CPB FMEA #43 Failure to prevent gross blood to the perfusionist’s face

Friends-

I am going to use this FMEA to address a pet peeve that I have had for over 40 years; the lack of eyewash stations at scrub sinks in ORs. How many of you have seen eyewash stations in the OR? I have worked in three different hospitals and visited many more. But I have never seen eyewash stations at the scrub sinks or anywhere in OR clean areas where perfusionists work. If you have them, you are lucky. Personnel Protective Equipment (PPE) is required in all ORs. But the masks and eye wear provided are only designed to protect against bloody aerosol or droplet contamination. Many perfusionists, at some point in their career, will get grossly splashed in the face with blood projected under pressure. I did it to myself when I was careless. Or it can happen at the hands of a co-worker who also was careless. It can occur during an emergency, like changing an oxygenator or repairing a circuit disruption. I think it most frequently occurs when dismantling a pump after use.

I have stewed about this for decades. When I talked to surgeons about getting eye wash stations installed at scrub sinks, their attitude was something like this; “If you choose to work in surgery, you should expect to get blood in your eyes and face on occasion.” When I asked hospital administrators, architects and engineers about installing eye wash stations they said that there was no specific JC, OSHA, CMMS or AORN requirement for eyewash stations in the OR for blood contamination; the lab, yes, the OR, no. So without surgeon support I could not get OR eyewash stations at my old hospital. Even when specialty rooms for ECMO were built in the ICU, I tried to get eyewash stations installed there. No go, despite the occurrence of several ECMO ICU nurses getting splashed in the eyes despite their PPE during the 28 years that I was active in our ECMO program.

I could write a lot about OSHA requirements to protect workers from blood borne pathogens. See the link below, you can look them up for your selves. But I am trying to keep this FMEA as short and simple as possible and focused on eye and face contamination. I think it is sufficient to say that OSHA (JC, CMMS and AORN for that matter) does not specifically mention the requirement for eyewash stations in operating rooms. Add to that the risks from ever more caustic sterilizing solutions needed for heater/coolers, the need is clearly there. It’s just that nobody seems to want to do anything about it. And it is not just perfusionists at risk. I would guess that in any large, multi-room OR someone (a surgeon, anesthesiologist, nurse, scrub tech or cleaning crew member) gets blood in their eye, nose or mouth on a weekly basis. You’ve all seen someone trying to rinse the blood away from their face under a scrub sink faucet. You probably have done that yourself.

<https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=1555&p_table=DIRECTIVES>

OSHA requires eyewash stations wherever there is a possibility that caustic or corrosive chemicals could splash into the eyes. But blood and body fluids are not considered to be caustic or corrosive by any authoritative entity. And I do not think the use of PPE negates the need for an eye wash station. Accreditation organizations like JC and CMMS do not require or specify the location for eye wash stations in cases of blood contamination. The facility, at its option, is expected to conduct a risk assessment to determine if and where eye wash stations are needed. So if a facility does not conduct such a risk assessment, then they are not in violation of any JC or CMMS regulation.

Epidemiologists claim that the risk of acquiring an infection by blood contact with the face and eyes is quite small. That may be true, but there is still a risk. I was seriously infected by an accidental needle stick back in the 1970’s. It took me 9 months to recover and I have lifelong ramifications associated with that infection. So I am gun shy when it comes to blood borne infections. I think the worst thing about accidental exposure is the fear and emotional trauma the victim experiences. Whenever a person’s face is grossly splashed with another person’s body fluid, including blood, there is often an immediate revulsion. Whenever such a thing happened, I saw perfusionists and other healthcare workers gag, freeze with shock and even cuss loudly. But the one thing all these victims have in common is the intense and immediate desire to wash their face, mouth, nose and eyes. Nobody completes a case with a grossly bloody face if they can help it.

This traumatizing experience is not even recognized as such by OHSA, JC, CMMS or AORN. If someone is verbally abused\* on the job, that is recognized as workplace trauma, but a face full of blood, no. Then there are the privacy issues that may arise if the facility requires the patient and perfusionist to undergo HIV and HBV testing. Eyewash stations won’t prevent that. I am just trying to illustrate the compounding traumatizing effect such an incident can have.

Perfusionists, ECMO specialists and hemodialysis nurses are the only healthcare workers that I know of that routinely operate equipment containing a large amount of blood under pressure that can suddenly and accidentally escape directly into their face. What about lab people? They are exposed to blood. But the volumes they are exposed to rarely exceed 10 mls and it is only under pressure when it is in a centrifuge. Besides, labs are required to have eyewash stations for other reasons.

\*Verbal abuse is the excessive use of language to undermine someone's dignity and security through insults or humiliation and may cause profound and serious psychological injury. <http://www.prevention-violence.com/en/int-151.asp>

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FAILURE: Failure to prevent gross blood contamination to the perfusionist’s face.

EFFECT:

A. The risk of emotional trauma to the perfusionist has an indeterminate severity.

B. The risk of infection to the perfusionist has an indeterminate severity.

1. Acute risk depends upon:

a. the pathogen concentration.

b. the perfusionist’s resistance based on current health, predisposing diseases, age, sex, and genetic heritage.

c. the portal of entry; inhalation, ingestion, mucous membrane, skin or direct inoculation.

d. the virulence of the organism.

2. Chronic risk: infection can affect organ systems for extended periods causing death years after exposure.

3. Most severe infection hazards:

hepatitis B virus (HBV), and human immunodeficiency virus (HIV).

(Biological agents--Refer to OSHA Instruction CPL 2-2.44B: Enforcement Procedures for Occupational Exposure to HBV and HIV.)

CAUSE: Gross blood contamination is always accidental and unexpected. Certain situations are more likely to result in contamination:

1. During tear down and disposal of used perfusion-related circuits.

2. During emergent repair or component replacement of a perfusion-related circuit.

3. After accidental pressurization of circuit with sudden, uncontrolled release of pressure by unclamping or circuit rupture.

4. Most operating room personal protective equipment (PPE) is inadequate to protect the perfusionist’s face against a large splash or projectile spillage originating from the CPB pump.

PRE-EMPTIVE MANAGEMENT:

1. The emergence of AIDS led to the 1985 CDC recommendation and the 1991 OSHA implementation of universal precautions using PPE for protection from fluid and blood borne pathogens. <https://www.osha.gov/SLTC/etools/eyeandface/employer/requirements.html>

2. Perfusionists should receive ongoing biohazard safety training including PPE.

3. Installation of an eyewash station should be required in any area with high risk for blood and bloody fluid splashes due to perfusion-related procedures or clean-up and disposal of CPB, ECMO, autotransfusion and dialysis circuits being performed in the area. (\* If there are no nearby eyewash stations, the Harmfulness RPN should be increased to 5, making the Total RPN 5x1x5x3 = 75).

4. Eyewash stations should be available within 55 feet of potential accident sites (American National Standards Institute; ANSI).

5. The eyewash station should deliver tepid water (60-100 degrees F) at a rate of 1.5 L/min for 15 minutes.

6. Eyewash stations should be designed to deliver fluid to both eyes simultaneously with hands free.

MANAGEMENT: Perfusionists should wash affected areas (face, eyes, nose and mouth) immediately after direct contact with blood or other body fluid.

1. Go to the eyewash station .

2. Push the lever. (An ANSI compliant unit will activate with one single motion, the dust covers will pop off and the flushing water will begin to flow out from the faucet heads. Once activated, the unit will stay on hands free.)

3. Get eyes directly in the stream of the flushing water.

4. Hold eyes open with fingers. (An ANSI compliant unit will be hands free.)

5. Roll eyes.

6. Rinse eyes, mouth, nose and entire face as needed.

7. Flush for fifteen minutes

8. Gently take out contact lenses while flushing. Don’t delay the flushing to take lenses out.

9. Afterwards seek medical assistance and document the exposure according to the employer’s policies.

10. Post-traumatic stress disorder (PTSD) therapy should be available if needed for the perfusionist or other employees, particularly if the employees experience an adverse outcome like infection or emotional trauma.

RISK PRIORITY NUMBER (RPN):

A. Severity (Harmfulness) Rating Scale: how detrimental can the failure be:

1) Slight, 2) Low, 3) Moderate, 4) High, 5) Critical

(Since the Harmfulness is indeterminate I would give this failure a Moderate RPN, 3’. If there are no nearby eyewash stations, the Harmfulness RPN should be increased to 5, making the Total RPN 5x1x5x3 = 75).

B. Occurrence Rating Scale: how frequently does the failure occur:

1) Remote, 2) Low, 3) Moderate, 4) Frequent, 5) Very High. (Gross blood to the face is rare. So the Occurrence is Remote. The RPN would be a 1.)

C. Detection Rating Scale: how easily the potential failure can be detected before it occurs:

1) Very High, 2) High, 3) Moderate, 4) Low, 5) Uncertain. (The Detectability RPN equals 5 because the incident is always accidental and unexpected. There is no way to detect if it is going to occur.)

D. Patient Frequency Scale: 1) Only a small number of patients would be susceptible to this failure, 2) Many patients but not all would be susceptible to this failure, 3) All patients would be susceptible to this failure. (All perfusionists are at risk. So the Frequency RPN would be 3.)

Multiply A\*B\*C\*D = RPN. The higher the RPN the more dangerous the Failure Mode.

The lowest risk would be 1\*1\*1\*1\* = 1. The highest risk would be 5\*5\*5\*3 = 375. RPNs allow the perfusionist to prioritize the risk. Resources should be used to reduce the RPNs of higher risk failures first, if possible. (The total RPN for this failure could be as low as 3\*1\*5\*3 = 45, or as high as 5\*1\*5\*3 = 75 if no eye wash stations are available.)