**CDR 14: Process: Blood glucose check prior to hyperbaric oxygen therapy (HBOT) treatment**

**MEASURE STEWARD:**
US Wound Registry and the Undersea and Hyperbaric Medical Society (UHMS)

This measure was developed via a consensus process in collaboration with the Undersea and Hyperbarics Medicine Society (UHMS) Quality Measure Committee.

**DESCRIPTION:**
Percentage of HBOT treatments of patients aged 18 years and older who had their blood glucose level assessed prior to undergoing hyperbaric oxygen therapy

**NUMERATOR:**
All HBOT visits with documentation of serum glucose determination at the time of the treatment.

**DENOMINATOR:**
All HBOT visits with documentation of serum glucose determination at the time of the treatment.

**RATIONALE:**
Studies show all patients undergoing hyperbaric oxygen therapy (HBOT) experience a reduction in blood glucose levels compared to pre-hyperbaric oxygen treatment levels. In 2005, a retrospective analysis of 13,510 hyperbaric oxygen therapy treatment records from 25 clinics. Among the 10,277 encounters in which the patients’ initial glucose was >150 and who were given no feeding prior to HBOT, the average decrease in blood sugar was 36.1 mg/dl and in 4.2% of treatments, the post treatment glucose was <100 mg/dL. Among the patients who were fed prior to HBOT, 11.6% presented with glucose < 100 and despite feeding, in 19.6% of 3,277 encounters, the patient had a post-HBOT glucose < 100.

In another observational study, insulin-dependent patients experienced a more severe decrease in blood glucose than non-insulin dependent patients with 19% of NIDDM patients having a drop of 72 mg/dL or more and requiring intervention before HBOT. The mechanism of this possible effect of HBOT has not been elucidated. However, studies have shown an increase in activity of insulin-receptor sites and changes in insulin sensitivity due to up-regulation of PPAR-γ signaling associated with hyperbaric oxygen. In one study, insulin sensitivity increased within 3 days of hyperbaric oxygen treatment, and this was maintained for 30 sessions. Animal studies also have shown HBOT has a direct effect on the enhancement of glucose metabolic capacity and uptake in the skeletal muscle. It is possible that the observed decreases in serum blood sugar are simply an effect of the timing of hyperbaric therapy in conjunction with the peak effect of diabetes medications. Since patients are usually not able to eat or drink *ad lib* during HBOT, the drop in blood sugar may be coincidental with the end of the hyperbaric session. This does not mean that the effects are benign since a decrease in serum blood sugar has been associated with a variety of side effects of HBOT such as otic barotrauma as well as hyperoxic seizure.

Diabetic patients whose blood sugar is evaluated prior to HBOT and who are provided with a source of glucose if the levels are <120 mg/dL are less likely to have significant decreases in blood glucose following HBOT. Since the side effect profile of HBOT is relatively low, it is unclear how much the risk of HBOT is increased by failing to assess blood glucose prior to treatment. However, serum blood glucose is
a commonly performed, safe, low risk test which provides valuable information regarding the status of a diabetic patient. It should be remembered that patients who undergo HBOT, particularly in monoplace chambers (the most commonly used type), are physically separated from medical staff inside the pressure vessel. Should a healthcare emergency arise, several minutes are required to decompress the chamber before clinicians have physical access to the patient. Extremes of serum blood glucose (high or low) can affect the patient’s mental status and ability to verbally communicate his or her state of physical status during HBOT. Thus, it is medically advisable to know whether the patient’s blood sugar is within a normal range prior to initiating a medical treatment like hyperbaric oxygen therapy.

Patients whose fingerstick blood glucose levels are <120 mg/dL may receive oral calorie intervention before HBOT as well as a post treatment reassessment of blood sugar. However, whether oral calorie intervention is appropriate depends on many complex factors including the timing of the patient’s most recent meal and the time and type of their previously administered diabetes medications. This decision should be made by the hyperbaric physician supervising the administration of HBOT therapy.

**CLINICAL RECOMMENDATION STATEMENTS:**
There is general consensus that best practice to help ensure the safety of patients undergoing HBOT is to measure blood glucose via finger stick on all diabetic patients prior to HBOT.