

**Guide to Anaesthetic Infrastructure and Supplies  
at Various Levels Of Health Care Facilities  
Emergency and Essential Surgical Procedures**  
(Compiled from WHO manual *Surgical Care at the District Hospital* 2003)

<b>Level 1 Small hospital / health centre</b>	<b>Level 2 District/provincial hospital</b>	<b>Level 3 Referral hospital</b>
<ul style="list-style-type: none"> <li>Rural hospital or health centre with a small number of beds and a sparsely equipped operating room (O.R) for minor procedures</li> <li>Provides emergency measures in the treatment of 90–95% of trauma and obstetrics cases (excluding caesarean section)</li> <li>Referral of other patients (for example, obstructed labour, bowel obstruction) for further management at a higher level</li> </ul>	<ul style="list-style-type: none"> <li>District or provincial hospital with 100–300 beds and adequately equipped major and minor operating theatres</li> <li>Short term treatment of 95–99% of the major life threatening conditions</li> </ul>	<ul style="list-style-type: none"> <li>A referral hospital of 300–1000 or more beds with basic intensive care facilities. Treatment aims are the same as for Level 2, with the addition of: <ul style="list-style-type: none"> <li>Ventilation in O.R and ICU</li> <li>Prolonged endotracheal intubation</li> <li>Thoracic trauma care</li> <li>Haemodynamic and inotropic treatment</li> <li>Basic ICU patient management and monitoring for up to 1 week : all types of cases, but with limited or no provision for: <ul style="list-style-type: none"> <li>Multi-organ system failure</li> <li>Haemodialysis</li> <li>Complex neurological and cardiac surgery</li> <li>Prolonged respiratory failure</li> <li>Metabolic care or monitoring</li> </ul> </li> </ul> </li> </ul>
<b>Procedures</b>	<b>Procedures</b>	<b>Procedures</b>
<ul style="list-style-type: none"> <li>Normal delivery</li> <li>Uterine evacuation</li> <li>Circumcision</li> <li>Hydrocele reduction, incision and drainage</li> <li>Wound suturing</li> <li>Control of haemorrhage with pressure dressings</li> <li>Debridement and dressing of wounds</li> <li>Temporary reduction of fractures</li> <li>Cleaning or stabilization of open and closed fractures</li> <li>Chest drainage (possibly)</li> </ul>	<p>Same as Level 1 with the following additions:</p> <ul style="list-style-type: none"> <li>Caesarean section</li> <li>Laparotomy (usually not for bowel obstruction)</li> <li>Amputation</li> <li>Hernia repair</li> <li>Tubal ligation</li> <li>Closed fracture treatment and application of plaster of Paris</li> <li>Eye operations, including cataract extraction</li> <li>Removal of foreign bodies: e.g. in the airway</li> <li>Emergency ventilation and airway management for referred patients such as those with chest and head injuries</li> </ul>	<p>Same as Level 2 with the following additions:</p> <ul style="list-style-type: none"> <li>Facial and intracranial surgery</li> <li>Bowel surgery</li> <li>Paediatric and neonatal surgery</li> <li>Thoracic surgery</li> <li>Major eye surgery</li> <li>Major gynaecological surgery, e.g. vesico-vaginal repair</li> </ul>
<b>Personnel</b>	<b>Personnel</b>	<b>Personnel</b>
<ul style="list-style-type: none"> <li>Paramedical staff without formal anaesthesia training</li> <li>Nurse-midwife</li> </ul>	<ul style="list-style-type: none"> <li>One [two] trained anaesthetists</li> <li>District medical officers, senior clinical officers, nurses, midwives</li> <li>Visiting specialists or resident surgeon and/or obstetrician/ gynaecologist</li> </ul>	<ul style="list-style-type: none"> <li>Clinical officers and specialists in an anaesthesia and surgery</li> </ul>
<b>Drugs</b>	<b>Drugs</b>	<b>Drugs</b>
<ul style="list-style-type: none"> <li>Ketamine 50 mg/ml injection, 10 ml</li> <li>Lidocaine 1% or 2%</li> <li>[Diazepam 5 mg/ml injection, 2 ml]injection</li> <li>Pethidine 50 mg/ml injection, 2 ml]</li> <li>[Epinephrine (adrenaline)] 1 mg</li> <li>[Atropine 0.6 mg/ml]</li> </ul>	<p>Same as Level 1, but also:</p> <ul style="list-style-type: none"> <li>Thiopental 500 mg/1g powder</li> <li>Suxamethonium bromide 500 mg powder</li> <li>Atropine 0.5 mg injection Epinephrine (adrenaline) 1 mg injection</li> <li>Diazepam 10 mg injection Halothane 250 ml inhalation</li> <li>[Ether 500 ml inhalation]</li> </ul>	<p>Same as Level 2 with the following additions:</p> <ul style="list-style-type: none"> <li>Vecuronium 10 mg powder</li> <li>Pancuronium 4 mg injection]</li> <li>Neostigmine 2.5 mg injection</li> <li>Trichloroethylene 500 ml inhalation]</li> <li>Calcium chloride 10% 10 m injection</li> <li>Potassium chloride 20% 10 ml injection</li> </ul>

	<ul style="list-style-type: none"> <li>• Lidocaine 5% heavy spinal solution 2 ml</li> <li>• Bupivacaine 0.5% heavy or plain, 4 ml]</li> <li>• Pethidine 50 mg injection</li> <li>• [Hydralazine 20 mg injection]</li> <li>• Frusemide 20 mg injection</li> <li>• Dextrose 50% 20 ml injection</li> <li>• Aminophylline 250 mg injection</li> <li>• Ephedrine 30/50 mg ampoules</li> </ul>	for infusion
<b>Equipment: capital outlay</b>	<b>Equipment: capital outlay</b>	<b>Equipment: capital outlay</b>
<ul style="list-style-type: none"> <li>• Adult and paediatric resuscitators</li> <li>• Foot sucker</li> <li>• [Oxygen concentrator]</li> </ul>	<p>Complete anaesthesia, resuscitation and airway management system consisting of:</p> <ul style="list-style-type: none"> <li>- Oxygen source</li> <li>- Vaporizer(s)</li> <li>- Hoses</li> <li>- Valves</li> <li>- Bellows or bag to inflate lungs</li> <li>- Face masks (sizes 00–5)</li> <li>- Work surface and storage Paediatric anaesthesia system</li> <li>- Adult and paediatric resuscitator sets</li> <li>• Pulse oximeter</li> <li>• Laryngoscope Macintosh blades 1-3(4)</li> <li>• Oxygen concentrator[s] [cylinder]</li> <li>• Foot sucker [electric]</li> <li>• IV pressure infusor bag</li> <li>• Adult and paediatric resuscitator sets</li> <li>• Magills forceps (adult and child), intubation stylet and/or bougie</li> </ul>	<p>Same as Level 2 with the following additions (one of each per O.R or per ICU bed, except where stated):</p> <ul style="list-style-type: none"> <li>• Pulse oximeter, spare probes, adult and paediatric*</li> <li>• ECG (electrocardiogram) monitor*</li> <li>• Anaesthesia ventilator, electric power source with manual override</li> <li>• Infusion pumps (2 per bed)</li> <li>• Pressure bag for IVI</li> <li>• Electric sucker</li> <li>• Defibrillator (one per O.R / ICU)</li> <li>• [Automatic B.P. machine*]</li> <li>• Capnograph*</li> <li>• [Oxygen analyzer*]</li> <li>• Thermometer [temperature probe*]</li> <li>• Electric warming blanket</li> <li>• Electric overhead heater</li> <li>• Infant incubator</li> <li>• Laryngeal mask airways sizes 2, 3, 4 (3 sets per O.R)</li> <li>• intubating bougies, adult and child (1 set per O.R)</li> </ul> <p>* It is preferable to buy combined modalities all in one unit</p>
<b>Equipment: disposable</b>	<b>Equipment: disposable</b>	<b>Equipment: disposable</b>
<ul style="list-style-type: none"> <li>• IVI equipment</li> <li>• Suction catheters size 16 FG</li> <li>• Examination gloves</li> </ul>	<ul style="list-style-type: none"> <li>• VI equipment (minimum fluids normal saline, Ringer's lactate and dextrose 5%)</li> <li>• Suction catheters size 16 FG</li> <li>• Examination gloves</li> <li>• Sterile gloves sizes 6–8</li> <li>• Nasogastric tubes sizes 10–16 FG</li> <li>• Oral airways sizes 000–4</li> <li>• Tracheal tubes sizes 3–8.5</li> <li>• Spinal needles sizes 22 G and 25G</li> <li>• Batteries size C</li> </ul>	<p>Same as Level 2 with the following additions:</p> <ul style="list-style-type: none"> <li>• ECG dots</li> <li>• Ventilator circuits</li> <li>• Yankauer suckers</li> <li>• Giving sets for IVI pumps</li> <li>• Disposables for suction machines</li> <li>• Disposables for capnography, oxygen analyzer, in accordance with manufacturers' specifications: <ul style="list-style-type: none"> <li>- Sampling lines</li> <li>- Water traps</li> <li>- Connectors</li> <li>- Filters– Fuel cells</li> </ul> </li> </ul>