Future

- Additional streamlining of existing REDCap database
- Plan to automate isolate notification dates (30 - 90 days)
- Development of automated stakeholder correspondence email
- Streamlining information communication and distribution
- Further research and development into electronic surveillance

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