IN-OFFICE INFECTION CONTROL

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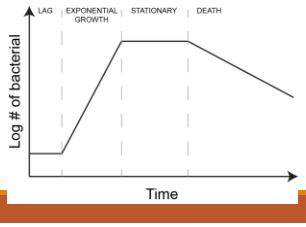
Main Outcomes

Aseptic vs Sterile techniques
Surgical Hygiene
Methods for disinfection
Methods for sterilization
Preparation of patients for procedures

Main reference – Berry & Kohn's Operating Room Technique

Microorganisms

Bacteria – eukaryotic vs. prokaryotic
Viruses
Protozoa
Fungi
Prions



Lines of defense

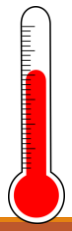
First line – generalized good health, natural biochemical, mechanical and anatomic protection

- Skin
- Mucous membranes
- Reflexes
- Sneeze
- Eyes
- Stomach acid, etc.

Lines of defense

Second line – body systems that aid in preventing the proliferation of bacteria.

- Inflammatory response
- Antibody production
- Elevation of temperature



Lines of defense

Third line – acquired naturally or through therapy. It requires exposure to the pathogen for which resistance is attained.

- Passive
- Active

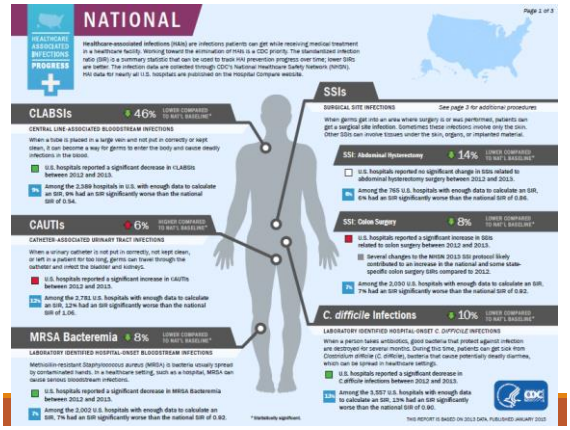
Surgical site infection

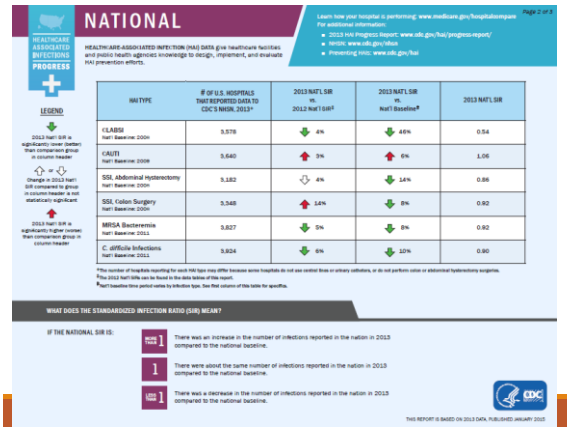
The CDC monitors healthcare associated infections (HAI)

In US hospitals approximately 1/25 patients on any day has at least one HAI.

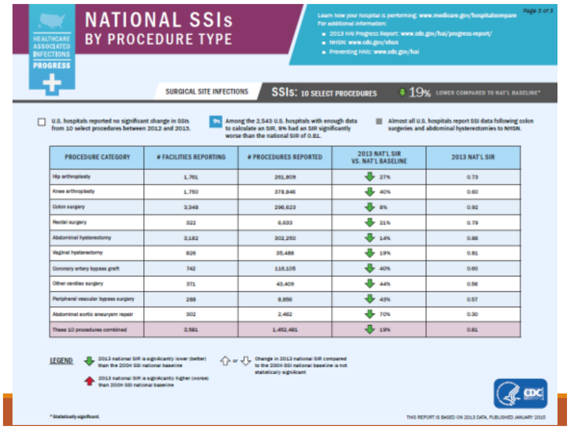
Data from 2011 would suggest that of 721,800 HAIs, 21.8% were from a surgical site infection.

http://www.cdc.gov/HAI/surveillance/





HAI TYPE	# OF U.S. HOSPITALS THAT REPORTED DATA TO CDC'S NHSN, 2013*	2013 NAT'L SIR vs. 2012 Nat'l SIR†	2013 NAT'L SIR vs. Nat'l Baseline§	2013 NAT'L SIR
CLABSI Nat'l Baseline: 2006	3,578	↓ 4%	↓ 46%	0.54
CAUTI Nat'l Baseline: 2008	3,640	↑ 3%	↓ 6%	1.06
SSI, Abdominal Hysterectomy Nat'l Baseline: 2006	3,182	↔ 4%	↓ 14%	0.86
SSI, Colon Surgery Nat'l Baseline: 2006	3,348	↑ 14%	↓ 8%	0.92
MRSA Bacteremia Nat'l Baseline: 2011	3,827	↓ 5%	↓ 8%	0.92
C. difficile Infections Nat'l Baseline: 2011	3,924	↓ 6%	↓ 10%	0.90



NATIONAL SSIs BY PROCEDURE TYPE

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

Page 3 of 3

Learn how your hospital is performing: www.medicare.gov/hospitalcompare
For additional information:
- 2013 HAI Progress Report: www.cdc.gov/hai/progress-report/
- NHSN: www.cdc.gov/nhsn
- Preventing HAIs: www.cdc.gov/hai

SURGICAL SITE INFECTIONS — SSIs: 10 SELECT PROCEDURES — 19% LOWER COMPARED TO NAT'L BASELINE*

- U.S. hospitals reported no significant change in SSIs from 10 select procedures between 2012 and 2013.
- 9% Among the 2,543 U.S. hospitals with enough data to calculate an SIR, 9% had an SIR significantly worse than the national SIR of 0.81.
- Almost all U.S. hospitals report SSI data following colon surgeries and abdominal hysterectomies to NHSN.

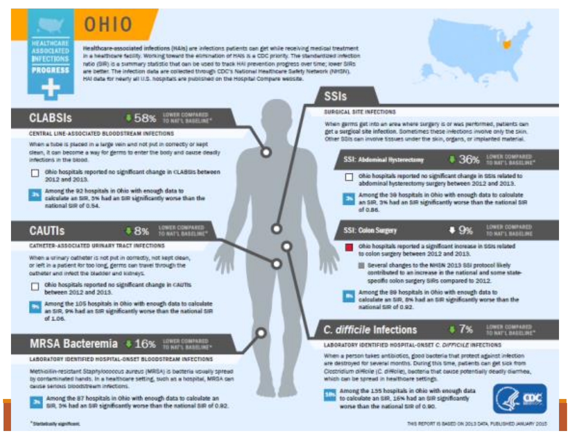
PROCEDURE CATEGORY	# FACILITIES REPORTING	# PROCEDURES REPORTED	2013 NAT'L SIR VS. NAT'L BASELINE	2013 NAT'L SIR
Hip arthroplasty	1,761	261,809	↓ 27%	0.73
Knee arthroplasty	1,750	378,846	↓ 40%	0.60
Colon surgery	3,348	296,623	↓ 8%	0.92
Rectal surgery	322	6,633	↓ 21%	0.79
Abdominal hysterectomy	3,182	302,250	↓ 14%	0.86
Vaginal hysterectomy	826	35,488	↓ 19%	0.81
Coronary artery bypass graft	742	116,105	↓ 40%	0.60
Other cardiac surgery	371	43,409	↓ 44%	0.56
Peripheral vascular bypass surgery	288	8,856	↓ 43%	0.57
Abdominal aortic aneurysm repair	302	2,462	↓ 70%	0.30
These 10 procedures combined	3,581	1,452,481	↓ 19%	0.81

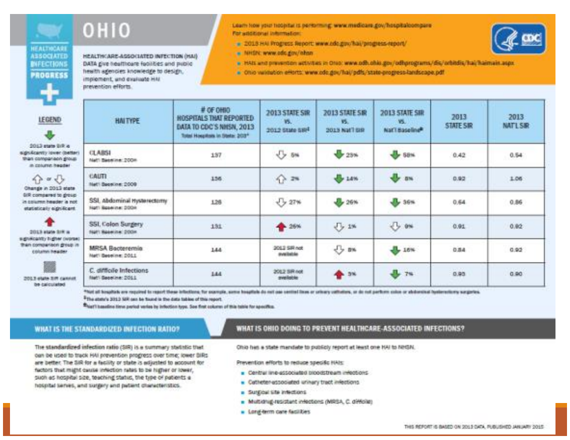
LEGEND
- ↓ 2013 national SIR is significantly lower (better) than the 2006 SSI national baseline
- ↑ 2013 national SIR is significantly higher (worse) than 2006 SSI national baseline
- ⇧ or ⇩ Change in 2013 national SIR compared to the 2006 SSI national baseline is not statistically significant

CDC

*Statistically significant.

THIS REPORT IS BASED ON 2013 DATA, PUBLISHED JANUARY 2015


OHIO
HEALTHCARE ASSOCIATED INFECTIONS PROGRESS
Healthcare-associated infections (HAIs) are infections patients can get while receiving medical treatment in a healthcare facility. Working toward the elimination of HAIs is a CDC priority. The standardized infection ratio (SIR) is a summary statistic that can be used to track HAI prevention progress over time; lower SIRs are better. The infection data are collected through CDC's National Healthcare Safety Network (NHSN). HAI data for nearly all U.S. hospitals are published on the Hospital Compare website.
CLABSIs 58% LOWER COMPARED TO NAT'L BASELINE*
CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS
When a tube is placed in a large vein and not put in correctly or kept clean, it can become a way for germs to enter the body and cause deadly infections in the blood.
Ohio hospitals reported no significant change in CLABSIs between 2012 and 2013.
Among the 92 hospitals in Ohio with enough data to calculate an SIR, 5% had an SIR significantly worse than the national SIR of 0.54.
CAUTIs 8% LOWER COMPARED TO NAT'L BASELINE*
CATHETER-ASSOCIATED URINARY TRACT INFECTIONS
When a urinary catheter is not put in correctly, not kept clean, or left in a patient for too long, germs can travel through the catheter and infect the bladder and kidneys.
Ohio hospitals reported no significant change in CAUTIs between 2012 and 2013.
Among the 105 hospitals in Ohio with enough data to calculate an SIR, 9% had an SIR significantly worse than the national SIR of 1.06.
MRSA Bacteremia 16% LOWER COMPARED TO NAT'L BASELINE*
LABORATORY IDENTIFIED HOSPITAL-ONSET BLOODSTREAM INFECTIONS
Methicillin-resistant Staphylococcus aureus (MRSA) is bacteria usually spread by contaminated hands. In a healthcare setting, such as a hospital, MRSA can cause serious bloodstream infections.
Among the 87 hospitals in Ohio with enough data to calculate an SIR, 3% had an SIR significantly worse than the national SIR of 0.92.
SSIs
SURGICAL SITE INFECTIONS
When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.
SSI: Abdominal Hysterectomy 36% LOWER COMPARED TO NAT'L BASELINE*
Ohio hospitals reported no significant change in SSIs related to abdominal hysterectomy surgery between 2012 and 2013.
Among the 39 hospitals in Ohio with enough data to calculate an SIR, 3% had an SIR significantly worse than the national SIR of 0.86.
SSI: Colon Surgery 9% LOWER COMPARED TO NAT'L BASELINE
Ohio hospitals reported a significant increase in SSIs related to colon surgery between 2012 and 2013.
Several changes to the NHSN 2013 SSI protocol likely contributed to an increase in the national and some state-specific colon surgery SIRs compared to 2012.
Among the 89 hospitals in Ohio with enough data to calculate an SIR, 8% had an SIR significantly worse than the national SIR of 0.92.
C. difficile Infections 7% LOWER COMPARED TO NAT'L BASELINE*
LABORATORY IDENTIFIED HOSPITAL-ONSET C. DIFFICILE INFECTIONS
When a person takes antibiotics, good bacteria that protect against infection are destroyed for several months. During this time, patients can get sick from Clostridium difficile (C. difficile), bacteria that cause potentially deadly diarrhea, which can be spread in healthcare settings.
Among the 135 hospitals in Ohio with enough data to calculate an SIR, 16% had an SIR significantly worse than the national SIR of 0.90.
CDC
*Statistically significant.
THIS REPORT IS BASED ON 2013 DATA, PUBLISHED JANUARY 2015



OHIO

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

HEALTHCARE-ASSOCIATED INFECTION (HAI) DATA give healthcare facilities and public health agencies knowledge to design, implement, and evaluate HAI prevention efforts.

Learn how your hospital is performing: www.medicare.gov/hospitalcompare
For additional information:
- 2013 HAI Progress Report: www.cdc.gov/hai/progress-report/
- NHSN: www.cdc.gov/nhsn
- HAIs and prevention activities in Ohio: www.odh.ohio.gov/odhprograms/dis/oribitdis/hai/haimain.aspx
- Ohio validation efforts: www.cdc.gov/hai/pdfs/state-progress-landscape.pdf

CDC

HAI TYPE	# OF OHIO HOSPITALS THAT REPORTED DATA TO CDC'S NHSN, 2013 (Total Hospitals in State: 203*)	2013 STATE SIR VS. 2012 State SIR‡	2013 STATE SIR VS. 2013 Nat'l SIR	2013 STATE SIR VS. Nat'l Baseline#	2013 STATE SIR	2013 NAT'L SIR
CLABSI (Nat'l Baseline: 2006)	137	⇩ 5%	↓ 23%	↓ 58%	0.42	0.54
CAUTI (Nat'l Baseline: 2009)	156	⇧ 2%	↓ 14%	↓ 8%	0.92	1.06
SSI, Abdominal Hysterectomy (Nat'l Baseline: 2006)	128	⇩ 27%	↓ 26%	↓ 36%	0.64	0.86
SSI, Colon Surgery (Nat'l Baseline: 2006)	131	↑ 26%	⇩ 1%	⇩ 9%	0.91	0.92
MRSA Bacteremia (Nat'l Baseline: 2011)	144	2012 SIR not available	⇩ 8%	↓ 16%	0.84	0.92
C. difficile Infections (Nat'l Baseline: 2011)	144	2012 SIR not available	↑ 5%	↓ 7%	0.93	0.90

*Not all hospitals are required to report these infections; for example, some hospitals do not use central lines or urinary catheters, or do not perform colon or abdominal hysterectomy surgeries.
‡The state's 2012 SIR can be found in the data tables of this report.
#Nat'l baseline time period varies by infection type. See first column of this table for specifics.

LEGEND
- ↓ 2013 state SIR is significantly lower (better) than comparison group in column header
- ⇧ or ⇩ Change in 2013 state SIR compared to group in column header is not statistically significant
- ↑ 2013 state SIR is significantly higher (worse) than comparison group in column header
- ▒ 2013 state SIR cannot be calculated

WHAT IS THE STANDARDIZED INFECTION RATIO?

The **standardized infection ratio** (SIR) is a summary statistic that can be used to track HAI prevention progress over time; lower SIRs are better. The SIR for a facility or state is adjusted to account for factors that might cause infection rates to be higher or lower, such as hospital size, teaching status, the type of patients a hospital serves, and surgery and patient characteristics.

WHAT IS OHIO DOING TO PREVENT HEALTHCARE-ASSOCIATED INFECTIONS?

Ohio has a state mandate to publicly report at least one HAI to NHSN.

Prevention efforts to reduce specific HAIs:
- Central line-associated bloodstream infections
- Catheter-associated urinary tract infections
- Surgical site infections
- Multidrug-resistant infections (MRSA, C. difficile)
- Long-term care facilities

THIS REPORT IS BASED ON 2013 DATA, PUBLISHED JANUARY 2015

Infection

It is always better to prevent infection than to treat.

Healing always occurs better by primary than secondary intension

Pre-op, it is important to ensure your patient does not already have some systemic infection. Diagnosis can be made when two of the following are present

- Temperature greater than 100.4^{0}F
- Heart rate greater than 90 bpm
- High respiration rate (20-22/min)
- Elevated white cell count (12,000/mm^3)

Infection

Key point

- Avoid surgical procedures on infected tissues unless necessary
- Treat infections prior to performing a minor surgical procedure
  - e.g. Treat blepharitis prior to performing Chalazion procedure.

BASIC PRINCIPLES

-Aseptic & Sterile Techniques

-Instrument Handling

-Surgical Environment

-Regulations/Resources

Aseptic, Sterile Techniques

On average, an individual sheds between 4,000 and 10,000 contaminated skin particles per minute.

In clinical practice, we are accustom to using clean techniques for working with our patients.

Clean techniques include, washing your hands, wearing examination gloves, and keeping a clean office environment.

Clean techniques reduce communication of infectious materials, but does not eliminate them.

Aseptic, Sterile Techniques

Although the terms aseptic and sterile and used interchangeably, they are technically not the same.

Aseptic technique is similar to clean technique, but involves handling instrumentation, preps, etc. in a manner to minimize the number of microorganisms present.

Sterile technique is asepsis, but to a much higher standard. For example, sterile packs are only opened when needed and in areas designated as sterile. The goal is to minimize the microbial number to as low as possible.

Aseptic, Sterile Techniques

KEEPING IN MIND…

It might be possible to clean a tool to be 100% microbe free

The air in the room, and the patient's skin is still going to have pathogens present.

Spalding's Levels of Importance

Critical items – confer a high risk for infection if they are contaminated. These include objects that enter sterile tissue or the vascular system. This category includes surgical instruments.

Semicritical items – items that contact mucous membranes or nonintact skin. This could include things such as D&I cannulas. These medical devices should be free from all microbes, but small number of spores may be permissable.

Noncritical items – items that come in contact with intact skin but not mucous membranes. These items should be disinfected using approved materials. Example might be a pulse oximeter used during minor procedures.

http://www.cdc.gov/hicpac/Disinfection_Sterilization/2_approach.html

Instrument Cleaning

After each procedure, the instruments should be cleaned as soon as possible.

Instruments should have all debris removed from the surfaces, and opened if needed.

An enzyme based or soap based disinfectant should be used to gently remove all contaminants from the surface of the instruments.

Personal protective equipment (PPE) should be worn when cleaning instruments. PPE may include a mask, eye protection, gloves, and closed toes shoes. More to come later on PPE in the surgical environment.

Presoaking

If debris or blood are present, or if materials are starting to dry on the instruments, presoak the tools.

Presoaking can be in a mild detergent or enzymatic formulation. Follow the instrument manufacturer's guidelines on how best to presoak, clean and sterilize their instruments.

In general materials may include stainless steel, titanium, and tungsten carbide.

Manual Cleaning

In general, most ophthalmic instruments should be cleaned by hand.

Using a soft brush, remove all debris on the instruments. Avoid splashing water or dispersing debris into the air.

Instruments should be rinsed and dried. Extreme care must be taken with delicate or sharp instruments.

Staff performing these tasks should wear PPE as previously described.

Ultrasonic Cleaning

For small ophthalmic tools – especially those with small crevices such as the chalazion curette, ultrasonic cleaning is an option.

The nature of ultrasound cleaning will loosen debris in the teeth of many tools used.

However, make sure you are able to place the tool in an ultrasonic cleaner prior to doing so.

Disinfection vs Sterilization

Disinfection is a process by which live pathogens are removed. However, spores may still be present.

- High-level – kills all bacteria, viruses and fungi, and may kill some endospores.
- Intermediate-level – Kills most bacteria, viruses and fungi on non-critical items.
- Low-level – Kills most vegetative bacteria, fungi, and some viruses on non-critical items.

Sterilization is a process by which live pathogens and spores are removed. These items can be used for surgical and minor surgical purposes.

Sterilization

There are many methods that can be used to sterilize tools. This will depend on what is appropriate for your tools and that recommended by the manufacturer.

It is necessary to monitor the sterilization process. This can be done using one of three indicators

- Mechanical indicators
- Chemical indicators
- Biological indicators

Instrument placement

Instruments should be placed such that

- They do not touch each other
- They are in the open position
- You should place one instrument per pack when using a pouch

Moist Heat - Autoclave

Easiest, safest, and fastest method.

Gravity displacement sterilizer – 250-254ºF at 15-18 psi. Min exposure time 15 min

Pre-vacuum sterilizer – 270-276ºF at 27 psi. Takes between 15-30 minutes.

Immediate/flash sterilize – 275ºF at 27 psi. Takes 3-10 minutes, should not be used routinely.

Dry Heat

Used for oil based products.

Usually not used for instruments.

Mechanical convection oven – 320 – 340°F for 6-12 min.

Gravity convection oven – 250 – 270°F for **6 hours**.

Ethylene Oxide

Used for items that are sensitive to heat.

Working temperature range is between 85 – 145°F

Not used commonly in private practice.

Requires specialized setups with specific health monitoring. Health records of those working with these tools have to be maintained for a minimum of 30 years.

ETO is extremely flammable and toxic.

Exposure time is usually long – up to 6hrs.

Plasma Sterilization

Plasma generation through H_2O_2 can be used to ionize particles on instrumentation

Takes between 35-75 min

Works at low temperatures

Not all materials can be sterilized using this method. Nylon becomes brittle for example.

Chemical

Most work at low temperatures

It offers good penetration into many materials.

It can be corrosive to certain materials.

It often requires extended periods of exposure time.

Many of the chemicals used are hazardous to your health.

Instruments have to be rinsed prior to use.

Chemical

Acetic acid

Formaldehyde

Glutaraldehyde

Paracetic acid

Hypochlorous acid

Many are mixtures with alcohols and/or other disinfectants

THE SURGICAL ENVIRONMENT

Pre-op

Verify that all tools and materials needed including emergency supplies are available.

Obtain a complete case history including review of systems. Get HPI of the pathology being addressed.

Provide patient with all alternatives to surgical intervention. Discuss risks and benefits.

Determine if the procedure is medically necessary. Photodocument the lesion or anterior segment pathology.

Get vital signs. Some may order EKG and bloodwork on their patients.

The surgical environment

Components of appropriate attire

- Head cover
- Shoe covers
- Mask (laser)
- Surgical gown
- Surgical gloves

FIG. 15-1 Zones of sterility on front of gown. The zones of sterility can change based on position of draped patient and sterile team.

FIG. 15-3 Sterile personnel keep hands in sight at or above waist or level of sterile field. Gowns are considered sterile only in front from chest to level of sterile field, and the sleeves from above elbows to cuffs.

FIG. 15-2 Zones of sterility when standing at sterile field with patient as the baseline for the level of the sterile field.

FIG. 15-4 Seated team for upper extremity procedure. The zones of sterility change based on the placement of the team in relation to the type of surgical procedure.

Berry & Kohn's Operating Room Technique

The surgical environment

Fingernails should be kept clean

Cut nails short

Polish should not be chipped

No artificial nails

Jewelry should be removed

Clean hands with an antimicrobial skin-cleansing agent.

- Chlorhexidine, Iodophors, Triclosan, Alcohol, Hexachlorophene, Parachlorometaxylenol.

http://www.brooksidepress.org/Products/Scrub_Gown_and_Glove_Procedures/lesson_1_Section_1.htm

Closed vs Open Glove

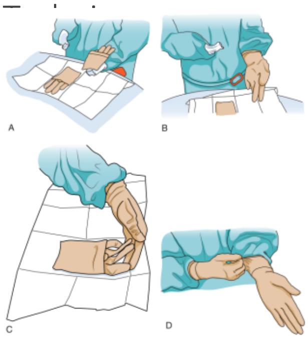


FIG. 16-14 Closed gloving. The hands remain within the cuffs at all times. **A,** Grasp the fingers of the 1st glove with the opposite cuffed hand and flip directly over onto the wrist of the supinated hand. **B,** Grasp the upper and undersides of the glove cuff and begin to pull the glove over the 1st cuffed hand. Work the fingers into the glove until it is fully on the hand. The white part of the 1st cuff must be completely covered. **C,** With the sterile gloved hand grasp the fingers of the 2nd glove and directly flip it onto the 2nd cuffed hand. **D,** Grasp the upper and undersides of the glove and pull it up and over the second cuff.

Berry & Kohn's Operating Room Technique

Closed vs Open Glove Techr

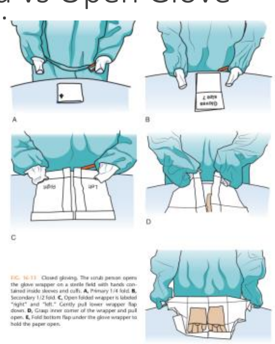


FIG. 16-13 Closed gloving. The scrub person opens the glove wrapper on a sterile field with hands contained inside sleeves and cuffs. **A,** Primary 1/4 fold. **B,** Secondary 1/2 fold. **C,** Open folded wrapper is labeled "right" and "left." Gently pull lower wrapper flap down. **D,** Grasp inner corner of the wrapper and pull open. **E,** Fold bottom flap under the glove wrapper to hold the paper open.

Berry & Kohn's Operating Room Technique

Preparing the surgical site

Patient is informed to wash their face with anti-microbial soap the day prior to, and the day of their procedure. They are also asked to wash their hair. This decreases bacterial load.

Prior to the procedure, the doctor may decide that hair needs to be removed if it will interfere with the surgical process.

Preparing the surgical site

The surgical staff will drape the area being cleaned, and wash the site being worked on.

Cleaning solutions may include

- Chlorhexidine
- Iodine and iodophors
- Alcohol
- Triclosan
- Parachlorometaxylenol

Preparing the surgical site

Using a circular inward to outward motion, clean the area.

It is important to apply the cleaning agent to the lash margin and eyebrow region

Preparing the surgical site

Once area has been cleaned, a sterile drape can be placed over the region of interest.

Sterile drapes should be placed on the instrument stand (Mayo stand). This should not be done ahead of time.

The sterile field must be maintained and is the responsibility of all those in the surgical environment.

Post procedure

Instruments should be handled as previously described.

If there is any exposure or incident, OSHA guidelines should be followed.

All individuals working in an area with reasonable chance of being exposed to bloodborne pathogens should be trained.

Common Exposures

Needlesticks

- The most common exposure.
- Remove both gloves, and place hands under running water, and clean with disinfectant soap. Squeeze the skin around the puncture wound.

Every healthcare facility must develop a written exposure control plan.

OSHA

Exposure plan must be updated annually

Implement the use of universal precautions

Identify and use engineering controls

Identify and ensure the use of work practice controls

Provide PPE

Make available hepatitis B vaccinations

Make available post-exposure evaluation and follow-up to any occupationally exposed worker.

Use labels and signs to communicate hazards.

Provide information and training to workers.

Maintain worker medical and training records.

http://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact01.pdf