Safety Report

Safety Improvement: Planning to do Better

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News from the Safety Committee

How does your hyperbaric program measure up?

Measurements are a common tool used in business to assess all manner of processes and outcomes – client satisfaction, staff performance, growth, and financial progress, to name a few. An unsafe operation, however, essentially negates all enhancements when the consequences of accidents outweigh the operation's improvements.

On the other hand, measurements can be tedious when they serve alternate agendas. Measurement for the sake of measurement, measurement to satisfy curiosity, and measurement to keep people busy are good examples of where the impact does not warrant the effort.

Safety is key. We can reduce the potential for adverse safety events with effective and well thought-out operational procedures, awareness and training, involvement and commitment, discipline and attention to detail. However, accidents happen in all businesses, including in hyperbaric chambers. A working environment that promotes openness among its employees has a higher potential for wider participation and greater consensus in improving operational safety.

All safety-related anomalies should be considered. This means not only accidents, but also incidents and near-misses. A program that considers all events that have the potential for damage, loss, injury or fatality is a program likely to succeed.

A Safety Improvement Program (SIP) in the hyperbaric facility must contain several elements to ensure success. This article will discuss a progression of steps, illustrate a typical process using a real-life example, provide practical and simple tools to decide on suitable measurements, and offer insights into an effective SIP.

After all, a facility needs to know how it is doing before it can do better.

A safety-based monitoring program: the basics

First, know what is important. Events with the potential to cause negative consequences, ranked considering the more severe and the more important, will determine what is at the top of the list. Select a review period to help determine what events have occurred in the past and their frequency. This will help decide if monitoring is in fact needed.

Aspects requiring continuous monitoring – including those with potential for damage, loss, injury or fatality – should be clearly identified. Management should approve the program and then observe progress, with commitment and acknowledgment. Empower those implementing the program and remain interested in the process and the outcomes.

Accidents, incidents and near-misses are obvious and informative indicators, but violations of procedures, lack of attention to detail, ill discipline and ignorance can also illustrate areas of concern. Suitable 'predictors' (used to assist predicting the number of future events and usually referred to as denominators) in the hyperbaric medicine field are usually easy to identify.

Good examples include:

- number of treatments;
- number of patients;
- number of patients received (or considered);
- number of chamber excursions; and
- number of operational days.

Possible incidents are numerous. Operations must take care to be practical and realistic. Very low occurrences will not provide meaningful measures. The following list includes some of the potential hazards to consider.

Note potential hazards

- violation of procedures
- incomplete or lack of emergency action plans
- not practicing drills
- not recording drills
- chamber system start-up or shut-down actions skipped
- contraband entering the chamber
- patients not inspected
- ignorance of rules
- patients denied treatment
- patient non-compliance
- equipment not serviced
- equipment breakdowns
- out of back-up gas
- unauthorized work on facility
- non-suitable materials used
- air contamination
- patient records not completed
- not updating staff
- staff not using personal protective equipment/PPE
- staff injuries/illnesses

Apply HIRA

The founding principle of HIRA (Hazard Identification and Risk Assessment) should be applied, each hazard assessed considering the probability of an event, the frequency of exposure, and then a realistic measure of the worst-case scenario.

Identify indicators

Next, we identify type of indicator.

- ***Leading indicators*** measure the risks where preventive actions can be applied.
- ***Lagging indicators*** measure the outcome from the risk – i.e., too late to prevent.

Usually the lagging indicator determines the need to measure. However, it would be wise to then select a correlating leading indicator based on the critical control point (CCP).

Sensible ways to select which risks to consider, based on real occurrences experienced in the facility, or, preferably, potential identified occurrences before they have actually occurred, could include:

- Focusing on high-risk and high-impact (significant consequence) events.
- Identifying the CCPs – those steps that control the hazard rather than the outcome: e.g., air quality tests not done rather than air contamination.
- Focusing on processes that could result in multiple outcomes: e.g., possible damage, loss, injury and/or fatality.

Avoid 'overkill'

Staff should not be overburdened with measurements that will prove onerous to maintain and consume excessive amounts of their time. Staff have many other obligations, and so often in the hyperbaric unit they are often already overworked.

The monitoring process: a step-by-step explanation

The monitoring process can be explained though the following 12 steps:

1. Determine the risks using the HIRA process.
2. Decide which risks to measure. Focus on those with the greatest impact.
3. Decide on the appropriate type of indicator – lagging or leading.
4. Develop clear definitions of what is to be measured.
5. Train everyone who will be performing measurements.
6. Implement the monitoring process.
7. Set realistic and achievable safety-related goals.
8. Provide regular feedback.
9. Refine and improve the process.
10. Analyze repetitive events to determine root causes.
11. Use the results to adjust operational procedures to improve safety.
12. Continue to monitor to see if the goals can be achieved.

Make sure management is actively involved

Without management providing resources, observing, taking an interest in the process and making decisions based on results, the entire monitoring process will likely be a waste of time.

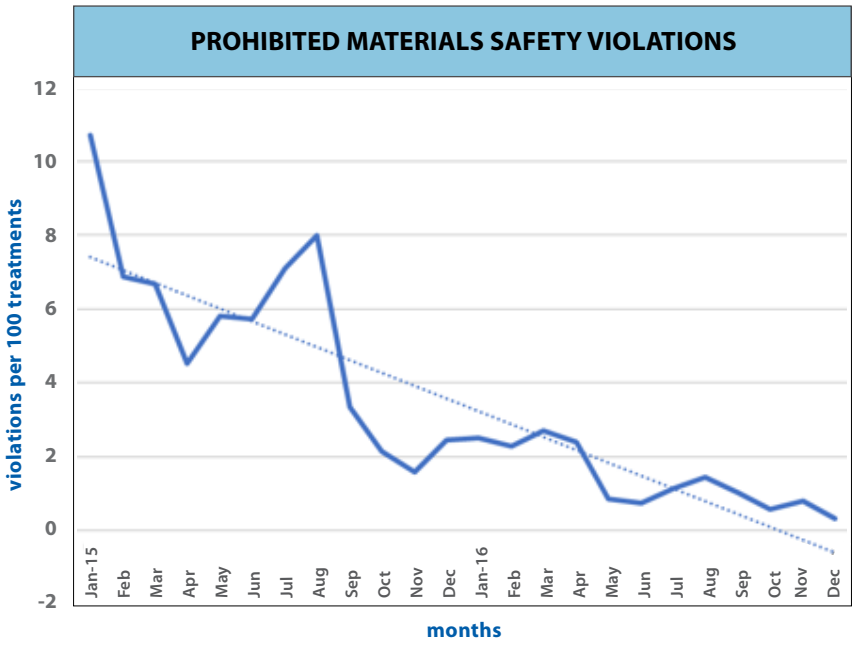
An adverse event: illustrating the process

Abstract theory does not always explain how to embark on such a process. A real and much-feared but perhaps infrequent risk for a hyperbaric unit, and one that has led to injuries and fatalities, is patients taking contraband equipment or materials into the chamber.*

Infrequent, however, does not imply negligible. There is always a probability that exposure to inappropriate equipment/materials can lead to very serious consequences.

This is a significant risk. Even one fatality is too many.

* This is a known issue and National Fire Protection Association. Standard for Health Care Facilities, NFPA 99, Annex A 14.3.1.6.13 recommends that the control measures to prevent patients or staff taking contraband equipment into the chamber, be monitored to ensure that these measures are having the desired effect.



Contraband cannot always be seen, the hazards understood, nor may it even be expected to be there.

What are the possible causes? Knowing these can assist in determining preventive measures, and provide indicators for measurement of any exposures or non-compliant activities as well.

Analyze the problem

Possible causes for contraband can include:

- lack of initial patient orientation
- poor/inadequate initial patient orientation
- lack of patient briefing prior to treatment
- lack of physical pat-down
- client non-compliance due to morbidity or depression
- client lack of understanding (e.g., language)
- client insecure without item
- contaminated clothing used
- inappropriate clothing used
- brand or model of acceptable equipment changed
- ignorance of staff to specific item hazards

It is hard to dispute that a several of these occurrences exist in most situations. Their being missed is the issue. History has shown that these misses have resulted in serious if not catastrophic events.

If known causes can be identified, it is logical to implement suitable risk mitigation strategies prior to commencing with measuring. Risk mitigation would usually imply changes to 'operational' processes, together with education.

Next - what indicators could be measured? We have two choices:

- A lagging indicator, defined as the number of items actually discovered during or after a treatment.
- A leading indicator, defined as the number of items detected prior to patient entering the chamber.

A denominator, or predictor, could be selected from any of the following:

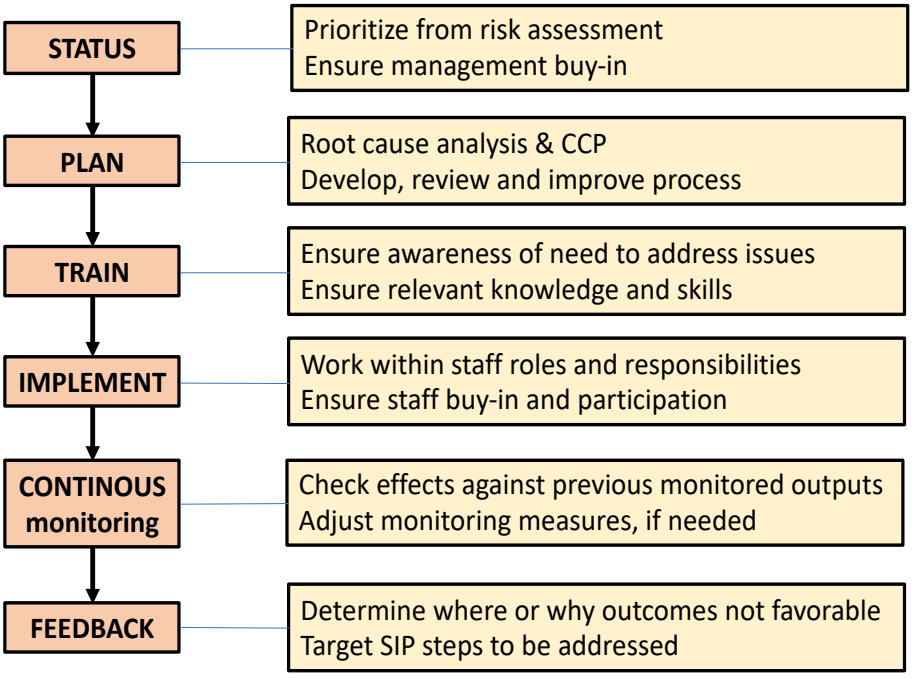
- number of patients treated
- number of treatments given
- number of chamber excursions
- number of operational days

A logical choice would be the number of patients treated each month.

The leading measure could thus be the number of items discovered prior to entering the chamber, including patients assuming that something is safe (after orientation and after preparation for the treatment) measured against number of chamber dives. This measure could be taken per 100 treatments per month (one often needs to multiply the response measure by a suitable factor in order to display a meaningful value).

A busy treatment facility with a clear non-compliance record might thus measure the failure rate as the number of incidents per actual treatments, multiplied by 100. The chart above illustrates a run-chart with certain events recorded to explain changes in failure rates.

SAFETY IMPROVEMENT PLAN



Implementation of the SIP: How we can do better

Training is an essential aspect of any improvement program. Staff should be thoroughly briefed, the measures clearly defined and explained, and responsible members identified and trained in how to collect and record the data.

Implementation is usually the most difficult step to achieve. The beginning is usually characterized by much enthusiasm and ambition – everyone wants to be involved. The outcomes will surely reflect well on them, and management acknowledgment carries with it the usual expectations of financial rewards.

The reality is that commitment to the program diminishes with time; especially where results are not as expected and the 'rewards' eventually viewed as wishful thinking. It is important to provide regular feedback, display commitment and interest by management, and continue to explain the needs.

Feedback should be given at least monthly, and run-charts updated similarly. Staff should be encouraged to participate. There is some merit to using a carrot-and-stick method to retain commitment. Financial rewards are not the only incentive.

The most important part of this process is determining whether the program is working. The results should be analyzed and perhaps subjected to renewed root cause analyses. Perhaps the CCPs are not really the points around which unfavorable events are centered. Are your targets unrealistic, or even too low?

At this stage, risk mitigation measures could be reassessed for impact, processes further streamlined, and recourse and training reassessed. Monitoring should continue all the while.

The complete SIP

Simple flow diagrams are often the most effective way of illustrating what might read as a complex and confusing program.

The above illustration is intended to summarize the process in a language that can perhaps be more easily comprehended.

So, how does your hyperbaric program measure up? The answer is multifaceted. It's essential to strike a balance between the effort of monitoring, the quest to know how safe you are and the potential improvement to the safety of the operation. What is the price of failure? Heed the warning signs. ■