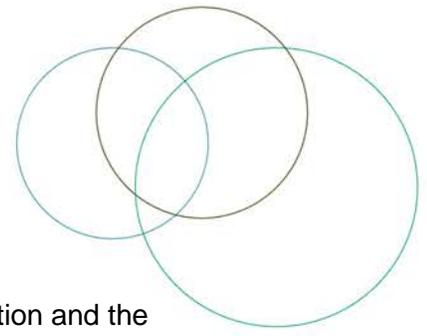


HOSPITAL HARM IMPROVEMENT RESOURCE

# Laceration/Puncture



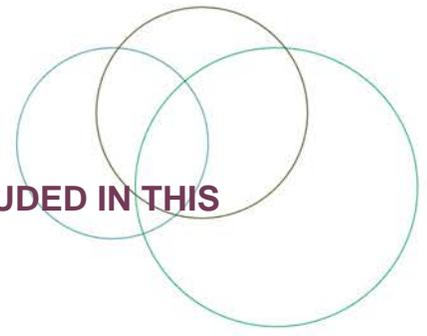
## ACKNOWLEDGEMENTS



The Canadian Institute for Health Information and the Canadian Patient Safety Institute have collaborated on a body of work to address gaps in measuring harm and to support patient safety improvement efforts in Canadian hospitals.

The Hospital Harm Improvement Resource was developed by the Canadian Patient Safety Institute to complement the Hospital Harm measure prepared by the Canadian Institute for Health Information. It links measurement and improvement by providing resources that will support patient safety improvement efforts.



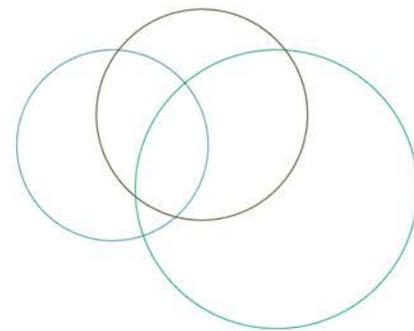


## DISCHARGE ABSTRACT DATABASE (DAD) CODES INCLUDED IN THIS CLINICAL CATEGORY:

### D21: Laceration/Puncture

<b>Concept</b>	Unintentional or accidental cut, puncture or perforation during a medical or surgical procedure
<b>Selection criteria</b>	
T81.2	Identified as diagnosis type (2)
<b>Codes</b>	<b>Code descriptions</b>
T81.2	Accidental puncture and laceration during a procedure, not elsewhere classified





## OVERVIEW AND IMPLICATIONS

### Laceration/Puncture

Surgery and other invasive procedures carry risk of complication and mortality (Magee et al., 2018). Unintentional or accidental cuts, punctures or perforations can occur in both surgical and medical procedures. A 10-year review of medico-legal cases in Canada between 2004 and 2013 found that incidents of **laceration, puncture**, hemorrhage and burns accounted for 66 per cent of surgical incidents reported to the Canadian Medical Protective Association and 44 per cent of surgical incidents reported to the Healthcare Insurance Reciprocal of Canada (Canadian Medical Protective Association (CMPA) & Healthcare Insurance Reciprocal of Canada (HIROC), 2016). A review of high harm events reported to Pennsylvania Patient Safety Reporting System (PA-PSRS) as a complication following surgery or invasive procedure, revealed that more than a third of the cases (n=34/101) involved punctures, lacerations, or tears (Magee et al., 2018). A review of a sample of reports submitted to PA-PSRS involving unintended lacerations or punctures during surgery found that 78 per cent of the reports described injuries to the colon (mostly during colonoscopy), the bladder (mostly during hysterectomy), or the uterus (mostly during hysteroscopy).

A search of publicly available patient safety alerts revealed the following examples of accidental lacerations and punctures:

- bladder laceration during a cesarean section (Wallace, 2016)
- splenic laceration during a colonoscopy which required an emergent splenectomy (Magee et al., 2018)
- pulmonary artery laceration during robotic-assisted lobectomy (Dubeck, 2014)
- injury to the heart and stomach during the placement of the chest tubes (Pennsylvania Patient Safety Authority, 2007)
- tear to a child's atrium upon post-operative removal of an atrial pacing wire (McClurken, 2006)
- stomach perforation and subsequent needle decompression resulted in a lacerated liver, during an endoscopy procedure (Manitoba Health, Healthy Living & Seniors (MHLS), 2017)
- rectal perforation related to use of a glycerin enema (Japan Council for Quality Health Care, 2007)

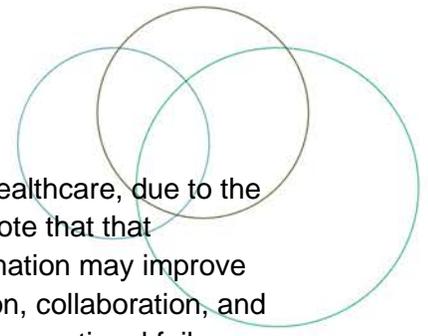
### Potential causes of accidental laceration/puncture

A search of patient safety reporting/alert systems revealed that the potential causes of accidental laceration/puncture during a medical or surgical procedure may include:

#### Distractions

Distraction is a threat to patient safety. Distraction is defined as having one's attention drawn or directed "to a different object or in different directions at the same time." The impact of distraction is influenced by multiple variables, including the characteristics of the primary task, the





distractions themselves, and the environment. Distractions are expected in healthcare, due to the constant communication and coordination that is required. It is important to note that that distraction due to interruptions that are purposeful and share important information may improve care by appropriately refocusing attention and improving problem identification, collaboration, and communication. However, distractions due to non-purposeful interruptions or operational failures that impair performance and contribute to error are concerning and risk patient safety.

Distraction is particularly detrimental to performance of complex tasks that require high levels of cognitive processing. Such tasks are encountered often in the operating room (OR) due to the complex nature of each work system factor: the physical environment, teamwork and communication, tools and technology, tasks and workload, and organizational processes. Even minor distractions in the OR can have a cascade effect that ultimately results in major events and patient harm. Engagement of surgeons and multidisciplinary teams is necessary to address the problem of distractions in the OR (Feil, 2014).

### Equipment Related

From simple lighting to technologically-advanced medical devices and surgical instruments, medical equipment is integral to the delivery of quality patient care. Although the potential for patient safety incidents related to equipment malfunction or failure exists, such incidents can be difficult to predict or prevent.

During a CMPA review of medico-legal cases arising from equipment problems, three predominant equipment-related issues were identified:

1. equipment malfunctions and failures;
2. wrong application, improper use, or unapproved use of equipment during a procedure or during medication delivery by physicians and other healthcare professionals; and
3. new equipment issues, including training and supervision deficiencies.

Patient injury resulting from equipment-related misadventures was a recurrent theme. Burns, **lacerations, and perforations** were the most prevalent injuries.

Examples of equipment deficiencies during a procedure include:

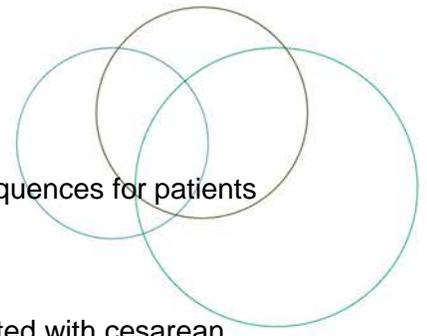
1. breakage of surgical instruments (e.g. needles, scalpel blades)
2. malfunctioning equipment or equipment failure (e.g. misfiring of a stapler)
3. defective equipment (e.g. rupture of a catheter balloon)
4. detachment of equipment (e.g. ureteric stone basket)

(CMPA, 2012)

### Central Line Related

Central lines are widely and effectively used in clinical medicine. The cannulation of major veins allows physicians to manage and monitor inpatients and outpatients. The ability to place these lines safely crosses many specialties and includes trainees. Complications such as vessel **laceration**, pneumothorax, neurological injury, **atrial perforation**, retroperitoneal hematoma,





venous thrombosis, and infection are infrequent, but can have serious consequences for patients (CMPA, 2011).

### **Fetal Lacerations Associated with Caesarean Section**

The Pennsylvania Health Authority has reported on fetal lacerations, associated with cesarean sections. Most of the lacerations were reported to be superficial, however some have required suturing and/or plastic surgery intervention. Risk factors identified with these patient safety incidents were: ruptured membranes prior to C-section, low transverse uterine incision, active labour, emergency/urgent C-section, inexperience of the surgeon (Pennsylvania Patient Safety Authority, 2004a).

### **Lacerations from scissor-related injuries**

Lacerations have resulted from scissor-related injuries obtained during the provision of care. Scissor-related injuries have ranged from superficial nicks to lacerations requiring closure with adhesive strips or sutures. An analysis of the circumstances involved in these reports indicates the following patterns. Difficulty removing adhesive tape (during IV or dressing changes) was documented in 38 per cent of the reports, while removing patient identification bands was involved in 31 per cent of the reports. Other factors cited in these reports included: bandage removal; obstructed view of the area in which scissors were used; and use of scissors when other equipment may have been safer (such as using scissors to remove excessive hair from an area) (Pennsylvania Patient Safety Advisory, 2004b).

### **Puncture from chest tube insertion**

The insertion of a chest tube is required to remove air, blood, pus or fluid from the pleural cavity, and is used in patients with a collapsed lung, malignancies, chest trauma or after surgery. Improper insertion of a chest drain may puncture major organs such as heart, lungs, liver and spleen, causing significant harm to the patient. Common themes from a review of incidents include: supervision of junior doctors and levels of experience of clinicians inserting chest drains; failure to follow manufacturer's instructions; improper selection of the site of insertion, poor positioning; improper use of dilators; anatomical anomalies and the patient's clinical condition; inadequate pre procedural or post placement imaging; lack of knowledge of existing clinical guidelines for chest tube insertion (National Patient Safety Agency (NPSA), 2008).

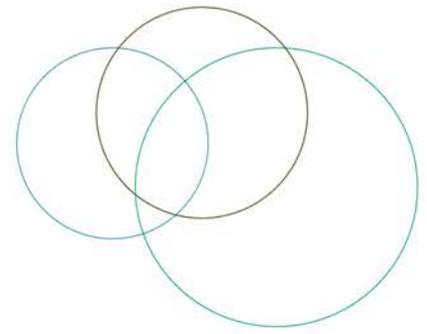
## **GOAL**

Reduce the incidence of inadvertent laceration/puncture.

## **IMPORTANCE FOR PATIENTS AND FAMILIES**

Unintentional punctures or lacerations during surgical or medical procedures may cause unintended injuries or death. With appropriate interventions and appropriate reporting and related learning, such incidents may be reduced or prevented. Effective communication with patients and their families, including disclosure discussions when injuries occur is an important aspect of improvement efforts for safer surgical care (Lefebvre et al., 2018).





## Patient Stories

### Felecia Gerardi: No one would listen!!

Connecticut Center for Patient Safety

“...following a routine laparoscopic hysterectomy, I knew there was a problem. A very disgusting odor discharge was coming out my body. No tests were ordered and I was catheterized three days after the initial surgery. Dr McDonnell who performed my surgery knew that I was still in the hospital but didn't come to see me till Tuesday. She called in a Urologist who discovered I had a severed right ureter. I was brought to the O.R. opened up he discovered pus pockets in my abdomen. I could not be repaired at this time so he had a tube placed in my right kidney to drain the urine.

I was getting sicker and sicker. I kept asking why am I still leaking stuff and why is it green? Could I have an intestinal leak? My doctor and others brought in on my case treated me as if I were crazy. Finally eight or nine days later when I tried to eat a piece of food it came out clumpy green stuff. I insisted on being tested; looked like feces to me. Only then did they test me and I was right - there were two holes in my small intestine.

I was in the fight for my life. What was supposed to be a one-day surgery had become 30 days hospitalized; tubes, and bags for five months and several more repair surgeries were required. I still have chronic pain from a large piece of mesh that had to be put into my abdomen from developing a surgical hernia, and I have a lot of fear of ending up back in the hospital. I've already been back for an obstruction in my bowel because of scar tissue from all my repair surgeries which can happen again. This experience has given me a determination to work for patients' voices to be heard!!” (Connecticut Center for Patient Safety, n.d.).

## CLINICAL AND SYSTEM REVIEWS, INCIDENT ANALYSES

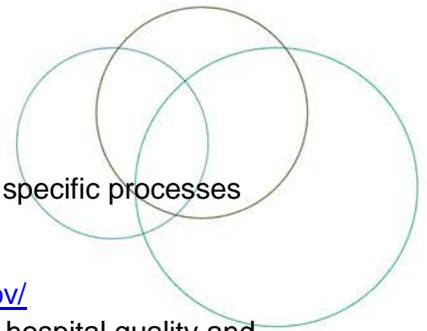
Given the broad range of potential causes of laceration/puncture, clinical and system reviews should be conducted to identify potential causes and determine appropriate recommendations.

Occurrences of harm are often complex with many contributing factors. Organizations need to:

1. Measure and monitor the types and frequency of these occurrences.
2. Use appropriate analytical methods to understand the contributing factors.
3. Identify and implement solutions or interventions that are designed to prevent recurrence and reduce risk of harm.
4. Have mechanisms in place to mitigate consequences of harm when it occurs.

To develop a more in-depth understanding of the care delivered to patients, chart audits, incident analyses and prospective analyses can be helpful in identifying quality improvement opportunities. Links to key resources for [conducting chart audits](#) and [analysis methods](#) are included in the [Hospital Harm Improvement Resources Introduction](#).

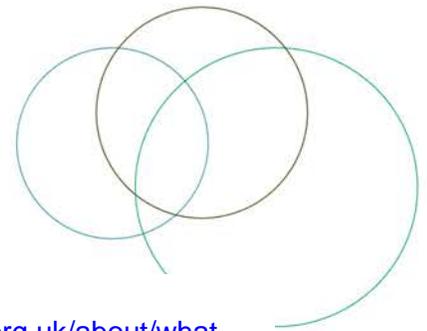




If your review reveals that your cases of laceration-puncture are linked to specific processes or procedures, you may find these resources helpful:

- **Agency for Healthcare Research and Quality** - <https://www.ahrq.gov/>
  - Toolkit for using the AHRQ quality indicators: How to improve hospital quality and safety. Selected best practices and suggestions for improvement PSI 15: Accidental puncture or laceration (Last reviewed 2017).  
[https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/systems/hospital/gito/olkit/combined/d4l\\_combo\\_psi15-accidentalpuncturelaceration-bestpractices.pdf](https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/systems/hospital/gito/olkit/combined/d4l_combo_psi15-accidentalpuncturelaceration-bestpractices.pdf)
- **Association of periOperative Nurses (AORN)** - [www.aorn.org](http://www.aorn.org)
  - Can you hear me? 3 Reminders to reduce OR distractions. (2019). Available at <https://www.aorn.org/about-aorn/aorn-newsroom/periop-today-newsletter/2019/2019-articles/reduce-or-distractions>
  - AORN Position statement on managing distractions and noise during perioperative patient care (2020).  
<https://www.aorn.org/-/media/aorn/guidelines/position-statements/posstat-safety-distractions-and-noise.pdf>
  - AORN Position statement on patient safety (2017). [https://www.aorn.org/-/media/aorn/guidelines/position-statements/posstat\\_pt\\_safety.pdf](https://www.aorn.org/-/media/aorn/guidelines/position-statements/posstat_pt_safety.pdf)
- **Canadian Medical Protective Association** - <https://www.cmpa-acpm.ca/en/home>
  - Working with medical equipment - Reducing the risks. 2012. Available at: [https://www.cmpa-acpm.ca/en/safety/-/asset\\_publisher/N6oEDMrzRbCC/content/working-with-medical-equipment-reducing-the-risks](https://www.cmpa-acpm.ca/en/safety/-/asset_publisher/N6oEDMrzRbCC/content/working-with-medical-equipment-reducing-the-risks)
  - Managing the medico-legal risks of placing a central line. 2011. Available at: [https://www.cmpa-acpm.ca/en/duties-and-responsibilities/-/asset\\_publisher/bFaUiyQG069N/content/managing-the-medico-legal-risks-of-placing-a-central-line](https://www.cmpa-acpm.ca/en/duties-and-responsibilities/-/asset_publisher/bFaUiyQG069N/content/managing-the-medico-legal-risks-of-placing-a-central-line)
- **Canadian Patient Safety Institute** - [www.patientsafetyinstitute.ca](http://www.patientsafetyinstitute.ca)
  - Surgical Safety Checklist  
<https://www.patientsafetyinstitute.ca/en/topic/pages/surgical-safety-checklist.aspx>
  - Surgical Safety in Canada: A 10-year review of CMPA and HIROC medico-legal data. (2016). Available at <https://www.patientsafetyinstitute.ca/en/toolsResources/Surgical-Safety-in-Canada/Documents/Surgical%20Safety%20in%20Canada%20-%20Detailed%20Analysis%20Report.pdf>
- **National Health Services** - <https://naturalhealthservices.ca/>
  - Chest drains: risks associated with the insertion of chest drains (2008). Archived 2010. Available at <https://webarchive.nationalarchives.gov.uk/20100312170233/http://www.nrls.npsa.>

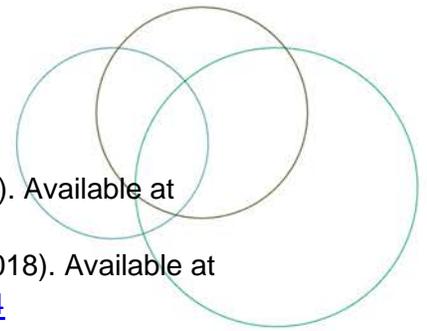




[nhs.uk/resources/search-by-audience/hospital-nurse/?entryid45=59887&p=1&char=ShowAll](https://www.nhs.uk/resources/search-by-audience/hospital-nurse/?entryid45=59887&p=1&char=ShowAll)

- **NICE** – <https://www.nice.org.uk/>
  - NICE interventional procedures guidance - <https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-interventional-procedures-guidance>
  - Guidance on the use of ultrasound locating devices for placing central venous catheters (Published 2002; Reviewed 2016) <https://www.nice.org.uk/guidance/ta49>
  
- **Pennsylvania Patient Safety Authority** - <http://patientsafety.pa.gov/>
  - Snip – it Safety (2004). Available at [http://patientsafety.pa.gov/ADVISORIES/Pages/200412\\_04.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200412_04.aspx)
  - Robotic-assisted surgery: Focus on training and credentialing. 2014. [http://patientsafety.pa.gov/ADVISORIES/Pages/201409\\_93.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201409_93.aspx)
  - Distractions in the operating room. 2014. Available at [http://patientsafety.pa.gov/ADVISORIES/Pages/201406\\_45.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201406_45.aspx)
  - Fetal lacerations associated with cesarean section (2004). Available at [http://patientsafety.pa.gov/ADVISORIES/Pages/200412\\_09.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200412_09.aspx)
  - Strategies to Minimize Vascular Complications following a Cardiac Catheterization (2007). [http://patientsafety.pa.gov/ADVISORIES/Pages/200706\\_58.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200706_58.aspx)
  
- **The American College of Surgeons (ACS)** - <https://www.facs.org/>
  - Statement on patient safety in the operating room: team care (2018). Available at <https://www.facs.org/about-acs/statements/113-patient-safety>
  - Statement on distractions in the operating room (2016). Available at <https://www.facs.org/about-acs/statements/89-distractions>
  - Statement on documentation and reporting of accidental punctures and lacerations during surgery (2016). Available at <https://www.facs.org/about-acs/statements/90-accidental-punctures>
  - Revised statement on recommendations for use of real-time ultrasound guidance for placement of central venous catheters (2011). Available at <https://www.facs.org/about-acs/statements/60-real-time-ultrasound>
  - Revised statement on sharps safety (2016). Available at <https://www.facs.org/about-acs/statements/94-sharps-safety>
  
- **The New England Journal of Medicine: Videos in Clinical Medicine** <https://www.nejm.org/multimedia/medical-videos>
  - Chest-Tube insertion (2007). Available at <https://www.nejm.org/doi/full/10.1056/NEJMvcm071974>
  - Central venous catheter insertion:
    - Ultrasound-guided internal jugular vein cannulation (2010). Available at <https://www.nejm.org/doi/full/10.1056/NEJMvcm0810156#figure=preview.jpg>
    - Placement of a femoral venous catheter (2008). Available at <https://www.nejm.org/doi/full/10.1056/NEJMvcm0801006>





- Central Venous catheterization — subclavian vein (2007). Available at <https://www.nejm.org/doi/full/10.1056/NEJMvcm074357>
- Ultrasound-guided cannulation of the subclavian vein (2018). Available at <https://www.nejm.org/doi/full/10.1056/NEJMvcm1406114>

## MEASURES

Vital to quality improvement is measurement, and this applies specifically to implementation of interventions. The chosen measures will help to determine whether an impact is being made (primary outcome), whether the intervention is actually being carried out (process measures), and whether any unintended consequences ensue (balancing measures).

In selecting your measures, consider the following:

- Whenever possible, use measures you are already collecting for other programs.
- Evaluate your choice of measures in terms of the usefulness of the final results and the resources required to obtain them; try to maximize the former while minimizing the latter.
- Try to include both process and outcome measures in your measurement scheme.
- You may use different measures or modify the measures described below to make them more appropriate and/or useful to your particular setting. However, be aware that modifying measures may limit the comparability of your results to others.
- Posting your measure results within your hospital is a great way to keep your teams motivated and aware of progress. Try to include measures that your team will find meaningful and exciting (IHI, 2012).

## GLOBAL PATIENT SAFETY ALERTS

[Global Patient Safety Alerts](#) (GPSA) provides access and the opportunity to learn from other organizations about specific patient safety incidents including alerts, advisories, recommendations and solutions for improving care and preventing incidents. Learning from the experience of other organizations can accelerate improvement.

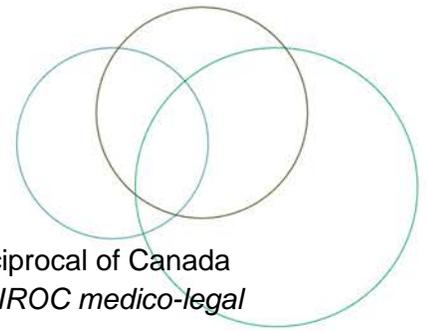
### Recommended search terms:

- [Laceration](#)
- [Puncture](#)

## SUCCESS STORIES

We are looking for an improvement success story related to laceration/puncture. If you are aware of a success story, please share it with the Canadian Patient Safety Institute at [info@cpsi-icsp.ca](mailto:info@cpsi-icsp.ca)



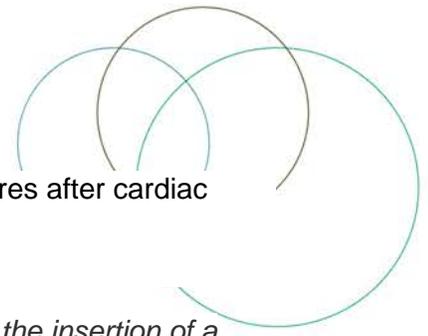


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<http://www.ihl.org/resources/Pages/Tools/HowtoGuidePreventHarmfromHighAlertMedications.aspx>
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**HOSPITAL HARM IMPROVEMENT RESOURCE  
LACERATION/PUNCTURE**



McClurken JB. Minimizing complications from temporary epicardial pacing wires after cardiac surgery. *Pa PSRS Patient Saf Advis.* 2006;3(1):8-12.

[http://patientsafety.pa.gov/ADVISORIES/Pages/200603\\_08.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200603_08.aspx)

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[http://patientsafety.pa.gov/ADVISORIES/Pages/200603\\_08.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200603_08.aspx)

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[http://patientsafety.pa.gov/ADVISORIES/Pages/200709\\_99.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200709_99.aspx)

Pennsylvania Patient Safety Authority. Snip-It Safety. *Pa PSRS Patient Saf Advis.* 2004b;1(4):4-5.

[http://patientsafety.pa.gov/ADVISORIES/Pages/200412\\_04.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/200412_04.aspx)

Wallace SC. Data snapshot: Maternal serious events. *Pennsylvania Patient Safety Authority.* 2016;13(4):163-165. [http://patientsafety.pa.gov/ADVISORIES/Pages/201612\\_163.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201612_163.aspx)

