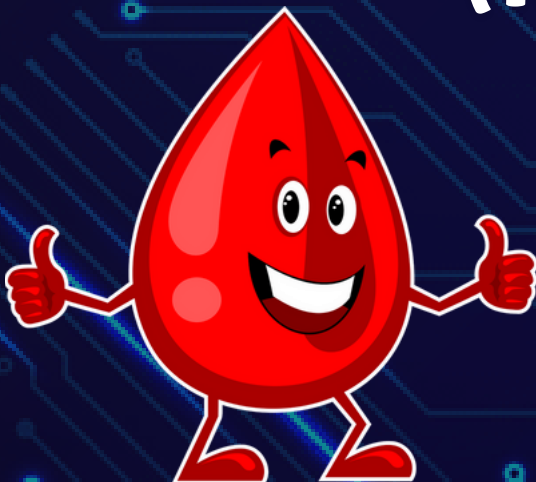




MAXIMUM SURGICAL BLOOD ORDERING SCHEDULE (MSBOS)



SCAN ME



2nd Edition, 2025

TRANSFUSION MEDICINE DEPARTMENT

FOREWORD

DIRECTOR OF HOSPITAL TENGKU AMPUAN AFZAN



It is with great pleasure that I present this book on the Maximum Surgical Blood Ordering Schedule (MSBOS) 2nd Edition, 2025. This comprehensive guide serves as a crucial resource for all surgical and medical personnel, marking a significant step forward in our hospital's commitment to optimise patient care and resource management.

The MSBOS is an evidence-based tool that establishes a standard for the initial blood cross-match request for common surgical procedures. Its rationale is rooted in the principle of rational blood usage and patient safety. By providing a standardised guideline, the MSBOS helps to prevent over ordering of blood, which in turn reduces unnecessary costs, minimises blood wastage, and ensures that our blood bank's resources are available for those who truly need them. This proactive approach significantly enhances our efficiency and ability to respond to emergencies.

The implementation of the MSBOS is also a cornerstone of our hospital's broader Patient Blood Management (PBM) programme. PBM is a multifaceted, patient centred approach designed to improve clinical outcomes by managing and preserving a patient's own blood. This is achieved by optimising erythropoiesis, minimising blood loss, and harnessing the patient's physiological tolerance for anaemia. The MSBOS directly supports this by ensuring that blood is only transfused when clinically indicated, thereby reducing the risks associated with unnecessary transfusions.

By embracing the principles outlined in this book, we are not just standardising a process; we are upholding our professional duty to provide the highest standard of care while being responsible stewards of a precious and limited resource. I urge all fellow clinicians in Hospital Tengku Ampuan Afzan (HTAA) to familiarise themselves with this guide and to integrate the MSBOS into their daily clinical practice.

Thank you for your unwavering commitment to excellence.

A handwritten signature in black ink, appearing to be 'Gowri Sundaram'.

DATIN DR. GOWRI SUNDARAM
HOSPITAL DIRECTOR
HOSPITAL TENGKU AMPUAN AFZAN

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TABLE OF CONTENTS

SURGERY



1-4

PLASTIC & RECONSTRUCTIVE SURGERY



5-6

OTORHINOLARYNGOLOGY (ENT)



7-8

CARDIOTHORACIC & CARDIOLOGY



9-10

NEUROSURGERY



11-16

UROLOGY



17-18

OBSTETRICS



19-20

GYNAECOLOGY



21-23

ORTHOPAEDICS



24-28

MISCELLANEOUS



29-30

SURGERY

PROCEDURES	GSH/GXM
Angiogram KIV PTCA	GSH
Anterior resection - high / low / ultra-low	GSH
Bile duct exploration with/without T-tube drainage	GSH
Biliary bypass/ duct repair/ intubation/ biopsy	GSH
Biopsy	GSH
Cholecystectomy - open/laparoscopic	GSH
Drainage / deroofing of liver cyst	GSH
Exploratory laparotomy	GSH
Hemicolectomy - Elective	GSH
Hemicolectomy - Emergency	GSH
Ligation of mycotic aneurysm	GSH

SURGERY

PROCEDURES	GSH/GXM
Mastectomy with axillary clearance	GSH
Pancreatic pseudocyst drainage	GSH
Panproctocolectomy	GSH
Partial gastrectomy	GSH
Perforated viscus	GSH
Saucerization	GSH
Small bowel surgery / intestinal obstruction	GSH
Splenectomy - elective	GSH
Thyroidectomy - hemi/partial/total	GSH
Transduodenal sphincteroplasty	GSH
Varicose vein	GSH

SURGERY

PROCEDURES	GSH/GXM
Abdominal aortic aneurysm	6 pints
Abdomino - perineal resection	2 pints
Bleeding gastric /duodenal ulcer	4 pints
Distal/proximalpancreatectomy	2-4 pints
Esophagectomy	2 pints
Exploratory laparotomy for liver trauma	4 pints
Hemihepatectomy - left/right, extended left/right	4 pints
Hepatectomy	6 pints
Hepatic arterial thrombectomy	2 pints
Hepatic artery cannulation with chemoport replacement	2 pints
Hepatic artery reconstruction	2 pints
Hepatic vein / IVC repair	4 pints
Hiatus hernia repair - transthoracic	2 pints
Intra abdominal injury	4 pints

SURGERY

PROCEDURES	GSH/GXM
Liver Transplant	15 pints irradiated
Non-anatomical liver resection	4-6 pints
Pancreatectomy	2 pints
Pancreatic debridement/necrosectomy	4 pints
Portal thrombectomy	2 pints
Portal vein reconstruction	4 pints
Portosystemicshunts	6 pints
Segmental liver resection	4-6 pints
Splenectomy - emergency	2 pints
Splenectomy with variceal ligation	6 pints
Thoracotomy / transthoracic surgery	2 pints
Total gastrectomy	2 pints
Total pancreatectomy	4-6 pints
Whipple's Procedure	4 pints

PLASTIC & RECONSTRUCTIVE SURGERY

PROCEDURES	GSH/GXM
Abdominoplasty	GSH
Craniofacial surgery (craniosynotosis, encephaloceles)	GSH
Debridement of Fournier's gangrene and locoregional flap/SSG	GSH
Excision of vascular anomaly - small to medium size	GSH
Groin & axillary lymph nodes dissection	GSH
ORIF for facial fracture	GSH
Palatoplasty	GSH
Pharyngoplasty	GSH
Repair of myelomeningoceles	GSH
Resection of head, neck tumor and neck dissection	GSH
SSG - large size area	GSH
SSG - moderate size area	GSH
Superficial parotidectomy	GSH
Tangential excision	GSH

PLASTIC & RECONSTRUCTIVE SURGERY

PROCEDURES	GSH/GXM
Excision / debulking of neurofibromatosis	4 pints
Excision of vascular anomaly - large size (head, upper & lower limb)	2-4 pints
Free flap surgery - breast, trunk & lower extremity reconstruction	2 pints
Large skin and soft tissue cancers with reconstruction	2 pints
Orthognatic surgery	4 pints
Pressure sore surgery	2 pints

OTORHINOLARYNGOLOGY (ENT)

PROCEDURES	GSH/GXM
Excision of benign tumors	GSH
Frontoethmoidectomy	GSH
Lateral rhinotomy	GSH
Ligation of ethmoid vessel	GSH
Parotidectomy	GSH
Submandibulectomy	GSH
Tonsillectomy	GSH
Tonsillectomy + adenoidectomy	GSH

OTORHINOLARYNGOLOGY (ENT)

PROCEDURES	GSH/GXM
Excision of angiofibroma	6 pints
Excision of malignant tumors (Except BCC)	4 - 6 pints
Laryngectomy	2 pints
Ligation of carotid artery	2 pints
Maxillectomy	6 pints
Partialpharyngectomy without reconstruction	6 pints
Radical neck dissection	4 pints
Repair of laryngeal and tracheal stenosis	4 pints
Surgery for cancer of jaw or neck	6 pints
Surgery of ptergopalatine fossa	6 pints
Total laryngopharyngectomy with reconstruction	6 pints
Trans palatal removal of postnasal tumor	6 pints

CARDIOTHORACIC & CARDIOLOGY

PROCEDURES	GSH/GXM
Angioplasty	GSH
Bronchoscopy	GSH
Bullectomy	GSH
Cardiac Catheterization	GSH
Coronary Angiogram	GSH
Pacemaker Insertion	GSH
Open pleural lung biopsy	GSH
Open Thoracotomy	GSH
PDA repair	GSH
Pleural Abrasion	GSH
Pleurectomy	GSH
VATS	GSH

CARDIOTHORACIC & CARDIOLOGY

PROCEDURES	GSH/GXM
Aortic arch surgery	4 pints
ASD / VSD repair	2 pints
CABG	2 pints
Lobectomy / pneumonectomy	2 pints
Valve replacement	2 pints
Redo surgery (CABG / Valve)	4 pints

GENERAL NEUROSURGERY

PROCEDURES	GSH/GXM
Burr Hole & Aspiration of Abscess	GSH
Burr Hole & EVD	GSH
Burr Hole & Washout	GSH
Carpal Tunnel Release	GSH
Cranial Injections / Radiofrequency Ablations	GSH
Cranioplasty Surgery	GSH
Endoscopic Third Ventriculostomy (ETV)	GSH
EVD/ELD Revision	GSH
Mini-Craniotomy & Washout	GSH
Tracheostomy	GSH
Ventriculo-Peritoneal Shunt	GSH
Ventriculoscopy	GSH
Cranio/Craniectomy & Excision of Abscess	2 pints
Cranio/Craniectomy & Washout of Subdural Empyema	1 pint

NEURO-TRAUMA

PROCEDURES	GSH/GXM
Burr Hole & ICP Catheter Insertion	GSH
Craniotomy & Elevation of Skull	GSH
Wound Debridement or Toilet & Suturing	GSH
Cranio/Craniectomy for Intracranial Injury (EDH/SDH/Contusions)	2 pints

NEURO-ONCOLOGY

PROCEDURES	GSH/GXM
Burrhole & Stereotactic Biopsy Surgery	GSH
Cranio/Craniectomy & Excision of Meningiomas	2 pints
Cranio/Craniectomy & Excision of Tumours (Gliomas/Schwannomas/Skull Base)	2 pints
Craniotomy & Biopsy of Tumor	1 pint
Endoscopic Transsphenoidal Surgery	2 pints

NEURO-VASCULAR

PROCEDURES	GSH/GXM
Aneurysm Angiography / Coiling	GSH
Arteriovenous Malformation (AVM) Embolization	GSH
Craniotomy & Microvascular Decompression	GSH
Craniectomy for MCA Infarction	1 pint
Cranio/Craniectomy & Evacuation of Intracranial Haematoma	2 pints
Cranio/Craniectomy + Aneurysm Clipping	2 pints
Cranio/Craniectomy + Arteriovenous Malformation (AVM) Excision	2 pints
Cranio/Craniectomy & Bypass Surgery	2 pints

NEURO-SPINE

PROCEDURES	GSH/GXM
Anterior Cervical Discectomy/Corpectomy and Fusion (ACDF/ACCF)	GSH
Endoscopic Discectomy	GSH
Minimally Invasive Spinal Fixation	GSH
Spinal Injections / Radiofrequency Ablations	GSH
Transpedicular Biopsies	GSH
Chiari Malformation - Post Fossa Decompression	1 pint
Laminectomy & Discectomy	1 pint
Laminectomy & Tumour Excision	1 pint
Pedicle Screw and Post Spinal Fixation	1 pint

PEDIATRICS

NEUROSURGERY

PROCEDURES	GSH/GXM
Any Shunt Surgery	GSH
Burrhole & Endoscopic Third Ventriculostomy/Fenestration	GSH
Burrhole & EVD	GSH
Burrhole & Washout	GSH
Cranio/Craniectomy for Intracranial Injury	2 x 20cc/kg
Cranio/Craniectomy for Tumours/Neurovascular	2 x 20cc/kg
Repair of Myelomeningocele	20cc/kg

UROLOGY

PROCEDURES	GSH/GXM
Nephrectomy (simple -non functioning / tumor)	GSH
Penectomy (total / partial)	GSH
Percutaneous nephrolithotomy	GSH
Pyelolithotomy (simple)	GSH
Pyelolithotomy, complicated or large calculus	GSH
Renal angiogram	GSH
Renal Recipient	GSH
Transurethral resection of bladder tumor (TURBT)	GSH
Transurethral resection of prostate (TURP)	GSH
Urethroplasty	GSH

UROLOGY

PROCEDURES	GSH/GXM
Adrenalectomy	4 pints
Anatrophic nephrolithotomy	2 pints
Cystectomy + Ileal Conduit / Neobladder	4 pints
Exploration / complicated AVF operation	2 pints
Nephrectomy (simple - non functioning /donor)	2 pints
Partial nephrectomy	2 pints
Radical nephrectomy	2 - 4 units (large vascular tumor)
Radical prostatectomy	4 pints
Renal Biopsy	2 pints
Renal Transplant	4 pints
Retropubic prostatectomy	2 pints

OBSTETRICS

PROCEDURES	GSH/GXM
Abnormal presentation	GSH
Breech	GSH
Cephalopelvic Disproportion (CPD)	GSH
Cord prolapsed	GSH
Failed induction	GSH
Fetal distress	GSH
Obstructed labour	GSH
Poor progress	GSH
≥ 2 previous scar	GSH

OBSTETRICS

PROCEDURES	GSH/GXM
Abruptio placenta with coagulopathy	4 pints + 1 DIVC
Abruptio placenta without coagulopathy	2 pints +/- 1 DIVC
Classical Caesarean Section	2 pints
Evacuation of Vulva Haematoma	2 pints
Hysterectomy (Caesarean / post partum)	4 pints + 1 DIVC
Placenta praevia major anterior	2 pints
Placenta praevia major posterior	2 pints
Severe pre-eclampsia / eclampsia with coagulopathy	2 pints + 1 DIVC

GYNAECOLOGY

PROCEDURES	GSH/GXM
Adhesiolysis	GSH
Burch colposuspension	GSH
Cold knife cone biopsy / LLETZ	GSH
Cystectomy / Oophorectomy	GSH
ERPOC	GSH
Excision of cervical fibroid	GSH
Exploratory laparotomy	GSH
I & D of vulva haematoma	GSH

GYNAECOLOGY

PROCEDURES	GSH/GXM
Laparoscopic adhesiolysis	GSH
Laparoscopic cystectomy/oophorectomy	GSH
Laparoscopic vaginal hysterectomy	GSH
Polypectomy	GSH
Salpingectomy for ectopic pregnancy	GSH
Simple hysterectomy	GSH
Total laparoscopic hysterectomy	GSH
TVT	GSH
Vault suspension	GSH
Vaginal reconstruction	GSH

GYNAECOLOGY

PROCEDURES	GSH/GXM
Complicated/ Difficult hysterectomy	2 pints
Debulking surgery	4 pints
Extrafascial hysterectomy	2 pints
Myomectomy	2 pints
Radical hysterectomy (wertheim)	4 pints
Salpingectomy for bleeding ectopic pregnancy	2 pints
Suction & curettage for molar pregnancy	2 pints
Vaginal hysterectomy & pelvic floor repair	1 pint
Vulvectomy with lymph nodes sampling	2 pints

ORTHOPAEDICS

PROCEDURES	GSH/GXM
Arthrodesis Hip/ Knee	GSH
Bone Transport or lengthening (Femur / Tibia)	GSH
Disc Surgery	GSH
Foot / Ankle (any procedure)	GSH
Hand (any procedure)	GSH
Ilizarov fixation of Femur / Tibia	GSH
Ilizarov fixation of humerus/radius/ulna	GSH
ORIF (intraarticular fracture/Proximal and Distal Tibia)	GSH
ORIF of Distal Femur fracture	GSH
ORIF of Humerus / Radius / Ulna	GSH
ORIF of Neck of Femur fracture	GSH

ORTHOPAEDICS

PROCEDURES	GSH/GXM
Patellectomy	GSH
Proximal Femur (Dynamic HipScrew/PFN/plating)	GSH
Putti-Platt Shoulder Repair	GSH
Radius and ulna (other than ORIF)	GSH
Ray Amputation of finger	GSH
Ray Amputation of toe	GSH
Shoulder Arthroscopy	GSH
Soft Tissues & Ligament Reconstruction of Knee	GSH
Soft Tissues & Ligament Reconstruction of Shoulder	GSH
Total Shoulder Replacement	GSH

ORTHOPAEDICS

PROCEDURES	GSH/GXM
Above Knee Amputation (AKA) / Transfemoral Amputation	2-4 pints
Anterior Decompression and Fusion of Spine	3 pints
Anterior Spine Decompression and Instrumentation / Fusion of Thoracolumbar Spine	4 pints
Below Knee Amputation (BKA) / Transtibial Amputation	2 pints
Bilateral Total Knee Replacement	2-4 pints
Brachial Plexus Repair	2 pints
Complex Anterior Acetabular Fracture	3 pints
Complex Anterior and Posterior Acetabular Fracture	4 pints
Complex Posterior Acetabular Fracture	2 pints
Femoral Osteotomy	2 pints
Foot Amputation	2 pints

ORTHOPAEDICS

PROCEDURES	GSH/GXM
Hand Amputation	2 pints
Harrington Rods	4 pints
Hemiarthroplasty	2 pints
Hip Disarticulation	2 pints
Laminectomy	2 pints
Massive bone resection	2 pints
Multi Ligament Reconstruction of Knee	2 pints
Open Reduction of DDH	1 pint
ORIF of Femur / Tibia	2 pints
Pelvic and Acetabulum - Open Reduction Internal Fixation	2 pints
Pelvic Fracture	2 pints

ORTHOPAEDICS

PROCEDURES	GSH/GXM
Pelvic Osteotomy	2 pints
Pelvic Trauma	6 pints
Posterior Decompression and Fusion of Spine	2 pints
Posterior Spinal Decompression (Discectomy, Laminotomy)	2 pints
Revision or Complex Total Hip Replacement (THR)	3 pints
Revision or Complex Total Knee Replacement (TKR)	3 pints
Shoulder Disarticulation	2 pints
Spinal Decompression for Tumours	2 pints
Spinal Fusion	2 pints
Total Hip Replacement (THR)	2 pints
Total Knee Replacement (TKR)	2 pints
Transhumeral Amputation	2 pints

MISCELLANEOUS

PROCEDURES	GSH/GXM
Arthroscopic Repair/ Reconstruction	GSH
Bone Grafting	GSH
Contracture Release	GSH
Open Reduction of Fracture	GSH
Regional Flaps (eg: Groin, Forearm)	GSH
Removal of Nail/Plate	GSH
Revision/Removal of K-wire	GSH
Skin Grafting (SSG/FTSG)	GSH
Tendon transfer	GSH
Wound debridement	GSH
Resection of Soft Tissue Tumours; <10cm	GSH

MISCELLANEOUS

PROCEDURES	GSH/GXM
Deformity Correction of Long Bone	2 pints
Interlocking Nails/Plating of long bones	2 pints
Massive Skin Grafting (requiring mesh and Dermatone)	2 pints
Paediatric Pelvic Osteotomy	1 pint
Resection of Soft Tissue Tumours; >10cm	2 pints
Resection of Vascular Tumours (eg: Hemangioma)	2 pints
Vascularised Fibular Graft	2 pints