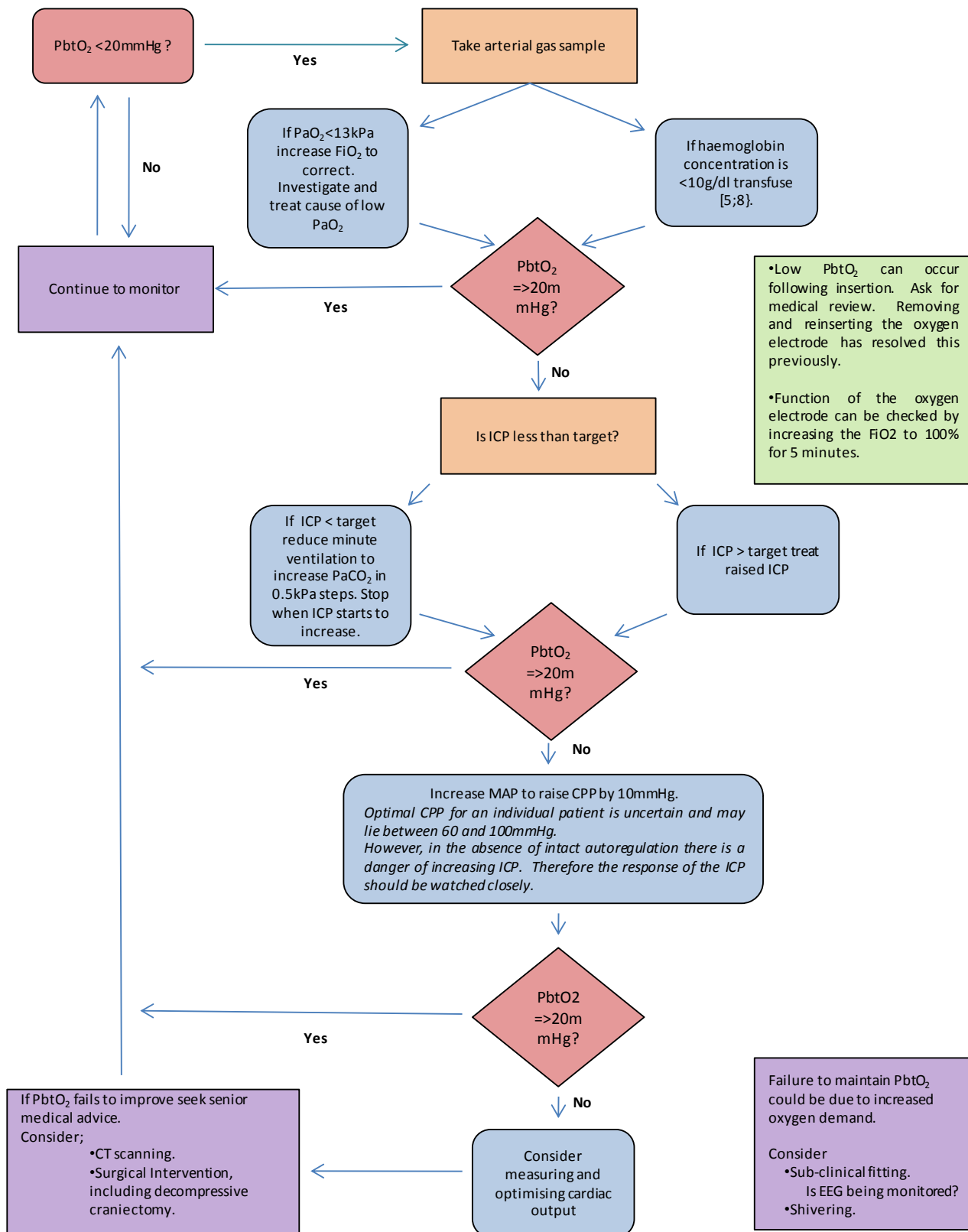


**Licox Brain Tissue Oxygen Monitoring Algorithm**

We aim to keep  $\text{PbtO}_2 \Rightarrow 20\text{mmHg}$ . There are several steps that can be taken to correct a low  $\text{PbtO}_2$ .



## Notes

The integrated Licox brain tissue oxygen tension (PbtO<sub>2</sub>), temperature and intracranial pressure (ICP) monitoring system should be the standard form of invasive ICP monitoring in patients with traumatic brain injury (TBI).

- The literature and our own clinical experience demonstrate that significant cerebral hypoxia can exist despite achieving guideline values of cerebral perfusion pressure (CPP) and intracranial pressure (ICP) [1;2].
- Although the use of PbtO<sub>2</sub> monitoring is not supported by randomised controlled trials there are published studies in which the measurement and correction of PbtO<sub>2</sub> is associated with improved outcomes [3-5].
- Episodes of low PbtO<sub>2</sub> are associated with death. Early studies demonstrated this association for very low PbtO<sub>2</sub> (<6mmHg) [6;7]. More contemporary work suggests that the threshold for concern is much higher, between 15 and 25mmHg [4;5;8].
- Management of CPP, ICP, haemoglobin, fever, fitting and shivering have been used to help correct a low PbtO<sub>2</sub> [5;9].
- The Licox system is **NOT** MRI compatible.

## Reference List

- [1] Gopinath,S.P., Robertson,C.S., Contant,C.F., Hayes,C., Feldman,Z., Narayan,R.K. and Grossman,R.G., Jugular venous desaturation and outcome after head injury, J. Neurol. Neurosurg. Psychiatry., 57 (1994) 717-723.
- [2] Stiefel,M.F., Udoetuk,J.D., Spiotta,A.M., Gracias,V.H., Goldberg,A., Maloney-Wilensky,E., Bloom,S. and Le Roux,P.D., Conventional neurocritical care and cerebral oxygenation after traumatic brain injury, J. Neurosurg., 105 (2006) 568-575.
- [3] Meixensberger,J., Jaeger,M., Vath,A., Dings,J., Kunze,E. and Roosen,K., Brain tissue oxygen guided treatment supplementing ICP/CPP therapy after traumatic brain injury, J. Neurol. Neurosurg. Psychiatry., 74 (2003) 760-764.
- [4] Stiefel,M.F., Spiotta,A., Gracias,V.H., Garuffe,A.M., Guillaumondegui,O., Maloney-Wilensky,E., Bloom,S., Grady,M.S. and LeRoux,P.D., Reduced mortality rate in patients with severe traumatic brain injury treated with brain tissue oxygen monitoring, J. Neurosurg., 103 (2005) 805-811.
- [5] Spiotta,A.M., Stiefel,M.F., Gracias,V.H., Garuffe,A.M., Kofke,W.A., Maloney-Wilensky,E., Troxel,A.B., Levine,J.M. and Le Roux,P.D., Brain tissue oxygen-directed management and outcome in patients with severe traumatic brain injury, J. Neurosurg., 113 (2010) 571-580.
- [6] van Santbrink H., Maas,A.I. and Avezaat,C.J., Continuous monitoring of partial pressure of brain tissue oxygen in patients with severe head injury, Neurosurgery., 38 (1996) 21-31.
- [7] Valadka,A.B., Gopinath,S.P., Contant,C.F., Uzura,M. and Robertson,C.S., Relationship of brain tissue PO<sub>2</sub> to outcome after severe head injury, Crit Care Med., 26 (1998) 1576-1581.
- [8] Smith,M.J., Stiefel,M.F., Magge,S., Frangos,S., Bloom,S., Gracias,V. and Le Roux,P.D., Packed red blood cell transfusion increases local cerebral oxygenation, Crit Care Med., 33 (2005) 1104-1108.
- [9] Oddo,M., Frangos,S., Maloney-Wilensky,E., Andrew,K.W., Le Roux,P.D. and Levine,J.M., Effect of shivering on brain tissue oxygenation during induced normothermia in patients with severe brain injury, Neurocrit. Care., 12 (2010) 10-16.