

- Purpose:** The maximum surgical blood order schedule (MSBOS) is a tool for transfusion services, surgical services and anesthesia to predict blood utilization based on historical experience within an institution. The MSBOS is meant as a guide and should not interfere with the use of clinical judgment related to individual patient needs. A well designed MSBOS process provides flexibility to the user. The ultimate goal of using a MSBOS is to raise efficiency without compromising patient safety.¹
- Scope:** The MSBOS can be applied to elective surgical procedures that carry a risk of transfusion. Mintz et al. 1976 (as cited by Penney 1982) found that a group and screen provides adequate cover for procedures that average <0.5 units of blood transfused per patient.² For those procedures likely to require blood, the recommended blood order for a procedure should provide for the transfusion needs of 90% of patients.²
- Methods:** Ideally, the data used to create the MSBOS is taken from the historical experience within an institution.³ Using institutional specific data will help reduce some of the barriers to implementation as a result of challenges to the validity of the suggested ordering schedule.

To create a MSBOS, the following information will be required:

- list of commonly performed elective surgical procedures
- number of red cell units ordered by procedure
- number of red cell units transfused by procedure

Additional optional data:

- ordering physician
- pre-op hct

A comparison between the number of units ordered and the number of units transfused by procedure may be performed either prospectively or retrospectively. The length of time for data collection will be dependent upon the number of procedures performed. The data

¹ Atrah, HI Galea, G Urbaniak, SJ The sustained impact of a group and screen and maximum surgical blood ordering schedule policy on the transfusion practice in gynaecology and obstetrics Clin.Lab.Haem 1995,17,177-181

² Penney, GC Moores, HM Boulton, FE Development of a rational blood-ordering policy for obstetrics and gynaecology British Journal of Obstetrics and Gynaecology February 1982, Vol. 89, pp. 100 – 105

³ Fung MK et al Ed. Technical Manual 18th Edition. Bethesda MD: AABB, 2014, p227

collection may either be defined over a specific timeframe or for a pre-determined number of procedures performed.

- i. Retrospective study – a review of 1 – 2 years historical data, depending upon the number of surgical procedures performed.
- ii. Prospective study – gather information related to surgical procedures comparing blood ordered vs blood on a “real time” basis
- iii. Benchmarking - for new facilities or new procedures where historical institutional specific data is not available, data from another facility may be used in consultation with the facilities’ surgeons and anesthesiologists with agreement to review site specific data and revise as necessary within a pre-determined time

4. **Discussion:** Over-ordering of blood for surgical procedures raises surgical costs and removes blood from inventory thereby increasing the chance of wastage⁴. As mentioned in the introduction, the MSBOS is meant as a guide and does not replace the need for individual patient assessment and customization based on the patient’s condition. In fact, there are those who suggest that the MSBOS be taken a step further and customized to be not only based on the procedure, but should calculate the anticipated blood loss based on the patient’s total blood volume⁵. While the merits of such a system are obvious, consideration of time and resources would ultimately determine if this was feasible.

The successful implementation of the MSBOS is directly related to the degree of cooperation and commitment by the surgeons, anesthesiologists and transfusion service medical director. Flexibility must be carefully built into the ordering process to allow for individual clinical judgment related to exceptional cases without opening a window for physicians to order based on personal preference. For the MSBOS to be successful, the technologists in the Transfusion Medicine Service need to be empowered to provide only that which was set out in the MSBOS unless exceptional circumstances exist as confirmed by the ordering MD. Ideally, exceptions would require a consult with the transfusion medicine medical director. Examples of exceptions could include patients with anemia or bleeding disorder.³

5. **Monitoring:** Audits of ordering practice should be performed on a predetermined basis or when there is a change in surgical technique. Monitoring physician ordering practice

⁴ Walczak S, Scharf J Transfusion Cost Containment for Abdominal Surgery with Neural Networks Neural Processing Letters 11:229-238, 2000

⁵Palmer T, Wahr J, O’Reilly M, Greenfield ML Reducing Unnecessary Cross-Matching: A patient-specific Blood Ordering System is more accurate in predicting who will receive a blood transfusion than the maximum ordering system Anesth Analg 2003;96:369-75

related to blood products is a recommended activity to be undertaken by the hospital transfusion committee.⁶ The MSBOS can then be revised to reflect changes in practice. If there is no “gate keeping” performed prospectively, retrospective review of ordering practice will also facilitate discussion related to compliance.

6. **Approval:**

Transfusion Committee
Medical Advisory Committee

7. **Conclusion:** Use of the MSBOS results in a reduction in workload related to inventory management and crossmatching therefore providing more time for dealing with stats, antibody investigation etc. and ultimately results in a reduction in stress level for technologists in the Blood Transfusion.⁷ Standardizing ordering practice is applicable in all institutions and it may be particularly beneficial for use in teaching facilities where preoperative ordering is often done by interns and residents unfamiliar with blood utilization related to specific procedures and who have no previous experience within the institution. Using a MSBOS in conjunction with electronic crossmatching may result in a further reduction in workload providing the Transfusion Medicine Service is able to respond to the demand for units, if required, in a timely manner.

⁶ CSA, Z902-15 Standards for Blood and Blood Components, Dec 2015

⁷ Voak D, Napier JAF, Boulton FE, Cann R, Finney, RD et al. Guidelines for implementation of a maximum surgical blood order schedule. Clin.lab.Haemat 1990, 12, 321-327