



Ministry of Health of Kuwait

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Ministry of Health

Title: The Ministry of Health blood transfusion management policy 1: Maximum Surgical Blood Ordering Schedule (MSBOS)	
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1. Policy Introduction:

The Maximum Surgical Blood Ordering Schedule (MSBOS) is a tool for surgical , anaesthesia & transfusion services to guide blood product utilization based on the hospital's practice and experience in relation to the above mentioned services. It designates the appropriate pre- transfusion testing based on the estimated quantity of blood product units required to be transfused , in the periprocedural setting (pre, intra and or post) . It is intended to facilitate the potential need of 90 %of patients undergoing specific interventional procedures (or procedures with a >10% chance of requiring allogenic blood). Adoption of the MSBOS allows for efficient allocation of blood products on the day of a scheduled procedure .

Effective use of the MSBOS will yield a reduction in the amount of unnecessary type and screen blood samples drawn from the patient, and unnecessary testing will not be performed. To ensure efficient use of blood products, an ordered crossmatch-to-transfusion (C:T) ratio of less than or equal to (\leq) 2 is considered appropriate.

MSBOS are useful and beneficial for:

- 1-The promotion of efficient use of blood inventory.

2-The avoidance of the outdating of blood units as the shelf life of a unit decreases each time a unit is held or crossmatched for a patient that does not require transfusion.

3-The reduction of unnecessary pre-transfusion crossmatch testing.

4-The enhancement of quality of care in patient blood management.

5- Enhancing cost effectiveness (decreasing unnecessary pre-transfusion crossmatch testing and outdating of blood products).

1.2 Policy objective :

The policy is aimed at;

1. Establishing a national unified MSBOS for the different surgical and interventional specialties based on the needs of individual patients, utilization practices, and facility experience applicable in all MOH hospitals.

2.Setting the standard of review and modification of MSBOS as necessary, in conjunction with evidence based standards of practice.

3. Ensuring more cost effective , efficient use of the order of blood products and avoiding wasting resources (outdating of blood units, unnecessary pretransfusion crossmatching etc.)

2.0 DEFINITIONS:

2.1 Blood Typing

The test to determine your blood group is called ABO typing

2.1.1 ABO Compatibility:

All blood and blood components should be ABO compatible except in an emergency when non-ABO specific products can be substituted.

2.1.2 Type & Screen

Testing of a patient specimen to determine the presence of ABO and RH type and screening for the presence of atypical red cell antibodies in the plasma is known as Type & Screen (T&S). The presence of these antibodies makes crossmatch more difficult.

2.2 Crossmatch:

Is a testing method used to ensure compatibility between donor and recipient of blood. It is required before a blood transfusion to determine if the donor's blood is compatible with the blood of an intended recipient.

2.2.1 Crossmatched units

Number of blood product units to be crossmatched & kept reserved for a specific patient until use or cancellation.

2.2.2 Standby Units ;

number of PRBC units of the same blood group available in stock during the planned procedure and for 24 hours post procedure . They maybe crossmatched and ready for transfusion within 20-minutes of the physician's request.

2.3 Alloimmunization:

An immune response to foreign antigens after exposure to genetically different cells or tissue. Alloimmunization can be a complication of receiving incompatible blood.

2.4 Antigen:

A toxins, or foreign substance (e.g. bacteria, foreign blood cells, and the cells of transplanted organs), that when introduced into the body induces an immune response that results in the production of antibodies . Any antigen that is 'foreign' to our immune system is destroyed by an antibody.

2.5 Antibody:

A protein produced in the blood or tissues in response to a specific antigen, as a bacterium or a toxin that destroys or weakens bacteria and neutralized organic poisons, thus forming the basis of immunity.

2.6 Anemia:

Is defined as a hemoglobin level of less than 110 g/L in females (pregnant) and children under the age of 5 years , less than 120 g/L in non-pregnant females and less than 130 g/L in males.

2.7 Crossmatch Transfusion Ratio:

The ratio of units of red blood cells (RBC) that are crossmatched in the hospital blood bank for potential transfusion during a surgical procedure to number of units transfused.

Crossmatch to transfusion ratio (C/T ratio) = number of PRBC units crossmatched/number of units transfused. A ratio of 2.0 and below is considered appropriate blood usage. C/T ratio is an important national quality indicator that is used to gauge the appropriate use of services offered by the transfusion laboratory service. High C/T ratio implies that crossmatches were performed unnecessarily when a Type -Screen and Hold would have sufficed.

2.8 Transfusion Index

TI=number of blood product units transfused /number of patients crossmatched .

A value of 0.5 or more is considered indicative of significant blood utilization.

A value of <0.5/procedure = no crossmatch should be done .

2.9 Transfusion Probability

Number of patients transfused / number of patients crossmatched x 100

(Transfusion Probability of 30% or more is considered indicative of significant blood utilization)

2.10 Guidelines:

Guides that address practice related issues; assist care providers to make safe decisions regarding Best Practice. Guidelines offer some flexibility and are suggested to be the most effective and efficient way of attaining safe practice. These are suggestions but may not be absolute requirements.

2.11 In date:

Refers to expiry date of blood components. Opposite of out date.

2.12 Maximum Surgical Blood Ordering Schedule:

(MSBOS) A list of common surgical procedures that define the number of units of blood to be type/screened and or crossmatched prior to surgery.

2.13 Staged Surgeries:

Are procedures that are planned to occur within 3-6 months apart. This increases the risk of transfusion.

2.14 Sample Age

Refers to expiry date of a T&S blood sample.

**A T&S will have a valid in date for 72 hours.*

***When a pretransfusion testing is performed for a patient with history of pregnancy or transfusion within a 3 month period , or the pregnancy or transfusion history unclear, the sample used for testing must be no more than 72 hours old prior to intended transfusion.*

3.0 GUIDING PRINCIPLES

The need for T&S should be evaluated based on the following considerations;

3.1 Uncrossmatched blood is safe to give in emergency situations.

3.2 There is no shortage of emergency blood.

3.3 Turnaround time for T&S is usually within 45-55 minutes (upto 90 min for T&S *with* xmatch). Transfusions can often be delayed for a number of hours in stable patients.

3.4 Alloimmunization (those that have antibodies and would have prolonged testing requirements) is present in about 1-3 % of the local population.

3.5 The decision to order a T&S for elective surgical patients should be guided by the clinical history, comorbidities, and physical examination findings and estimated blood loss.

3.6 Transfusion risk should be the primary factor in the consideration of pre-operative T&S.

3.7 emergency procedural (and surgical interventions)

***Clinical practice guidelines are **not** designed to replace physician clinical judgment in deciding upon appropriate medical interventions for their patients, nor do they compromise physician's right and obligations to practice medicine with diligence in determining the appropriate medical care for his or her patient.*

4.0 Guide to prospective estimation of risk of bleeding and need of blood preparation

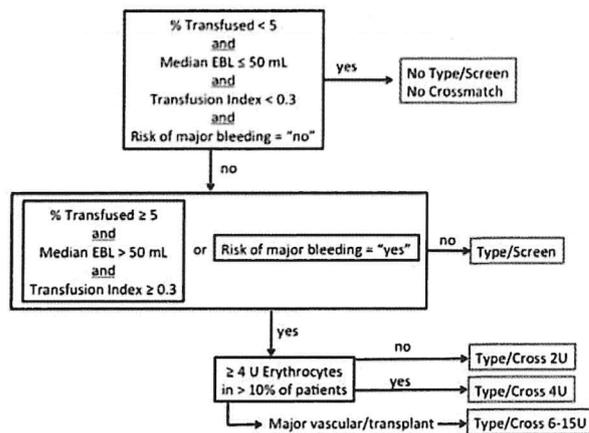


Fig. 1. The algorithm used to derive the maximum surgical blood order schedule. The thresholds in the algorithm for percentage of patients transfused, median estimated blood loss (EBL), and transfusion index (mean number erythrocyte units transfused per patient) are derived from previous studies.^{11,13-15} "Risk of major bleeding" was determined to be "yes" or "no" for each surgical procedure category based on the proximity of the surgical field to large vascular structures. RBC = erythrocytes; U = units.

The institution MSBOS committee should follow Crossmatch to transfusion ratio (C/T ratio) to assess the need for preop blood products. A C/T ratio is an important national quality indicator that is used to gauge the appropriate use of services offered by the transfusion laboratory service.

A Crossmatch to transfusion ratio (C/T ratio) = number of units crossmatched/number of units transfused. A ratio of 2.0 and below is considered appropriate blood usage. High C/T ratio implies that crossmatches were performed unnecessarily when a Group-Screen and Hold (GSH) would have sufficed.

5.0 STANDARDIZED BLOOD ORDERING.

5.1 Type & Screen

Best practice includes having available crossmatched blood for elective surgical patients when needed. A thorough assessment of the patient's risk for blood transfusion should preclude each decision regarding the request for T&S. In elective surgical adult patients, a T&S should be considered if **one or more** of the following are present;

1. anemia - male less than 130g/L, female less than 120g/L
2. low body weight <60kg
3. estimated procedural blood loss (EBL) >100 ml
4. previously diagnosed difficult cross-match; rare blood types; or multiple antibodies
5. staged procedure or multiple surgeries
6. known bleeding disorder or family history of bleeding disorders
7. surgery with >10% risk of transfusion

*T&S should **not** be requested in surgeries when the risk of transfusion is low.*

5.1.1 Timing of T&S Request Submission

Physicians requesting blood T&S for a patient, should do so within the following time frames prior to the intended procedure ;

- 1- in clinic 24- 72 hours prior to procedure
- 2- on admission 12-48 hours prior to procedure

5.1.2 MSBOS for Inter-hospital transferred patients

In case of inter-hospital transfers, new blood samples and requests (for T&S etc) are to be processed in the recipient health care facility for the transferred patient.

5.1.2 Post Antibody Screening Process

5.1.2.1

If T&S is ordered and the patient is antibody negative , no blood is crossmatched, but the serum is saved with a standby unit if needed (by the index hospital blood bank)

5.1.2.2

If T&S is ordered and the patient is antibody positive, antigen negative crossmatched blood ,should be made available by the Kuwait central blood bank and dispensed to the index requesting hospital blood bank). Once available and delivered to the index hospital, the blood bank technician should inform the respective ward in which the patient is residing .

5.1.2.3

If the patient's blood group or phenotype is rare, at least 1 units should be provided by the Kuwait central blood bank prior to the surgical intervention.

5.1.2.4

*If a discrepancy occurs in the ABO typing , it should be resolved between the index hospital blood bank and central blood bank of Kuwait prior to issuing blood products . The sample and request should be sent to the central blood bank .
The alternative at times of urgency/emergency would be issued Type O blood products .*

5.2 Crossmatched Blood:

5.2.1

The number of units agreed upon in this MSBOS policy and respective tables are to be made available prior to the procedure .

5.2.1.1

Unless secure electronic patient identification system is in place , a second sample should be requested for confirmation of the ABO group of a first time patient prior to transfusion provided it does not impede or delay the delivery of urgent blood products .

5.2.1.2

If a second ABO check is required urgently and obtaining a second sample is not possible , a second ABO check is to be done on the same sample preferably undertaken using different methods/reagent from fresh sampling and/or serological crossmatch.

5.2.1.3

Depending on the risk and benefits considerations the decision to transfuse group O units until a second sample has been processed versus issue group specific RBC based on the first sample is to be made by the responsible treating physician based on urgency .

5.2.2

If the treating surgeon, presiding anaesthetists request blood product numbers exceeding or less than the numbers set forth in this policy, they should consult their index hospital haematologist to provide accordingly .

5.2.3 Cancellation of ordered blood product

5.2.3.1

Pending establishment of a unified cancellation process and time per blood product per procedures by the central MOH MSBOS committee, cancellation of blood product orders is subject to the policy of the blood bank of the index hospital.

5.2.3.2

For health care facilities with operating theatre lab or fridge , the unused cross matched blood will kept for 24 hours postoperatively after which it will be sent back to the facility blood bank and thereafter processed for cancellation after 48 hours .

5.2.3.3

For health care facilities with no operating theatre lab or fridge , the unused cross matched blood will be kept for 24-48 hours postoperatively in the facility blood bank and thereafter processed for cancellation.

5.2.3.4

For unused antibody positive crossmatched blood products ,the cancellation processes is initiated 72 hours postoperatively by the index facility blood bank .

5.2.3.5

Upon cancellation, the respective blood banks are required to have the necessary documentation & data registry for auditing (including patient name, MRN, blood group, date xmatched, date and reason of cancellation)

5.2.4 Standard times to order processing

T&S; 45-55 minutes

Group X-matched ; upto 90 minutes

Cross matching Antibody positive ; pending KCBB capabilities and resources (1-7 days)

Rare blood types;pending KCBB capabilities and resources (1-7 days)

6.0 Suggested MSBOS per speciality and procedures

6.1 Vascular Surgery

Vascular		
Procedure	Order	#Units
Aortic Stents	T&S	-
Axillary Bifemoral Graft	T&S	-
Axillary/ Femoral Graft	T&S	-
Carotid Endarterectomy	T&S	-
Femoral Crossover Bypass	T&S	-
Femoral/ Popliteal Graft	T&S	-
PTFE Graft/A-V Fistula access	T&S	
Subclavian/ Axillary Graft	T&S	
Subclavian Carotid Graft	T&S	
Varicose Veins	T&S	
Abdominal Aneurysm (elective)	T&S	4

Abdominal Aneurysm (emergency)	T&S	6
Aortofemoral Bypass Graft	T&S	4
Aortoiliac Bypass Graft	T&S	4
Aorto-Popliteal Bypass Graft	T&S	4
Axillobifemoral Bypass Graft	T&S	4
Balloon Angioplasty	T&S	
Elective Aneurysm Repair	T&S	4-6
Embolectomy/ Endarterectomy /Thrombectomy	T&S	2
Femoral Distal Reconstruction	T&S	2
Femoral-Popliteal Bypass graft	T&S	2
Renal artery repair	T&S	2

6.2 General Surgery

General Surgery		
Procedure	Order	#Units
Appendectomy	T&S	0
Abdominal Perineal Resection	T&S	2
Adrenalectomy	T&S	2
Anterior Bowel Resection	T&S	
Biliary Bypass		2
Bowel Resection	T&S	2
CBDE	T&S	2
ERCP	T&S	
Distal Gastrectomy	T&S	2
Distal Pancreatectomy	T&S	4
Esophagogastr ectomy	T&S	4
LN biopsy	None	
PNS surgery	None	
Gastrectomy/ Fundoplication	T&S	2

Laparotomy with Lymph Node or Biopsy of Mass	T&S	2
Left Hemicolectomy	T&S	2
Lobectomy	T&S	4
Lung Decortication	T&S	2
Major Hepatic Resection	T&S	4-6
Pelvic Exenteration	T&S	2-4
Pneumonectomy	T&S	4
Radical Mastectomy	T&S	
Radical Neck Dissection	T&S	2
Radical Prostatectomy	T&S	2
Resection of Abdomen Wall tumor	T&S	2
Retroperitoneal Node Dissection or Resection of tumor	T&S	2-4
Right Hemicolectomy	T&S	2

RYPB	T&S	
Splenectomy	T&S	2
Sub-total Gastrectomy	T&S	2
Thoractomy/ Lung Resection	T&S	2-4
Thoracoscopy	T&S	2-4
Total Colectomy	T&S	4
Total Gastrectomy	T&S	4
Total Proctocolectom y	T&S	4
Transhiatal Esophagectomy	T&S	4
Tumor Pancreatectomy	T&S	4
Vagotomy/ Antrectomy	T&S	2
Wedge Resection of Liver	T&S	4
Wedge Resection of Lung	T&S	4
Whipple's Procedure	T&S	4

Amputation of Limb	T&S	
Amputations digit	None	
Apronectomy	T&S	
AV Fistula	T&S	
Axillary Dissection	T&S	
Bronchoscopy/	T&S	
Mediastinoscopy	T&S	
Cholecystectomy and Exploration CBD	T&S	
Choleduojajunostomy	T&S	
Closure Ileostomy/ Colostomy	T&S	
Colostomy	T&S	
Enteroenterostomy	T&S	
Exc. Transanal Villous Adenoma	None	
Exploratory Laparotomy	T&S	

Gastroenterostomy	T&S	
Insertion of Gastrostomy Tube	T&S	
Laparoscopic Cholecystectomy	T&S	
Lap; Lysis of Adhesions	T&S	
Loop Ileostomy	T&S	
Lumpectomy	T&S	
Mastectomy	T&S	
Mini Thoracotomy	T&S	
Modified Radical Mastectomy	T&S	
Parotidectomy	T&S	
Partial Gastrectomy Nissen Fundoplication	T&S	
Partial Mastectomy	T&S	
Repair of Incisional/ Ventral hernia	T&S	

Repair of Inguinal/ Umbilical Hernia	T&S	
Reversal/ revision Resection	T&S	
Small Bowel Resection	T&S	
Superficial & Ilii femoral Node Dissection	T&S	
Thyroidectomy	T&S	
Parathyroidectomy	T&S	
Traverse Colostomy	T&S	
Hemorrhoidectomy	None	
Circumcision	None	
Tracheostomy	T&S	
Biliary resection (GB cancer)	T&S	3
Liver biopsy	T&S	
Liver resection (normal liver)	T&S	4
Liver resection (cirrhotic)	T&S	4

Liver resection (cirrhotic)	T&S	4
Pancreatic transplant	T&S	3
Shunt surgery (PV)	T&S	3
Liver transplant	T&S	10
Lap. Gastric band	T&S	
Removal of lap. Gastric band	T&S	
Gastric bypass	T&S	
Sleeve gastrectomy	T&S	

6.3 Orthopaedic Surgery

Orthopedic		
Procedure	Order	#Units
Primary Hip arthroplaty	T&S	1
Primary Knee arthroplaty	T&S	
Shoulder arthroplasty	T&S	
Revision Hip arthroplaty	T&S	2
Revision Knee arthroplaty	T&S	1
Osteotomies around knee	T&S	1
open laterjet	T&S	
Fractured Pelvis	T&S	2
Revision Total Hip	T&S	2
ORIF Hip	T&S	0
Total Hip Replacement	T&S	3
Thompson Hip/ End conversion	T&S	2
TK Revision and TH Revision	T&S	2

Fracture Fixation		
Fracture pelvis& acetabulum open	T&S	2
Fracture pelvis& acetabulum perc screws	T&S	
Fracture around hip nail fix	T&S	1
Fracture around hip DHS	T&S	1
Fracture shaft & distal femur nail fix	T&S	
Fracture shaft & distal femur plate & screws	T&S	2
Fracture tibia nail plate	T&S	
Fracture ankle	T&S	
Fracture foot	T&S	
Fracture humerus (prox/ distal)	T&S	1
Fracture humerus shaft	T&S	
Fracture forearm	T&S	
Fracture wrist	T&S	

Removal of hardware		
Proximal humerus plate & screws	T&S	
Proximal humerus nail	T&S	
Shaft & distal humerus plate & screws	T&S	
Forearm & wrist	T&S	
Trochanter fracture plate & nail	T&S	
Femoral shaft nail	T&S	
Femoral shaft plate & screws	T&S	
Tibia plate & screws	T&S	
Ankle/foot	T&S	

spine		
1-2 level cervical/lumber microscopic discectomy	T&S	
One level ACDF	T&S	
1-2 level TILF	T&S	1
Thoracolumber fracture fix (short)	T&S	1
Thoracolumber fracture fix (long)	T&S	2
Path. Fracture TL spine (decompression , biopsy, fixation)	T&S	2
ACDF C-spine	T&S	1
ACDF C-spine & corpectomy	T&S	1
Post. Cervical decompression	T&S	1
Spine infection (decompression , biopsy, fixation)	T&S	2
Scoliosis correction	T&S	2
C-Spine Discectomy with fusion	T&S	2
Laminectomy with Fusion	T&S	2
Spinal (Fusion in situ, Fusion XIA, Instrumental, Stenosis)	T&S	2
Discectomy	T&S	0
Laminectomy	T&S	0

Pediatric ortho		
dysplastic hip dislocation ORPO&femur shortening	T&S	2
slipped capital fem.epiphysis pinning/screw	T&S	
perthes dx VRO	T&S	1
valgus/varus deformity correction	T&S	1
Lower limb epiphysiodesis	T&S	
Club foot PMR	T&S	
Equinus foot ETA	T&S	
Extra toe excision	T&S	
Septic arthritis hip I&D	T&S	2
Septic arthritis knee I&D	T&S	
Septic arthritis ankle I&D	T&S	
Osteomyelitis I&D	T&S	2
Fracture femoral neck screw	T&S	
Fracture femoral neck DHS	T&S	1
Fracture femoral shaft nail	T&S	1

Fracture around knee closed/ ORIF/kw/screw	T&S	
Tin/fib Fracture elastic nail	T&S	
Fracture medial maleolus screw	T&S	
Fracture foot K.Wire	T&S	
ORIF/Ext. fixation	T&S	
CP flexion hip deformity tissue release	T&S	
CP hip dislocation recon.	T&S	2
CP knee fixation tissue release/ osteotomy	T&S	
Fracture prox. Humerus closed reduction/K wire	T&S	
Fracture humeral shaft elastic nail	T&S	
Suprachondylar humeral fracture reduction and k-wire	T&S	
Med/lateral chondylar humeral fracture open reduction and k-wire	T&S	
Fracture olecranon closed/open reduction & k-wire/plates	T&S	
Radial/ulnar fracture reduction / elastic nail	T&S	

Other Ortho procedures		
IM Nailing Femur	T&S	2
Intertrochanteric Fracture DHS	T&S	2
Moore's Arthroplasty	T&S	2
Open Reduction femoral fracture	T&S	2
ORIF Humerus	T&S	2
Shoulder Arthroplasty	T&S	0
Total Knee Replacement	T&S	0
Arthroplasty (Other)	T&S	0
Above/ Below Knee amputation	T&S	1-2
Acromioplasty/ Rotator Cuff repair	T&S	0
Anterior Shoulder Repair	T&S	0
Disarticulation	T&S	1-2
IM Nailing Tibia	T&S	0
Neer's Shoulder Procedure	T&S	0
Upper/lower extremity arthroscopy	none	
Closed: Shoulder, Tibial/ Fibular	None	
Open: Humerus, Shoulder, Knee	T&S	0
Fasciotomy	T&S	0
Wrist Fusion with Graft	T&S	0

6.4 Neurosurgery

Neurosurgery		
Procedure	Order	#Units
Anteriovenous Malformation	T&S	3
Craniotomy for Cerebral Aneurysm	T&S	3-5
Other intracranial Procedures	T&S	0
Spinal Operations (Spine tumor , posterior cervical tumor, spine fusion or I&D)	T&S	2
Spinal Hardware Removal/Biopsy	T&S	0
Extracranial	None	
CSF/Shunt Procedure	T&S	

meningioma	T&S	2-4
endoscopic pituitary	T&S	2-3
Meningomylocele	T&S	50ccx4 pints
Cranioplasty	T&S	
Vascular tumor	T&S	2-4
cervical decompression +/- fixation	T&S	2-3
cervical anterior ACDF	T&S	2-3
spinal lumber fixation	T&S	2-3

6.5 Head & Neck Surgery

H&N		
Procedure	Order	#Units
Commando Procedure	T&S	4
Laryngectomy	T&S	2
Neck Dissection	T&S	
Thyroidectomy with Sternal split	T&S	
Tonsillectomy/ Adenoidectomy	T&S	
Branchial Cleft Cyst/ Sinus	T&S	
Bronchoscopy	T&S	
Cochlear Implant	T&S	
Excision of Vocal Cord Nodule	T&S	
Excision Submandibular gland	T&S	
Excision Thyroglossal	T&S	
External Septorhinoplasty	T&S	

Glossectomy Partial/ Glossectomy	T&S	
Hemithyroidecto my	T&S	
Mandiblectomy	T&S	1-2
Mastoidectomy	T&S	
Maxillectomy	T&S	
Open Reduction Nasal fracture	T&S	
Oral Surgery	T&S	
Ossiculoplasty	T&S	
Osteoplastic Flap	T&S	
Osteotomy	T&S	
Parathyroidect omy	T&S	
Septorhinoplasty	T&S	
Sinus Surgery	T&S	
Stapedectomy	T&S	
Thyroidectomy with Sternal split	T&S	
Tympanomastoi dectomy	T&S	
Uvulopalatoph aryngoplasty	T&S	

6.6 Urology

Urology		
Procedure	Order	#Units
Nephrectomy	T&S	2
Nephrolithotomy (open/percutaneous)	T&S	2
Pereyra-Raz Procedure (Bladder- Neck Suspension)	T&S	2
Pubovaginal Sling	T&S	2
Pyelolithotomy	T&S	
Radical Cystectomy	T&S	2-4
Radical Nephrectomy	T&S	2-4
Radical Prostatectomy	T&S	2-4
SP, RP, and RP Prostatectomy	T&S	2
Bladder Neck Suspension	T&S	

Cystolithotomy	T&S	
Epididymectomy	T&S	
Excision Cyst from Kidney and Partial Nephrectomy	T&S	
Exploration of Ureter	T&S	
L Node Dissection; L Nephroureterectomy with Cuff of Bladder	T&S	
Pelvic Lymph Node Dissection	T&S	
Percutaneous procedures	T&S	
Pyeloplasty	T&S	
Reimplantation Ureter	T&S	
SPARC Sling	T&S	
Transurethral Resection Bladder Neck	T&S	
Transurethral Resection Bladder Tumor (TURBT)	T&S	

Transurethral Resection Prostate (TURP)	T&S	
Ureterolithotomy	T&S	
Cysto/ureter/urethra	None	
Hydrocelectomy	None	
Orchiectomy	None	
Orchiopexy	None	
Penile implant	None	
Uretroscopy	None	
Internal urethrotomy	None	
Vesicopexy	T&S	
Uretrolithotomy	T&S	
Open prostate biopsy	T&S	
Donor nephrectomy	T&S	2
Kidney biopsy	T&S	

6.7 Obstetrics & Gynaecology

Obstetrics & Gynecology		
Procedure	Order	#Units
Myomectomy	T&S	2
Radical Hysterectomy	T&S	2-4
Radical Vulvectomy with Groin Node Dissection	T&S	2
Trial of Scar	T&S	2
Amputation of Cervix	T&S	
Anterior and Posterior Repair	T&S	
Aspiration of Ovarian Cyst	T&S	
Bilatetrial Salpingo Oophorectomy	T&S	
Caesarian Section	T&S	2
Cystoscopy	T&S	
Cerclage	T&S	
Hvsterectomv	T&S	2-4

L& D Laparoscopy	T&S	
Laparoscopy- Tubal Occlusion	T&S	
Laparoscopy- Diagnostic	T&S	
Laparotomy	T&S	
Laparotomy for Ovarian Cancer	T&S	2
Ovarian Cystectomy	T&S	
Posterior and Sacrospinous Vault Suspension	T&S	
Transcervical Resection of Endometrium	T&S	
Vaginal Termination	T&S	
Vaginoplasty	T&S	
Vesicovaginal Fistula Repair	T&S	
placenta previa	T&S	4

Retained placenta removal	T&S	
Bilateral tubal ligation	T&S	
Hydatiform mole	T&S	2
ectopic pregnancy	T&S	1-2
D&C/ hysteroscopy / miscarriages / evacuation of uterus	T&S	
Biopsy	T&S	
Vaginal prolapse open/ laparoscopic	T&S	

6.8 Cardiovascular Surgery

Procedure	Order	#Units
CABG	T&S	2-4
CABG redo	T&S	4-6
AVR/MVR	T&S	2-4
AVR/MVR redo	T&S	4-6
AVR+MVR	T&S	3-4
AVR+MVR+CA BG	T&S	3-4
Thoracic aortic aneurysms	T&S	6
ASD/VSD repair	T&S	2
Coarctation of aorta	T&S	2
Pericardiectomy	T&S	2
atrial myxoma removal	T&S	4
Debridement of sternal wound	T&S	
Sternal revision & rewiring	T&S	2
intraaortic balloon pump/ IMPELLA	T&S	
ECMO insertion/ removal	T&S	1

****All adult interventional cardiology & electrophysiology procedures require a Type & Screen**

**** subject to treating team discretion, judgment, and clinical urgency.**

Peads CVS		
Procedures	Order	#units
Thoracic procedures	T&S	
Lobectomy	T&S	2
Open heart surgery	T&S	3 (250x1 +50x10)
Redo Open heart surgery	T&S	3 (250x1 +50x15)
Open heart surgery (& coagulopathy)	T&S	3 (250x1 +50x15)
Closed heart surgery	T&S	1
Catheter guided procedures	T&S	
Adult congenital heart dx	T&S	4
Adult congenital heart dx REDO	T&S	6
Catheter guided procedures baby <4 months	T&S	250x1

6.9 Thoracic Surgery

Thoracics		
Order	T&S	Units#
Esophageal surgery/ resection	T&S	2
Pleural Procedures; VATS, empyema, fistula repair	T&S	1 (for BP fistula)
Thymectomy	T&S	2
cervical mediastinoscopy (LN biopsy)	T&S	1
Sympathectomy	T&S	
Diaphragmatic procedures ; hiatal hernia, morgagni, heller, VATS	T&S	1
pulmonary procedures ; wedge , blebectomy, bullectomy, biopsy, metastectomy	T&S	1
thoracotomy/ sternotomy; pneumonectomy, lobectomy, decortication, mediastinal tumor	T&S	2
Chest wall recon	T&S	1
bronchoscopy/ EBUS	T&S	
tracheal dialation/recon	T&S	1 for recon

**** subject to treating team discretion, judgment, and clinical urgency.**

6.10 Transplant Surgery

Transplant		
Procedure	Order	#Units
Renal Transplant	T&S	2-5
Donor Nephrectomy	T&S	2
Lymphocele Drainage	T&S	1
General Surgical procedures for kidney recipients	T&S	2
percutaneous biopsy GA	T&S	
Interventional Radiology Procedure	T&S	1
AV graft	T&S	1

6.11 Plastic & Reconstructive Surgery

Plastic Surgery & Burns		
Procedure	Order	#Units
Aesthetic		
Abdominoplasty	T&S	2
Belt lipectomy	T&S	4
Brachioplasty	T&S	1-2
Breast Augmentation	T&S	
Breast Augmentation & mastopexy	T&S	2
Breast Reconstruction	T&S	3
Breast Reduction	T&S	2
Gynecomastia	T&S	
Liposuction	T&S	1-2
Rhinoplasty	T&S	
Thigh lift	T&S	2-3
Upper body lift	T&S	3-4
Reconstructive		
bimaxillary osteotomy	T&S	2-3
cleft lip	T&S	
cleft palate	T&S	1
cleft alveolus	T&S	1
craniosynstosis	T&S	2
neurofibromatosis	T&S	
scar revision	T&S	1
syndactyly/ polydactyly	T&S	
free flaps	T&S	2-4
local flaps	T&S	2-3

6.12 Pediatric Surgery

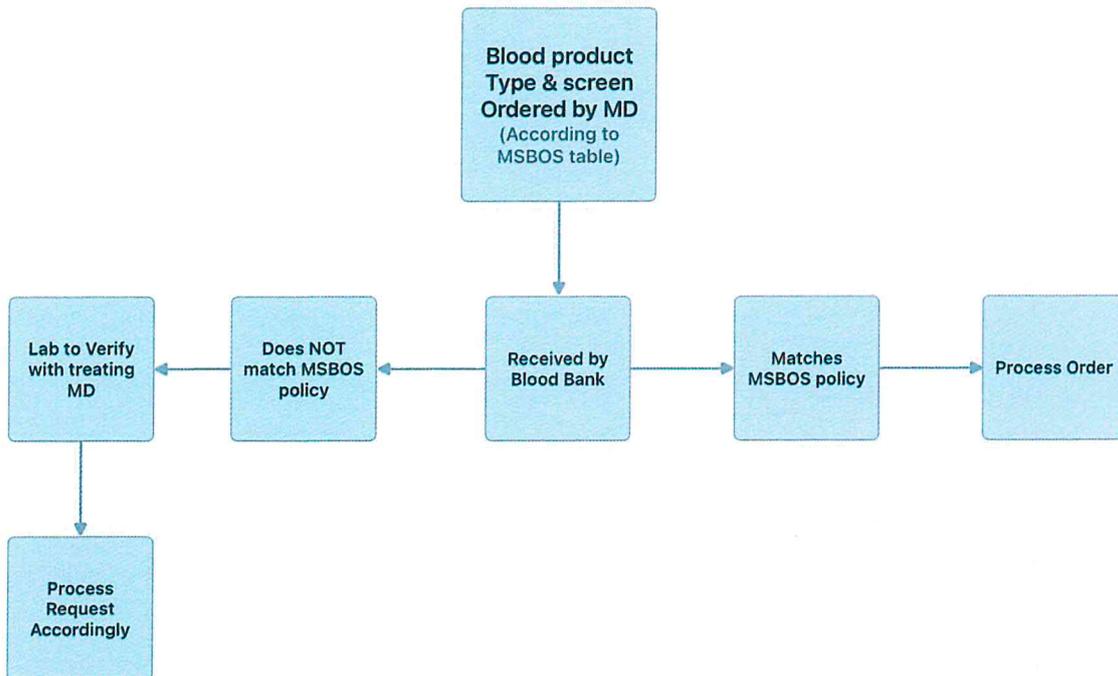
Pediatric Surgery		
Procedure	Order	#Units
Neonatal Surgeries		
Congenital Hypertrophic Pyloric Stenosis	T&S	
Necrotizing Enterocolitis	T&S	50ccx3 LRRBC
Congenital Diaphragmatic Hernia	T&S	50ccx3 LRRBC
ARM -colostomy	T&S	50ccx2 LRRBC
Omphalocele	T&S	50ccx3 LRRBC
Gastroschesis	T&S	50ccx2 LRRBC
Cloacal Exstrophy	T&S	1unit x2 LRRBC
Neonatal intestinal obstruction	T&S	50ccx3 LRRBC
Duodenal atresia	T&S	50ccx2 LRRBC
Ileal atresia	T&S	50ccx2 LRRBC
Jejunal atresia	T&S	50ccx2 LRRBC
Muconium ileus	T&S	50cc LRRBC
Malrotation	T&S	50ccx3 LRRBC
Annular pancreas	T&S	50ccx2 LRRBC
Sacrococcygeal teratoma	T&S	1 unit x2 LRBC
Duplication cyst	T&S	50ccx2 LRRBC
Closure colostomy	T&S	50ccx2 LRRBC

Elective Pediatric Laparoscopy		
Procedure	Order	#Units
Undescended Testis	T&S	
Appendectomy	T&S	
Ovarian cyst	T&S	
Gastrostomy	T&S	
Fundoplication	T&S	1unit x2 LRRBC
Repair morgagny	T&S	1unit x2 LRRBC
Splenectomy	T&S	1unit x2 LRRBC
Nephrectomy	T&S	1unit x2 LRRBC

Elective Pediatric Surgery		
Procedure	Order	#Units
Thyroglossal Cyst	T&S	
Bronchial Fistula	T&S	
LN biopsy	T&S	
Intussusception	T&S	50ccx3 LRRBC
Meckel's diverticulum	T&S	50ccx2 LRRBC
Upper endoscop	T&S	
US guided liver/mass biopsy	T&S	50ccx2 LRRBC
Hypospadias	T&S	
Epispadias	T&S	
Pyeloplasty	T&S	50ccx2 LRRBC
Hickman line insertion	T&S	50ccx2 LRRBC
Hirschsprung's disease	T&S	50ccx2 LRRBC
Anorectal malformation	T&S	50ccx2 LRRBC
Biliary atresia	T&S	50ccx2 LRRBC
Wilm's tumor	T&S	1 unit x 3 LRRBC
Neuroblastoma	T&S	1 unit x 3 LRRBC
Rhabdomyosarcoma	T&S	1 unit x 3 LRRBC
Teratoma	T&S	50ccx3 LRRBC
Hygroma	T&S	50ccx3 LRRBC
Abdominal lymphoma	T&S	1 unit x 2 LRRBC
Hepatic tumor	T&S	1 unit x 2 LRRBC

Emergency Pediatric Surgeries		
Procedure	Order	#Units
Torsion Ovarian Cyst	T&S	1 unit x 2 LRRBC
Exploration Abdomen	T&S	1 unit x 2 LRRBC
Abdomen Exploration trauma	T&S	1 unit x 2 LRRBC

Pathway for MSBOS orders



***The MSBOS shall allow for flexibility of ordering, dependent on **exceptional circumstances** in conjunction with clinical judgment of the prescriber.

Ordering clinicians may override the MSBOS and make special requests for individuals that may require increased transfusion demands (for example, patients with alloantibodies, anemia or bleeding disorders).

7.0 MSBOS Review & Audit

7.1

The department of technical affairs of the MOH will designate a committee to review and oversee the MSBOS, in health care facilities of the MOH, and amend the MOH blood transfusion management policy 1; MSBOS on an annual basis.

7.2

It is the responsibility of the chairs of blood banks, in the MOH health care facilities, to ensure annual audit and reviews of the following;

- 1- index health care facility C/T ratio by procedure
- 2- percent of auto antibodies
- 3- suggested amendments
- 4-T&S turn around time in elective and emergency situations
- 5-the following data per Procedure
 - Number of units crossmatched
 - Number of units transfused
 - C/T ratio
 - Transfusion probability
 - Transfusion index

6-Document any variation in a specific procedure (*i.e if a procedure is allocated as "T&S" yet ongoing practice showed recurrent override to "crossmatch" or the opposite.*)

7-Document wasted or expired blood units.

7.2.1

It is the responsibility of the CMO of MOH health care facilities with laboratory and blood bank services to establish a Blood Utilization Team or committee with representative member from each department (*e.g. departments of surgery , anesthesia etc*) to discuss compliance to ,and the applicability of the MOH unified MSBOS policy,providing awareness ,monitoring blood utilization indices, and reporting annually to the central MOH MSBOS policy committee for review and action .

7.3

It is the responsibility of the chief medical officers of the respective MOH hospitals to ensure article 7.2 is followed .

7.4

The central MOH MSBOS committee is to report to the director of technical affairs and the Assistant Undersecretary of Technical Affairs;

1- the proposed MSBOS based on the annual review and C/T ratios

2- units wasted per speciality and institution

3- the proposed MSBOS based on MDT meeting with the respective services (anaesthesia, cardiac surgery etc) with justification.

4- MSBOS for antibodies positive T&S per procedure

5- massive transfusion protocol and updates