ICRA 2.0 for Planned Events

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What is a risk assessment?

Risk assessment is a risk management process which involves:

- Identify potential hazards
- Analyze what could happen if the hazard results in an accident

Preparing for your risk assessment

- Scope
- Resources
- Stakeholders
- Laws/Regs/Standards

Risk Assessment

Are door constructed of durable materials that can withstand equipment impacts and frequent cleaning? AAMI ST79 3.3.5.4?

Risk Assessment

- Scope
  - Processes
  - Activities
  - Functions
  - Physical Locations
- Resources
  - Time, personnel, and financial
- Laws/Regulations/Standards
- Stakeholders

ICRA TEAM

- Decision makers
- Dept managers
- Clinical leaders
- Facility mangers
- Project manager
- Safety
- Infection Control
- Maintenance
- Environmental Serv
- Departments affected

Risk Assessment Steps

ICRA Risk Assessment Steps

Integrating Human Factors into Risk Assessment

UNDERSTANDING THE TASK/PROJECT

WALK THROUGH/TALK THROUGH

Step 1: Define the Activity

- What do you need to consider when determining the full scope of tasks?
- Identify work hazards that increase risks to patients.
- What questions should you consider (and who should you ask) to accurately determine the level of work

Step One:
Using Table 1, Identify the Activity Type (A-D).

Table 1 - Activity Type: _____

Type A	**Inspection and non-invasive activities.** Includes but is not limited to: • Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time. • Limited building system maintenance (e.g., pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding) that does not create dust or debris. • Clean plumbing activity limited in nature.
Type B	**Small-scale, short duration activities that create minimal dust and debris.** Includes but is not limited to: • Work conducted above the ceiling (e.g., prolonged inspection or repair of firewalls and barriers, installation of conduit and/or cabling, and access to mechanical and/or electrical chase spaces). • Fan shutdown/startup. • Installation of electrical devices or new flooring that produces minimal dust and debris. • The removal of drywall where minimal dust and debris is created. • Controlled sanding activities (e.g., wet or dry sanding) that produce minimal dust and debris.
Type C	**Large-scale, longer duration activities that create a moderate amount of dust and debris.** Includes but is not limited to: • Removal of preexisting floor covering, walls, casework or other building components. • New drywall placement. • Renovation work in a single room. • Non-existing cable pathway or invasive electrical work above ceilings. • The removal of drywall where a moderate amount of dust and debris is created. • Dry sanding where a moderate amount of dust and debris is created. • Work creating significant vibration and/or noise. • Any activity that cannot be completed in a single work shift.
Type D	**Major demolition and construction activities.** Includes but is not limited to: • Removal or replacement of building system component(s). • Removal/installation of drywall partitions. • Invasive large-scale new building construction. • Renovation work in two or more rooms.

Define Activity – Identify the hazard

Infection Control Risk Assessment 2.0
Matrix of Precautions for Construction, Renovation and Operations

Step One:
Using Table 1, identify the ~~Construction Project~~ ① Activity Type (A-D).

Table 1 - ~~Construction Project~~ ① Activity Type: _____

Type A	**Inspection and non-invasive activities.** Includes but is not limited to: • Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time. • Limited building system maintenance (e.g., pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding)

ICRAs Are Not Just for Construction

- Recent edit to tool broadens scope.
- Not just for construction.

What is the activity type for replacing this door?

A. Type A: Inspection and non-invasive activities
B. Type A: Inspection and non-invasive activities
C. Type C: Large-scale, longer duration activities that create a moderate amount of dust and debris
D. Type D: Major demolition and construction activities

What is the activity type for replacing this door?

A. Type A: Inspection and non-invasive activities
B. Type A: Inspection and non-invasive activities
C. Type C: Large-scale, longer duration activities that create a moderate amount of dust and debris
D. Type D: Major demolition and construction activities

Discussion

What do we do when there is a difference of opinion about the type of activity?

Step 2: Identify Patient Risk

- Types of patients who are particularly vulnerable.
- Classify patient risk categories and care areas.
- Ask the right questions to gain understanding of patient vulnerabilities.

Table 2 - Patient Risk Group: _____

Low Risk Non-patient care areas such as:	**Medium Risk** Patient care support areas such as:	**High Risk** Patient care areas such as:	**Highest Risk** Procedural, invasive, sterile support and highly compromised patient care areas such as:
• Public hallways and gathering areas not on clinical units. • Office areas not on clinical units. • Breakrooms not on clinical units. • Bathrooms or locker rooms not on clinical units. • Mechanical rooms not on clinical units. • EVS closets not on clinical units	• Waiting areas. • Clinical engineering. • Materials management. • Sterile processing department - dirty side. • Kitchen, cafeteria, gift shop, coffee shop, and food kiosks.	• Patient care rooms and areas • All acute care units • Emergency department • Employee health • Pharmacy – general work zone • Medication rooms and clean utility rooms • Imaging suites: diagnostic imaging • Laboratory.	• All transplant and intensive care units. • All oncology units. • OR theaters and restricted areas. • Procedural suites. • Pharmacy compounding. • Sterile processing department - clean side. • Transfusion services. • Dedicated isolation wards/units. • Imaging suites: invasive imaging.

Identify the patient risk group

A. Low Risk: Non-patient-care areas
B. Medium Risk: Patient care support areas
C. High Risk: Patient care areas
D. Highest Risk: Procedural, invasive, sterile support and highly compromised patient care areas

Identify the patient risk group

A. Low Risk: Non-patient-care areas
B. Medium Risk: Patient care support areas
C. High Risk: Patient care areas
D. Highest Risk: Procedural, invasive, sterile support and highly compromised patient care areas

Should patients be evacuated?

- Present but with the required controls and protections in place to mitigate risk.
  - Airborne,
  - Waterborne
  - Environmental contaminants
  - Noise /vibration
  - Interruption in care
  - Patient satisfaction
- Relocate patients/service for the duration of the work
  - New ICRA for this phase

Step 3: Define Class of Precautions

- Cross-reference work type and patient risk to identify class of precautions.
- Balance risk needs with cost, materials and scheduling.
- Identify work that could fit into standard protocols.

What classification of precautions is needed?

	Activity Type			
Patient Risk Group	**TYPE A**	**TYPE B**	**TYPE C**	**TYPE D**
LOW Risk Group	I	II	II	III*
MEDIUM Risk Group	I	II	III*	IV
HIGH Risk Group	I	III	IV	V
HIGHEST Risk Group	III	IV	V	V

What classification of precautions is needed?

A. Class I: Basic Precautions
B. Class II: Minimally Controlled Precautions
C. Class III: Moderately Controlled Environment
D. Class IV: Highly Controlled Environment
E. Class V: Extremely Controlled Environment

What classification of precautions is needed?

A. Class I: Basic Precautions
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C. Class III: Moderately Controlled Environment
D. Class IV: Highly Controlled Environment
E. Class V: Extremely Controlled Environment

Discussion

Do all projects require an ICRA?

Is an ICRA needed to change a light bulb or remove bugs from a light fixture?

A. No – this is our standard work
B. Yes – anytime we pop a tile or go above the ceiling plane
C. Depends on the setting of the light fixture
D. We should be submitting an ICRA when we go above the ceiling plane, but we don't

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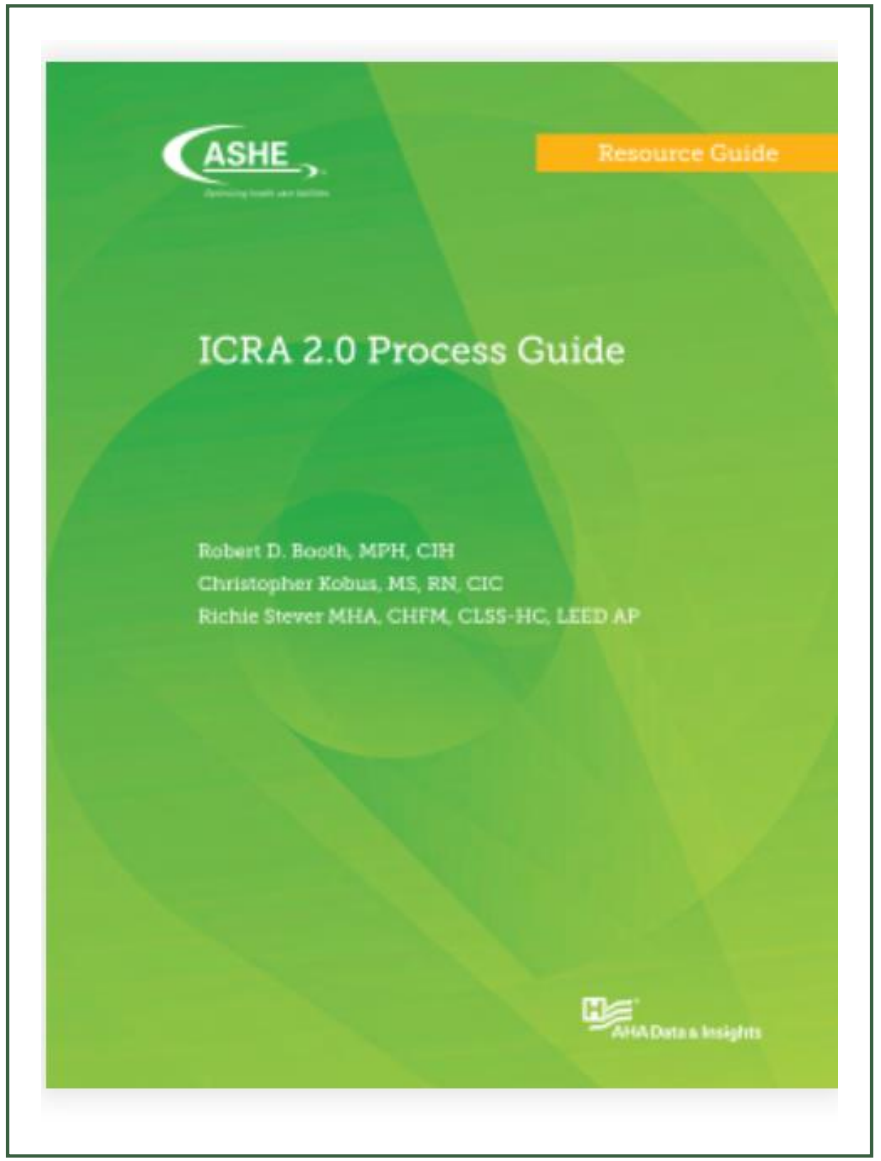
Lint Collection

You get a work order to clean lights and vents in the clean linen room.

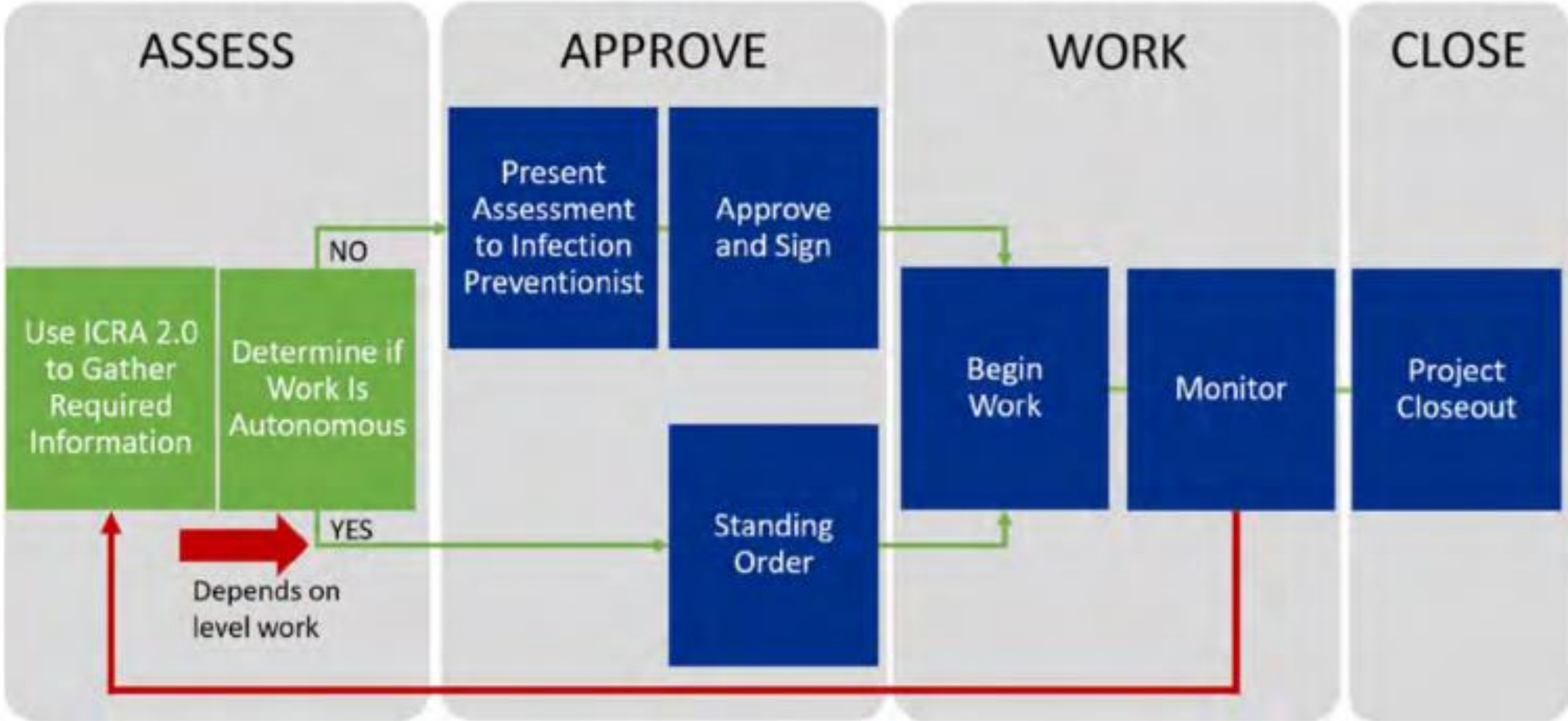
Would you submit an ICRA?

Standard Project Phases

1. Assess and Reassess:
   - Use the ICRA 2.0 to gather information and determine the extent of work.
   - Determine whether work activities are autonomous to engineering/facilities work.
2. Approve: Approval by the ICRA team (and IP especially) and determination of mitigation plan, including if standing orders are appropriate.
3. Work and Monitor: Work activities, controls, monitoring and continued reassessment.
4. Close: Completion of work activities, cleaning and verification of system conditions.



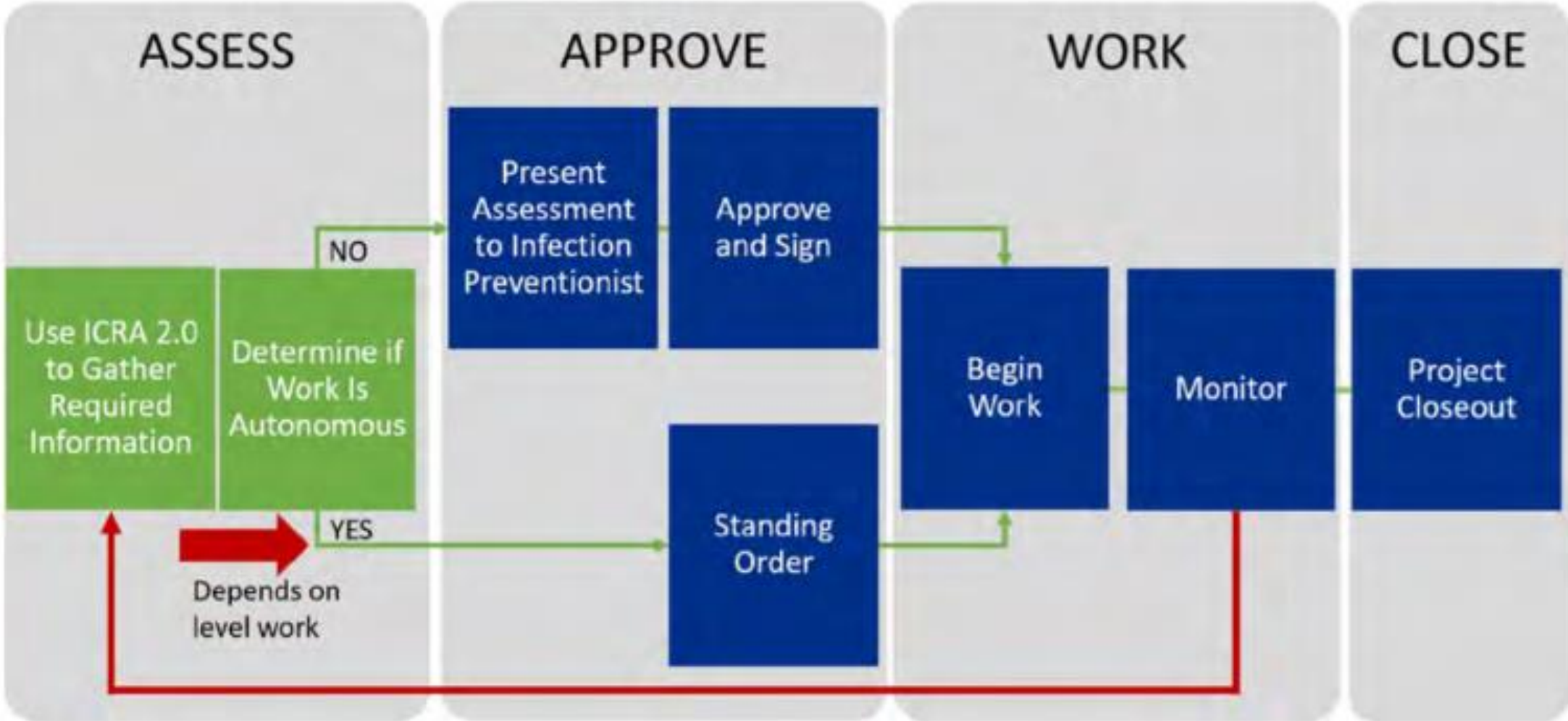
ICRA 2.0 During Ongoing Work and Monitoring



Leaky Pipe

- Long standing issue.
- Does this require an ICRA?

ICRA 2.0 During Ongoing Work and Monitoring



Monitoring

The IP finds two open ceiling tiles over unprotected clean linen.

Who is responsible to monitor?

What are our next steps?

Figure 4. Cutaneous necrotizing mucormycosis of the right upper limb of a burn victim.

Mucormycosis Outbreak Associated With Hospital Linens

- Mucormycosis outbreaks have been linked to contaminated linen.
- Mucormycosis is an invasive fungal infection with a high fatality rate.
- Mortality rates exceed 50%.

Clin Infect Dis, Volume 54, Issue suppl_1, February 2012, Pages S23–S34, https://doi.org/10.1093/cid/cir866

How Clean Is the Linen at My Hospital?

Clinical Infectious Diseases

BRIEF REPORT

How Clean Is the Linen at My Hospital? The *Mucorales* on Unclean Linen Discovery Study of Large United States Transplant and Cancer Centers

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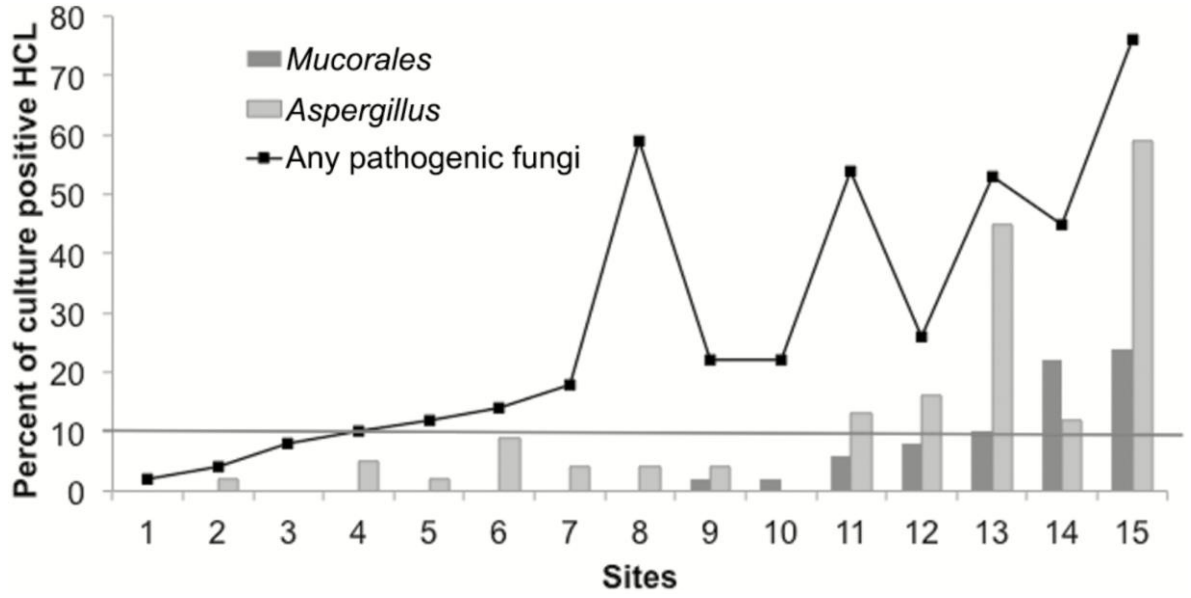
(HCM) can be difficult to recognize because it often is unclear whether cases are occurring above background rates at given centers. Nevertheless, HCM outbreaks are increasingly described [3]. Recently, 3 outbreaks were linked to contaminated healthcare linens (HCLs) [4, 5] or laundry carts [6]. The full extent to which HCLs contribute to the burden of HCM is unknown, and may be under-appreciated. Moreover, it is unknown whether contaminated HCLs account for sporadic cases of HCM, which are not typically subjected to epidemiologic investigations.

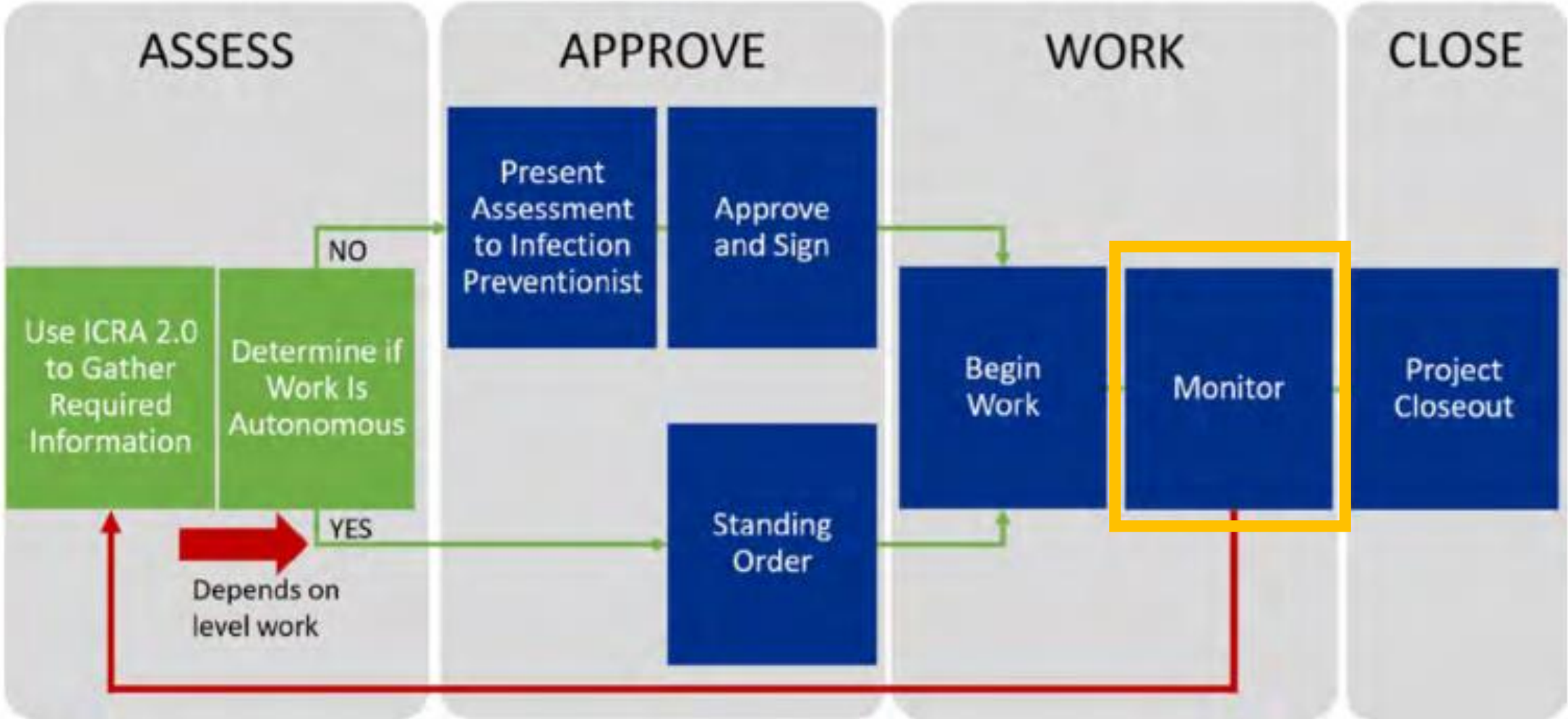
Microbiologic testing of HCLs is not mandated by government regulations in the United States or other countries, but it is required by certain third-party certification programs for healthcare laundries (http://hygienicallyclean.org/wp-content/uploads/2017/12/hygienic_trsa_fs_standard.pdf; http://hygienicallyclean.org/wp-content/uploads/2017/12/hygienic_trsa_fs_standard.pdf). The Textile Rental Services Association (TRSA) administers a voluntary program that certifies US laundries as providing "hygienically clean" HCLs, which are defined as "free of pathogens in sufficient



Who Approves Standard Operating Procedures (SOPs)?

IP should not be completely left out of work that falls into the standing order category. In fact, as ensure that IP is a part of the decision-making around which work qualifies for standing orders, providing critical insights into determining what level of mitigation is appropriate even for Class I and II work.

ICRA 2.0 During Ongoing Work and Monitoring



Who is responsible to monitor routine projects/maintenance?

Step 4: Assess Surrounding Area

- Survey work areas and adjacent areas that may be affected.
- Consider how building structure and systems may be affected by work.
- Ask the right questions to identify unknown exposure.

Adjacent work areas commonly are impacted by the following:

- Noise from hammering and work.
- Vibration issues caused by construction activities.
- Additional dust or debris from core drilling, hammering or equipment movement.
- Ventilation disruption including alteration of required pressure differentials, air exchanges and temperature and humidity control.
- Vertical connections between floors that could provide a pathway for migration of dust and airborne pathogens such as stairways, elevators and vertical lift shafts.
- Disruption of data management systems.
- Disruptions in hot and cold-water systems that could cause stagnation.
- Disruption of other mechanical systems and utilities.
- Disruption of medical gas and vacuum systems

Step Four:

Assess potential risk to areas surrounding the project. Using Table 4, identify the surrounding areas that will be affected and the type of impact that will occur. If more than one risk group will be affected, select the higher risk group using Table 2 - Patient Risk Group.

Table 4 - Surrounding Area Assessment

Unit Below:	Unit Above:	Unit Lateral:	Unit Behind:	Unit in Front:
Risk Group:	Risk Group:	Risk Group:	Risk Group:	Risk Group:
Contact:	Contact:	Contact:	Contact:	Contact:
Phone:	Phone:	Phone:	Phone:	Phone:
Additional Controls: ☐ Noise ☐ Vibration ☐ Dust control ☐ Ventilation ☐ Pressurization ☐ Vertical Shafts ☐ Elevators/Stairs **Systems impacted:** ☐ Data ☐ Mechanical ☐ Med Gases ☐ Hot/Cold Water	**Additional Controls**: ☐ Noise ☐ Vibration ☐ Dust control ☐ Ventilation ☐ Pressurization ☐ Vertical Shafts ☐ Elevators/Stairs **Systems impacted:** ☐ Data ☐ Mechanical ☐ Med Gases ☐ Hot/Cold Water	**Additional Controls**: ☐ Noise ☐ Vibration ☐ Dust control ☐ Ventilation ☐ Pressurization ☐ Vertical Shafts ☐ Elevators/Stairs **Systems impacted:** ☐ Data ☐ Mechanical ☐ Med Gases ☐ Hot/Cold Water	**Additional Controls**: ☐ Noise ☐ Vibration ☐ Dust control ☐ Ventilation ☐ Pressurization ☐ Vertical Shafts ☐ Elevators/Stairs **Systems impacted:** ☐ Data ☐ Mechanical ☐ Med Gases ☐ Hot/Cold Water	**Additional Controls**: ☐ Noise ☐ Vibration ☐ Dust control ☐ Ventilation ☐ Pressurization ☐ Vertical Shafts ☐ Elevators/Stairs **Systems impacted:** ☐ Data ☐ Mechanical ☐ Med Gases ☐ Hot/Cold Water

Noise & Vibration Mitigation Strategies

- ☐ Use diamond drills instead of powder-actuated fasteners.
- ☐ Schedule noise-making periods with adjacent spaces.
- ☐ Use beam clamps instead of shot.
- ☐ Prefab where possible.
- ☐ Use tin snips to cut metal studs instead of using a chop saw.
- ☐ Install metal decking with vent tabs, then use cellular floor deck hangers.
- ☐ Consider compression style fittings instead of soldering, brazing or welding.
- ☐ Wet core drill instead of dry core or percussion.
- ☐ Instead of jackhammering concrete, use wet diamond saws.
- ☐ Use HEPA vacuums instead of standard wet/dry vacuums.
- ☐ Use mechanical joining system sprinkler fittings instead of threaded.
- ☐ Where fumes are tolerated, use chemical adhesive remover (flooring glue) instead of mechanical.
- ☐ To remove flooring, consider abrasive blasting instead of using a floor scraper.
- ☐ Use electric sheers instead of reciprocating saw for ductwork cutting.
- ☐ Install exterior man/material lifts.

Ventilation & Pressurization Mitigation Strategies

- ☐ HEPA to exterior.
- ☐ Install temporary ductwork.
- ☐ Utilize temporary HVAC equipment.
- ☐ Vacate the area.
- ☐ Install temporary partitions.
- ☐ Use carbon filtration to filter odors.

Impact to Other Systems Mitigation Strategies

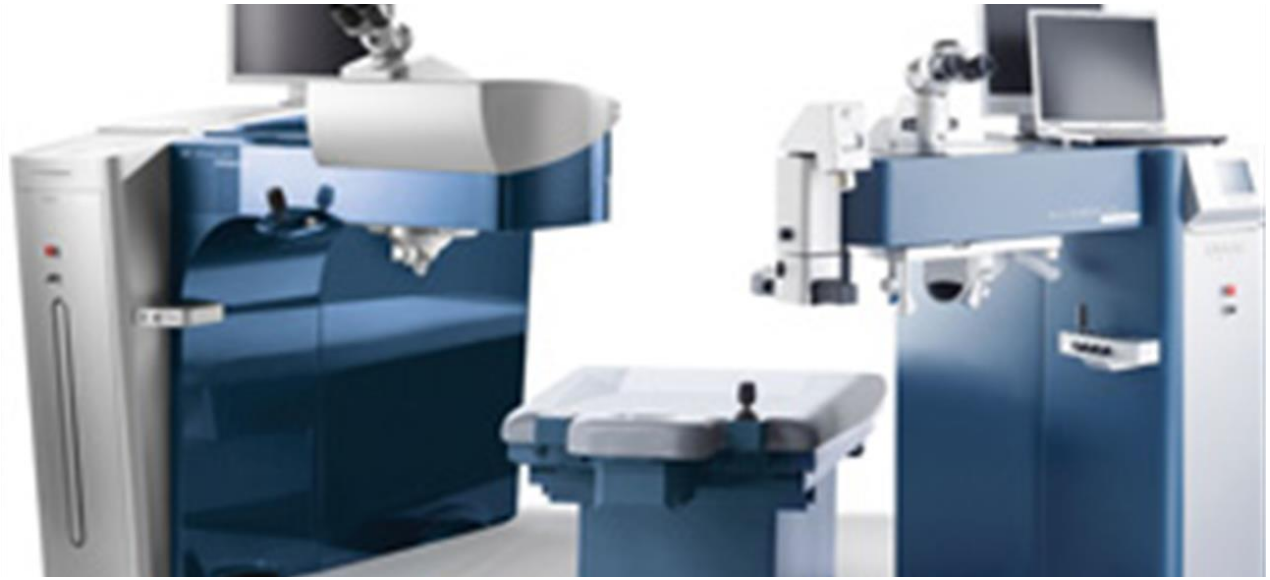
- ☐ Schedule outages.
- ☐ Provide temporary systems.
- ☐ Back-feed electricity or medical gases.

‘Sands of the Sahara’ Outbreak

- Diffuse lamellar keratitis (DLK) – a.k.a. ‘Sands of the Sahara’
- DLK is an early postoperative complication following eye procedures (commonly LASIK) that can progress to visual impairment. It appears as an inflammatory response.

Outbreak

- Opened new LASIK procedure room – Sept. 3, 2020. Room was cleaned before opening.
- First patient seen on Oct. 2, 2020.
- There were four cases of severe DLK over a 2-week period [October 2-16, 2020]. There were two cases from procedures done on October 16th. Procedures were done one day a week after opening.
- Most DLK cases were the first case of the day



Environmental Concerns

- HVAC system – energy conservation ramps down system evenings, nights and weekends. Turns on at 5:15am and is on until 11:59 pm.
- Air exchange range rate is 6 -20 ACH based on the room size and time of day.
- Considerable amount of dust noted under equipment and in crevices during service call by Alcon technician. Laser was deep cleaned by technician.
- Alcon tested the filters and the exhaust for the plume.
- Could dust come from halo during lowering over patient?
- Door to procedure room is left open after hours.
- Carpeting in hallway outside of procedure room. Rugs vacuumed in the evening.
- No door seals present.
- Low humidity levels (22%) – static cling. Hair and particles clinging to the machine.
- Renovation project occurring on lower level and under procedure room

Vertical connections between floors that could provide a pathway for migration of dust and airborne pathogens such as stairways, elevators and vertical lift shaft

Step 5: Establish Mitigation Plan

- Make appropriate accommodations to work plan to control risk to patients.
- Explicitly communicate controls and mitigation expectations.
- Conduct a walk through to discuss mitigation measures.

During Work Activity

Class of Precautions	Mitigation Activities (Performed Before and During Work Activity)
Class I	1. Perform noninvasive work activity as to not block or interrupt patient care. 2. Perform noninvasive work activities in areas that are not directly occupied with patients. 3. Perform noninvasive work activity in a manner that does not create dust. 4. Immediately replace any displaced ceiling tile before leaving the area and/or at end of noninvasive work activity.
Class II	1. Perform only limited dust work and/or activities designed for basic facilities and engineering work. 2. Perform limited dust and invasive work following standing precautions procedures approved by the organization. 3. This Class of Precautions must never be used for construction or renovation activities.
Class III	1. Provide active means to prevent airborne dust dispersion into the occupied areas. 2. Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door. 3. Remove or isolate return air diffusers to avoid dust from entering the HVAC system. 4. Remove or isolate the supply air diffusers to avoid positive pressurization of the space, 5. If work area is contained, then it must be neutrally to negatively pressurized at all times. 6. Seal all doors with tape that will not leave residue. 7. Contain all trash and debris in the work area. 8. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 9. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 10. Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.
Class IV	1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling or, if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type). 4. Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air. 5. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 6. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 7. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 8. Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 9. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 10. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable. 11. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator.
	13. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 14. Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suits is acceptable. 15. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 16. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 17. Consider collection of particulate data during work to monitor and ensure that contaminates do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.
Class V	1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling, or if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type). 4. Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area. 5. Personnel will be required to wear disposable coveralls at all times during Class V work activities. Disposable coveralls must be removed before leaving the anteroom. 6. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 7. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 8. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 9. Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 10. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 11. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable. 12. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator. 13. Contain all trash and debris in the work area. 14. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 15. Worker clothing must be clean and free of visible dust before leaving the work area anteroom. 16. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 17. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 18. Consider collection of particulate data during work to monitor and ensure that contaminates do not

Is your team adept at properly engaging and monitoring these controls?

During Work Activity

Class of Precautions	Mitigation Activities (Performed Before and During Work Activity)
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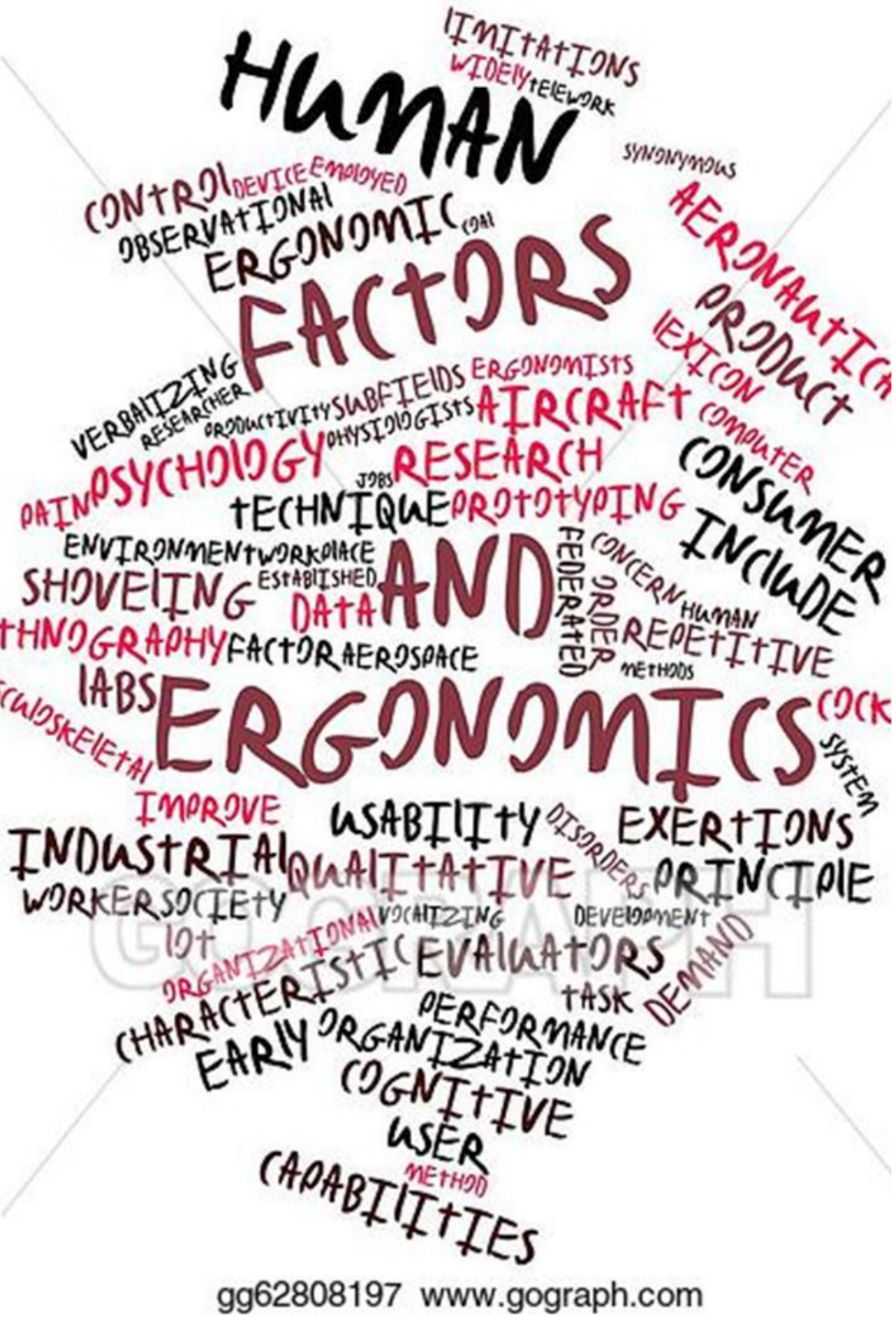
Class II	1. Perform only limited dust work and/or activities designed for basic facilities and engineering work. 2. Perform limited dust and invasive work following standing precautions procedures approved by the organization. 3. This Class of Precautions must never be used for construction or renovation activities.
Class III	1. Provide active means to prevent airborne dust dispersion into the occupied areas. 2. Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door. 3. Remove or isolate return air diffusers to avoid dust from entering the HVAC system. 4. Remove or isolate the supply air diffusers to avoid positive pressurization of the space, 5. If work area is contained, then it must be neutrally to negatively pressurized at all times. 6. Seal all doors with tape that will not leave residue. 7. Contain all trash and debris in the work area. 8. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 9. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 10. Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.
Class IV	1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling, or if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type). 4. Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air. 5. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 6. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 7. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 8. Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 9. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 10. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable. 11. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator. 13. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 14. Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suits is acceptable. 15. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 16. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 17. Consider collection of particulate data during work to monitor and ensure that contaminates do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.
Class V	1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling, or if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type). 4. Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area. 5. Personnel will be required to wear disposable coveralls at all times during Class V work activities. Disposable coveralls must be removed before leaving the anteroom. 6. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 7. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 8. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 9. Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 10. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 11. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable. 12. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator. 13. Contain all trash and debris in the work area. 14. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 15. Worker clothing must be clean and free of visible dust before leaving the work area anteroom. 16. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 17. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 18. Consider collection of particulate data during work to monitor and ensure that contaminates do not

Removal of air to create negative pressure

- Exhaust must be directed outside the work area.
- Exhaust air must be a safe distance from outside air intakes, windows and other openings to the building.
- Exhaust air must be HEPA filtered prior to discharge if within 25 feet of outside air intakes, windows and other openings to the building.
- Exhaust air must never be directed into an active HVAC system that is used to condition occupied spaces.
- Exhaust air must never be directed into active exhaust air systems used by other building systems.
- Airflow direction must be into the workspace from entry points, anterooms or other entrances/exits.
- Monitoring of pressurization in the space must be achieved using recommended methods at negative pressurization established by the healthcare organization



Human Factor Engineering

- the study of all the factors that make it easier to do the work in the right way
- apply wherever humans work
- also sometimes known as ergonomics

Human Factor Engineering in Health Care

- Only recently been acknowledged as an essential part of patient safety
- A major contributor to adverse events in health care
- All health-care workers need to have a basic understanding of human factors principles

Which one do you think is safer?

Private room or ward setting?

Ergonomics Definition

An applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely. — called also:

- biotechnology,
- human engineering,
- human factors.

SEIPS (Systems Engineering Initiative for Patient Safety) model

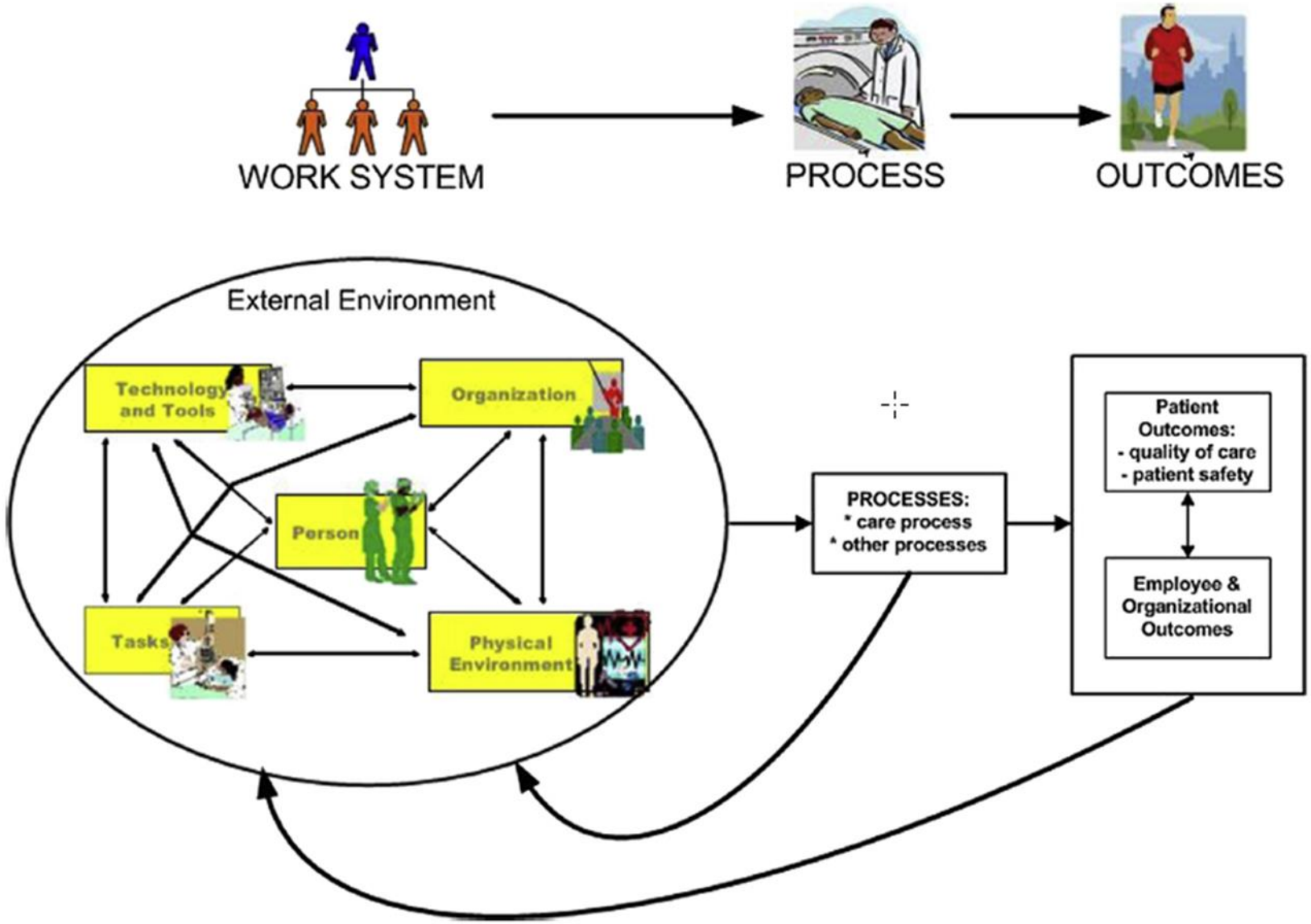


Fig. 1. The SEIPS model of work system and patient safety (Carayon et al., 2006b).

Person/Person

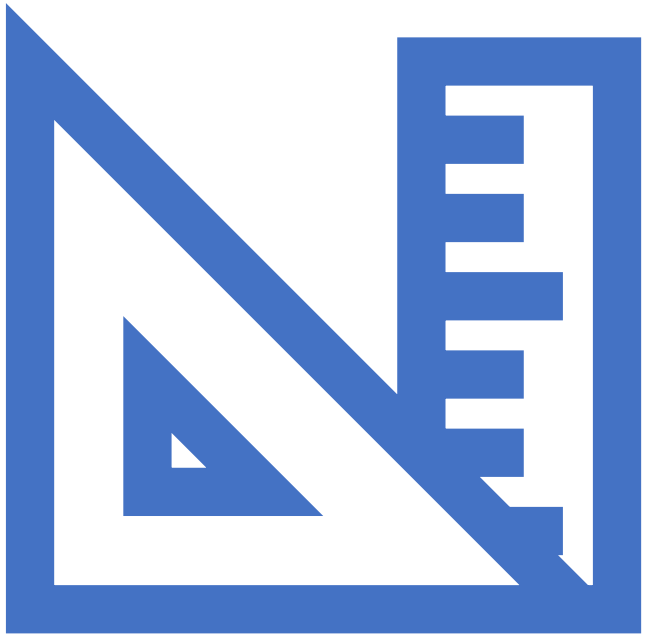
- The individual at the center of the system can be a single individual (e.g., physician, nurse, patient) or can be a group of individuals (e.g., team, organizational unit).
- Individual characteristics include:
- Physical characteristics: strength, height, weight
- Cognitive characteristics: expertise, experience
- Psychosocial characteristics: motivation, need for social support

Tools and Technology Health Information Technologies

- Medical devices
- Other tools and technologies

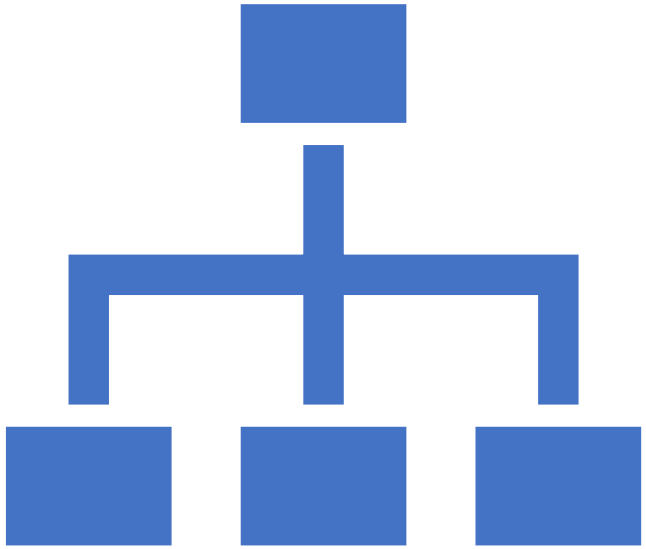
Tasks

- Description and characteristics of tasks: variety, content, physical and psychological demands



Physical environment

- Physical layout
- Workstation design
- Noise
- Lighting
- Temperature and humidity
- Air quality



Organization

- Formal and informal organization
- Organizational culture and climate
- Rules, procedures, laws, standards
- Organizational structure and management

SEIPS (Systems Engineering Initiative for Patient Safety) model

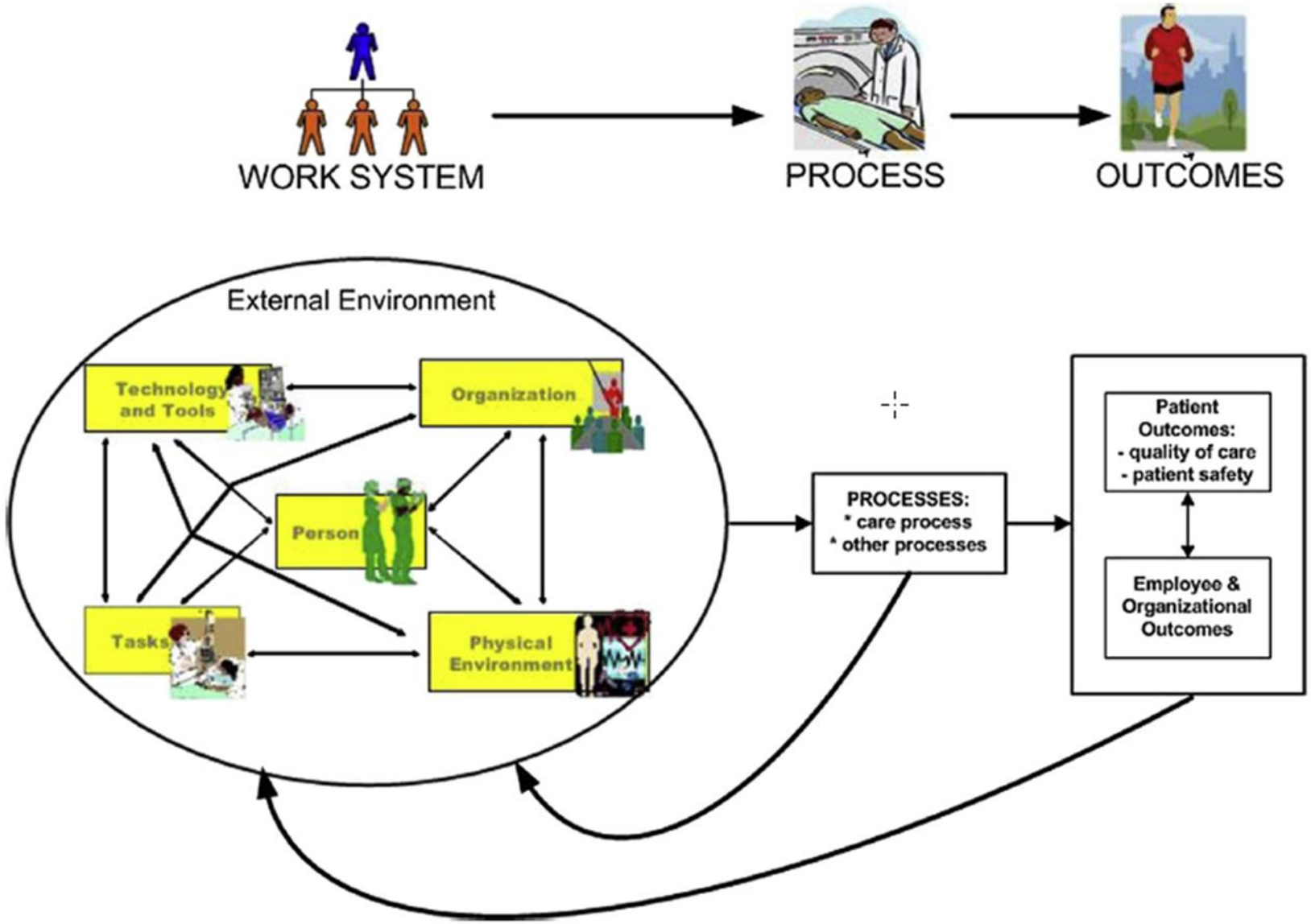
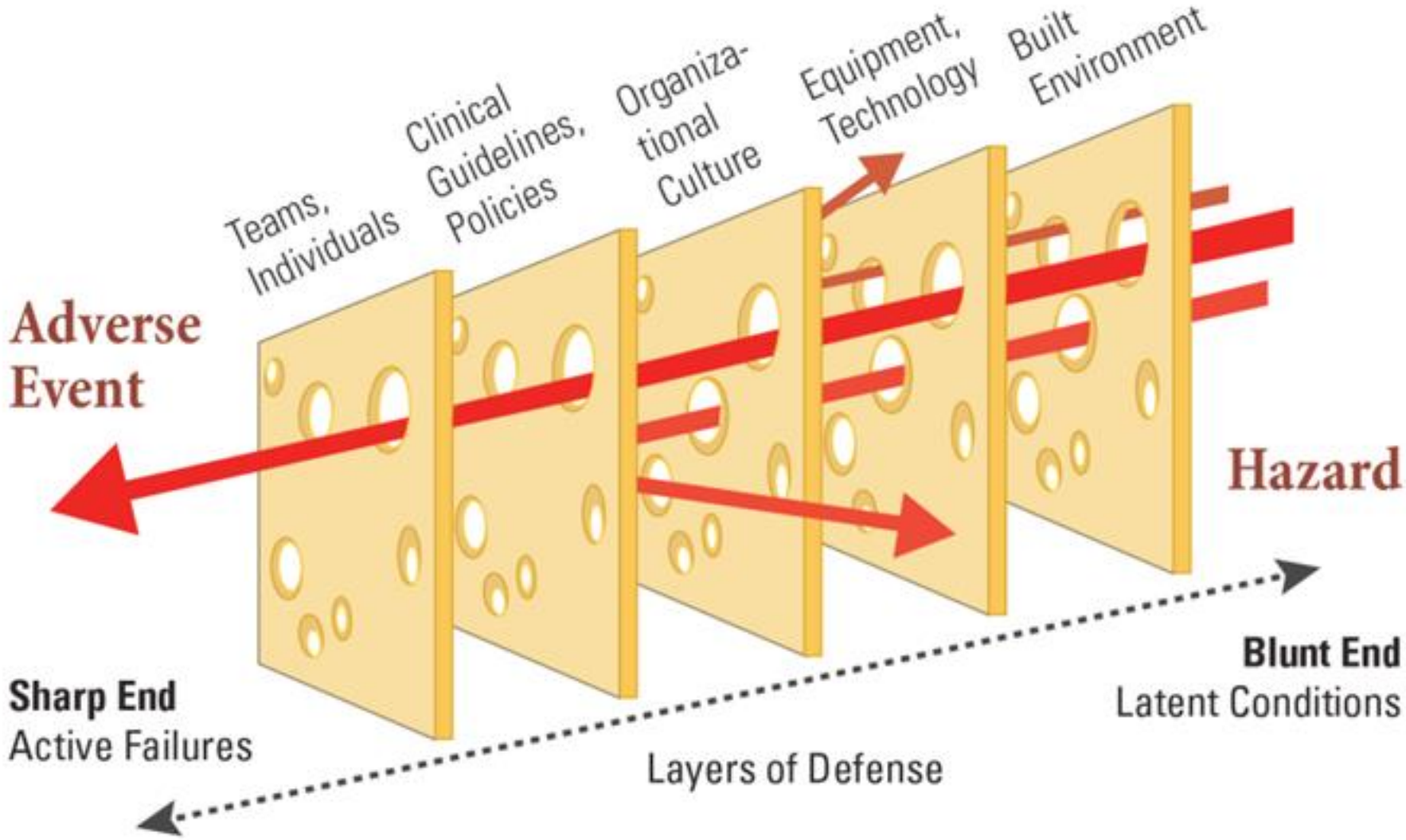


Fig. 1. The SEIPS model of work system and patient safety (Carayon et al., 2006b).

The Swiss Cheese Model (adapted from James Reason, 1991)



Ergonomics

Physical ergonomics

Cognitive ergonomics

Organizational ergonomics

Physical Ergonomics

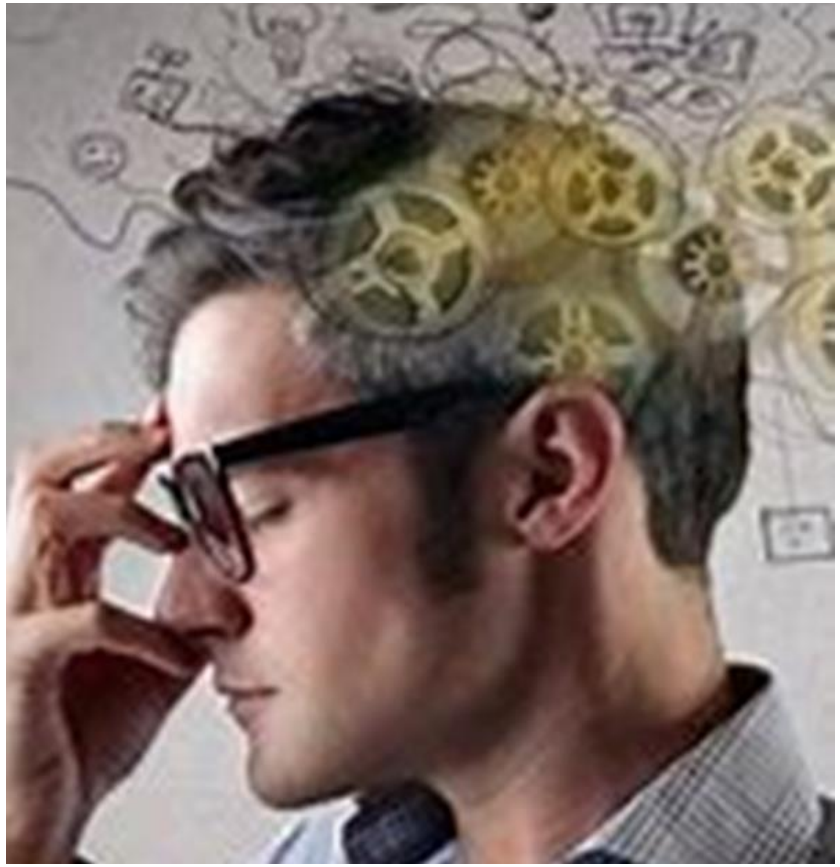
- Working postures, materials handling, repetitive movements, work-related musculoskeletal disorders,
- Workplace layout, safety and health.

Physical Ergonomics

- Working postures, materials handling, repetitive movements, work-related musculoskeletal disorders,
- Workplace layout, safety and health.

Cognitive Ergonomics

- Mental workload, decision-making, skilled performance,
- Human-computer interaction, human reliability, work stress and training as these may relate to human-system design.



We are only human – human nature

- Range of workers
  - Novice to expert
  - Fatigued to rested
  - Anxious to calm
  - Petite to tall
  - Color blind
  - Dyslexic
  - Language
  - Reading level

Organizational ergonomics - Macroergonomics

- Optimization of sociotechnical systems, organizational
- Structures, policies, and processes, teamwork, scheduling,
- Coordination/communication

Human factors engineering is about designing the workplace and the equipment in it to accommodate for limitations of human performance

Adjusting the work environment

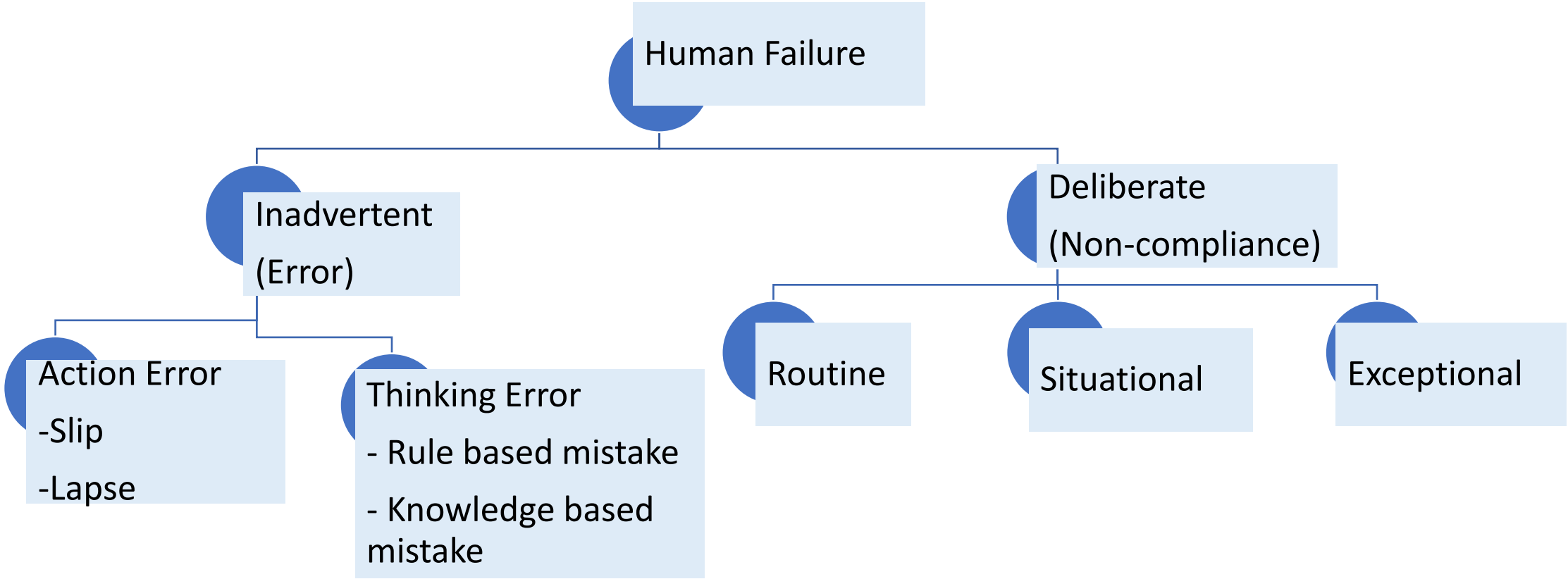
- Avoid: Avoid reliance on memory
- Make: Make things visible
- Review and simplify: Review and simplify processes
- Standardize: Standardize common processes and procedures
- Use: Routinely use checklists
- Decrease: Decrease the reliance on vigilance

What is wrong with this picture?

Ante Room

What is wrong with this picture?

Human Failure Types



References

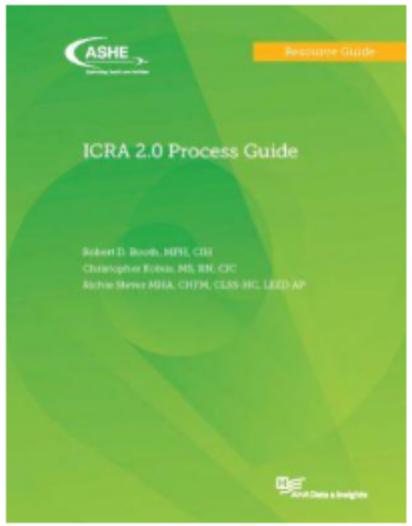
Infection Control Risk

Not Just for “Construction”

FGI 2018 Guidelines include Infection Prevention guidelines in the design phase as well as during the actual construction phase

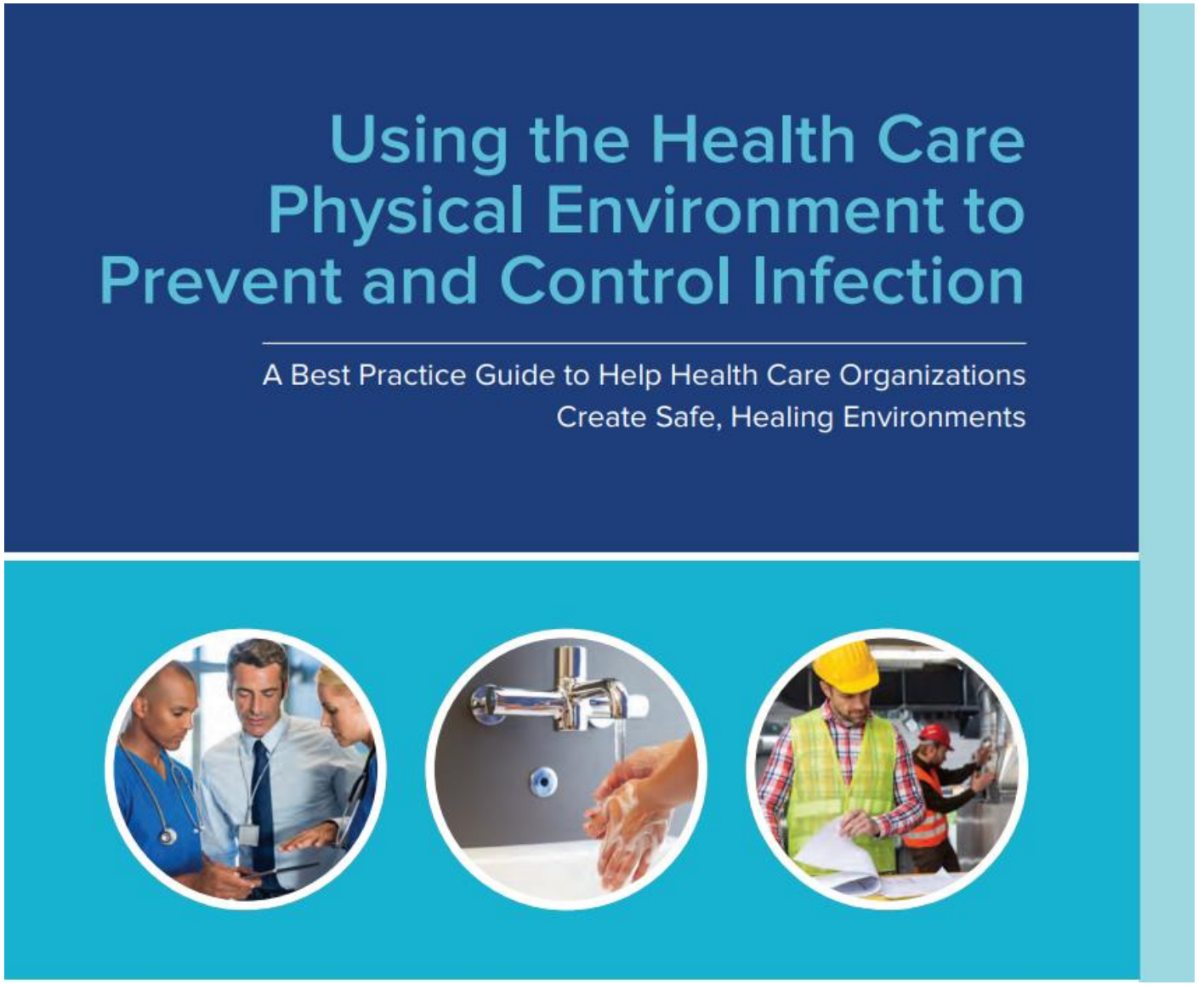
- Planning
- Design
- Construction
- Mitigation
- Monitoring

Management Monographs



ICRA 2.0 Process Guide

Full compliance with ASHE's Infection Control Risk Assessment (ICRA) 2.0 goes beyond merely completing the form; it requires an all-team approach to implement and follow the mitigation controls from before the project begins through its full completion. The ICRA 2.0 Process Guide is your how-to manual for successfully engaging the ICRA 2.0 tool. It closely follows the steps outlined on the form, but it also helps you understand where the ICRA 2.0 fits within the larger project plan and who you should include on the ICRA 2.0 team. The full ICRA 2.0 toolbox can be found at ashe.org/icra2.

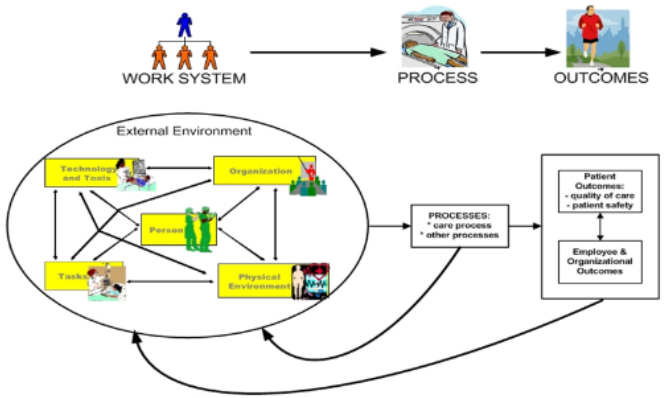


http://www.ashe.org/resources/pdfs/cdc/CDCfullbookDIGITAL.pdf

SEIPS

The Systems Engineering Initiative for Patient Safety (SEIPS)

The Systems Engineering Initiative for Patient Safety (SEIPS), housed within CQPI, is a multidisciplinary initiative applying systems engineering, human factors engineering, and quality engineering approaches. This research empirically examines systems design, quality management, job design, and technology implementations that affect safety-related patient and organizational and/or staff outcomes (Carayon et al., 2006; Karsh, et al, 2006). SEIPS was one of 18 patient safety developmental centers originally funded by the Agency for Healthcare Research and Quality (AHRQ), the only such center located in a college of engineering.



The SEIPS Model is based on the Balance Theory of Job Design (Smith and Carayon, 1989, 1995; Carayon and Smith, 2000)

SEIPS draws on its own members' expertise, scientific literature, and research findings to develop educational programs on patient safety issues. The educational programs are aimed internally for use in developing a coherent research team and externally for medical consumers, medical providers, and the research community. Ties to local medical delivery systems have been formalized. A core team, research affiliates, community affiliates, and student affiliates are part of the SEIPS structure. Oversight and direction is provided to SEIPS by the core team comprised of representatives from the UW School of Medicine and Public Health (SMPH) – Maureen Smith, MD, PhD, MPH who functions as the liaison between SEIPS and ICTR-CAP (see below for the description), Tosha Wetterneck, MD, MS, Caprice Greenberg, MD, MPH, Michelle Kelly, MD, Nasia Safdar, MD, Amye Tevaarwerk, MD, Sharon Weber, MD, Amy Liepert, MD, Brian Patterson, MD, Luke Funk, MD, MPH, and Carla Pugh, MD, PhD; School of Nursing – Linsey Steege, PhD, Roger L. Brown, PhD, Barbara King, PhD, RN, and Patricia Brennan, PhD, RN,(also College of Engineering); School of Pharmacy – Michelle Chui, PharmD, PhD ; College of Engineering – Pascale Carayon, PhD, Douglas Wiegmann, PhD, Ann Schoofs Hundt, PhD, Peter Hoonakker, PhD, Mary Sesto, PhD, John Lee, PhD, Jingshan Li, PhD, Nicole Werner, PhD, and Vicki Bier, PhD, who, as chair of the department, functions as the liaison between SEIPS and Industrial and Systems Engineering faculty.

Questions