Chapter

Combat Casualty Care for Children: *Peculiarities, Problems, & Provisions*

Sunil Jain

Abstract

Armed Forces doctors are often required to treat children affected in war, combat, and disasters. Tender care & comprehensive tact is needed for children. Acquisition of these qualities comes with knowledge, its application, and practicing skills. Throughout history, children have been victims of armed conflict. War-related injuries are more severe as compared to the civilian sector injuries. Penetrating injuries are associated with significant damage to local structures, whereas blast injuries are associated with less local injury and more multisystem trauma. Children are not small adults. The differences have important practice implications. Identifying and correcting physiological compromise improves outcomes. The examination and vital sign data can be interpreted only if the caregiver has a thorough understanding of normal values. Identification & treatment of what is killing the patient is done in primary survey. Secondary survey, extremity trauma, fracture biomechanics, & burns peculiarities need attention. Care of the injured patient is a dynamic process. Frequent monitoring required for proper response. Small infants have a narrow margin for error. Combat trauma provides multiple opportunities for improvement. Continuation of research will ensure ongoing progress and further improvement in the outcomes of both military and civilian casualties.

Keywords: pediatric, combat care, multiple trauma, battlefield resuscitation, transfusion protocols, burns

1. Introduction

The scenario & statistics are highly suggestive of the need for heightened professionalism in treating children affected in war, combat, and disasters. Armed Forces doctors are often required to treat these children.

Throughout history, children have been victims of armed conflict. War-related injuries tend to be more severe as compared to the civilian sector [1]. In children combat-related injuries have a higher mortality than noncombat injuries or other admissions [2].

The primary mission of the Armed Forces field hospitals deployed in support of combat operations is 'The care of its injured troops". However they often provide care to civilians including pediatric patients [3]. Children are treated for combat injuries and also non-combat conditions on humanitarian grounds.

The reported workload of children treated in Armed Forces field hospitals recently ranged from 4–25% in various studies [4–7]. A study of pediatric casualties treated in U.S. and coalition military hospitals in Iraq and Afghanistan has reported that majority require intensive care [8].

Tender care & comprehensive tact is needed for children. Acquisition of these qualities comes with knowledge, its application, and practicing skills. Experiences from recent wars and disasters have highlighted the surgeons' increasingly crucial role in these scenarios. Surgeons should attend Advanced Trauma Life Support (ATLS) programme which covers trauma in children [9]. *Matos et al* have commented that "*Providing forward-deployed medical staff with training in the acute care of young children with severe traumatic injuries may improve outcomes in this population*" [10].

The Committee on Tactical Combat Casualty Care (TCCC), Joint Trauma System, U.S. Army Institute of Surgical Research has commented "*TCCC has taken a leadership role in advocating for battlefield trauma care advances*" [11]. TCCC is essentially a set of best-practice guidelines of pre-hospital trauma care customized for use in the battlefield. It includes (i) tourniquets and hemostatic dressings: aggressive use to control life-threatening external hemorrhage; (ii) fluid resuscitation: improved protocols and techniques for casualties in hemorrhagic shock; (iii) airway positioning and surgical airways: increased emphasis on these to manage the traumatized airway; (iv) battlefield analgesia: faster, safer, and more effective; (v) intra-osseous vascular access: increased use when needed; (vi) battlefield antibiotics; (vii) good medicine with good small-unit tactics combination [11]. The good of small victims – the children, can be greatly done with good understanding and the elaboration done below of pertinent specific challenges and professional special care.

2. Anatomical & physiological peculiarities

2.1 Adults vs. children

- Children are not small adults. Their anatomy and physiology is different. The differences have important implications for surgical practice.

- Children are more prone to multiple trauma [12]. This is logical given the same damaging force and small body size. Further the smaller body size in children results in a greater force applied per unit surface area (in blast injuries) /weight (in penetrating injuries). The energy is transmitted to a body with less fat, less connective tissue, and an immature skeleton; therefore injuries to multiple organs are more frequent.

- Pediatric airway is not a miniature replica of adult airway. It has different anatomy with regards to proportion and angulation. In pediatric population, epiglottis is large, floppy and omega-shaped. It makes an angle of 45° with the base of tongue. At birth, larynx is situated opposite to the lower border of C4 vertebra. It descends to C4–C5 interspace by the age of 3 years and finally descends to lie opposite to the body of C5. Importantly, the tonsils and adenoids appear in the second year of life and generally reach their largest size by 4–7 years, posing a risk of obstruction [13].

- Children are more susceptible to hypothermia. In children the surface area to body volume ratio is high. They have less subcutaneous fat, immature vasomotor control, and greater heat loss from pulmonary evaporation. This results in a higher thermal energy loss, necessitating guarding against hypothermia.

2.2 Injury patterns

- Children are commonly injured and sustain more severe injuries [14]. Young pediatric patients (ages ≤8 years) compared with older pediatric and adult patients have been reported to have increased severity of injury, as indicated by decreased Glasgow Coma Scale score; increased incidence of hypotension, base deficit, and serum pH on admission; red blood cell transfusion requirements; and increased injury severity scores on admission [10].

- Penetrating injuries are associated with significant damage to local structures, whereas blast injuries are associated with less local injury and more multisystem trauma [15].

- Young children have relatively large heads with immature neck musculature. This results in more susceptibility to cervical spine injury caused by the fulcrum effect in the C1–C3 area. Children under age 8 years are also susceptible to SCIWORA (spinal cord injury without radiographic abnormality).

- A child's chest wall is relatively pliable, therefore less force is absorbed by the rib cage & more is transmitted to the lungs. This makes pulmonary contusions frequent in children with blunt chest trauma. Children have more mobile mediastinal structures. Thus, a tension pneumothorax can shift the mediastinum causing respiratory & cardio-vascular compromise. It should always be considered in hypotensive-hypoxic child. It should also be noted that in children the thorax is disproportionately smaller as compared to the cranium and abdomen, hence if thoracic trauma is present one must assess the entire patient to rule out Traumatic Brain Injuries and abdominal injuries

- Infants & small children have a wider abdomen, a broader costal margin & a shallower pelvis. This makes liver, spleen & bladder trauma more common. In children the smaller & more pliable ribs offer less protection than those in adults. The spleen & liver are the organs most vulnerable to injury from blunt- or penetrating-force trauma.

2.3 Physiological parameters

- Identifying and correcting physiological compromise improves outcomes.

- Physiologically Total Body Water (TBW) as a percentage of body weight varies with age. TBW is 75% of body weight in a term infant. In the first year of life TBW decreases to approximately 60% of body weight and remains at this level until puberty. At puberty TBW changes are different in females and males. The fat content of females increases more than that of males. Males acquire more muscle mass than females. Fat has very low water content and muscle has high water content. Hence by the end of puberty, TBW remains at 60% in males, but in females it decreases to approximately 50% of body weight. Also the high fat content in overweight children causes a decrease in TBW as a percentage of body weight.

- Body weight is a critical measurement in children, because this is a major determinant of fluid balance and drug doses. At the turn of the century a peacetime study reported that incorrect recording of patient weights leading to an incorrect medication dose is a common cause for medication errors in the pediatric emergency department [16]. Estimation methods are useful in emergencies. A Tactical Combat Casualty Care oriented Broselow tape relates a child's height as measured by the tape to his/her weight to provide medical instructions. These include medication dosages, the size of the equipment that should be used, and the level of shock voltage when using a defibrillator.

- Vital signs are vital in detecting and assessing physiologic instability. These vary with age, & normal are:

Age	Heart rate (beats/minute)	Blood pressure (mm Hg)	Respiratory rate (breaths/min)
Premature	120–170	55–75/35–45	40–70
0–3 mths	100–150	65–85/45–55	35–55
3–6 mths	90–120	70–90/50–65	30–45
6–12 mths	80–120	80–100/55–65	25–40
1–3 yrs	70–110	90–105/55–70	20–30
3–6 yrs	65–110	95–110/60–75	20–25
6-12 yrs	60–95	100–120/60–75	14–22
12 yrs	55–85	110–135/65–85	12–18

Practical principles of use:

- child's respiratory rate should not be >60breaths/min for a sustained period;
- normal heart rate is 2–3 times normal respiratory rate for age; and
- pediatric blood pressure simple assessment: the lower limit of systolic blood pressure should be:

≥60 mm Hg for neonates;
≥70 mm Hg for 1 mo-1 yr. olds;
≥70 mm Hg + (2 × age) for 1–10 yr. olds; and
≥90 mm Hg for any child older than 10 yr.

Values not meeting these criteria are pathological.

- The examination and vital sign data can be interpreted only if the caregiver has a thorough understanding of normal values.
- All deviations from these physiological norms are pathological and need to be suitably corrected.

3. Battlefield resuscitation

The principles of ATLS should be followed. The philosophy of this is to identify & treat what is killing the patient in the primary survey. In the secondary survey one should proceed to identify all other injuries.

The trend evolving lays stress on correcting the physiological derangement, with surgical intervention restricted to stopping any active surgical bleeding & controlling any contamination.

3.1 Primary survey

- This addresses the ABCDEs: **a**irway, **b**reathing, **c**irculation, neurologic **d**eficit, & **e**xposure of patient & control of **e**nvironment.

3.1.1 Airway

- Optimizing oxygenation and ventilation while protecting the cervical spine from potential further injury is of paramount importance. Any child with multiple trauma should be suspected of having a cervical spine injury. Children are at risk for such injuries because of their large heads, which augment flexion-extension forces, and weak neck muscles, which predispose them to ligament injuries. If it is necessary to open the airway, a jaw thrust without head tilt is recommended. This procedure minimizes cervical spine motion. During maintenance of the airway it is important not to overextend the neck as this can lead to respiratory obstruction because of shorter neck and relatively larger tongue in children.

3.1.2 Breathing

- This should be assessed with the respiratory rate; visualizing chest wall motion for symmetry, depth and accessory muscle use; and auscultating breath sounds in both axillae. If breathing is inadequate, bag-valve-mask ventilation with 100% oxygen must be initiated immediately followed by endotracheal intubation. While intubating a child the following anatomical peculiarities of the airway in children should be borne in mind: smaller; more anteriorly placed, more difficult to visualize; and more prone to prone to mucosal injuries, leading to subglottic stenosis. The formulas for selecting the appropriate size ETT & its insertion are:

  Uncuffed ETT size (mm) = (age in yrs/4) + 4
  Cuffed ETT size (mm) = (age in yrs/4) + 3.5
  ETT depth (from lip to mid-trahea) = ETT internal diameter (size) x 3

- In the field, competent bag-mask ventilation may be preferable. Endotracheal intubation should be performed only by skilled providers.

A view from the history

- A substantial amount of medical and surgical progress has emanated from experiences in the battlefield. Sir Ivan Whiteside Magill developed the endotracheal tube during the First World War to facilitate plastic surgery around the mouth. It is pertinent to quote here:

  "*Necessity is the mother of invention, but for the Armed Forces*
  Adversity is the mother of all improvisations, innovations and inventions".

- Further dealing with pediatric patients in the battlefield, which is even more challenging task, should lead to more improvisations, innovations and inventions.

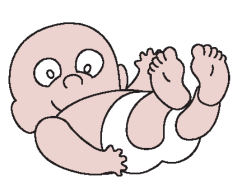
3.1.3 Circulation

- In children rapid thready pulse is a more reliable and earlier warning sign than a fall in blood pressure. More subtle signs need to be looked for early diagnosis. These are weakened or loss of peripheral pulse, reduced capillary refill, mottled pale skin, cooled extremities, reduced pulse pressure and changes in mentation.

- Blood pressure remains normal in early shock, as body compensates by increase in heart rate and peripheral vascular resistance. Blood pressure declines with loss of more than 25% of the blood volume. For a child weighing 10 kg this is only 200 ml! (20 ml/kg). With losses >25% hypotension ensues. Hypotension is a late and ominous sign of hypovolemic shock.

- Intravenous (IV) access is important and the quickest way to achieve is cannulating a larger vein, such as an ante-cubital vein. In a severely injured child, a 2nd catheter should be placed within the first few minutes of resuscitation. If IV access proves difficult readily and rapidly, an intra-osseous catheter is next option. All medications and fluids can be administered intra-osseously. *Cooper et al* have used this effectively in combat casualty care. They used IO needles to administer fluid (crystalloid, packed red cells and fresh frozen plasma) and drugs (analgesics, cardiac arrest drugs, antibiotics, drugs for both rapid sequence induction and maintenance of anesthesia) [17]. Next alternatives include central venous access using the Seldinger technique (femoral vein) or surgical cutdown (saphenous vein).

- A portable ultrasonic device may be of great help in locating and cannulating veins, especially those of the neck and groin.



- Patients with on-going hemodynamic instability require prompt intervention. In shock, early aggressive intravenous fluid resuscitation is essential to prevent further deterioration. Isotonic crystalloid solution- Ringer lactate or normal saline (20 ml/kg) should be infused rapidly. If necessary, crystalloid boluses should be repeated. Most children stabilize with administration of crystalloid solution alone. However if patient remains in shock after boluses totaling

40–60 ml/kg of crystalloid then 10-15 ml/kg of cross-matched packed red blood cells should be transfused. Early initiation of massive transfusion protocols (including fresh-frozen plasma) prevents coagulopathy. If shock persists despite these measures, surgery to stop internal hemorrhage is usually indicated.

- Frequent monitoring required for proper response. Small infants have a narrow margin for error.

- Severe combat injuries frequently require massive transfusion of large volumes of blood products. Experience from numerous military accounts in Iraq and Afghanistan indicates that patients receiving equal or near equal ratios of packed red blood cells to fresh frozen plasma and platelets had increased survival [18–21].

3.1.4 Neurologic deficit

- In the primary survey, neurologic status is briefly assessed using by evaluating the level of conciousness and determining pupil size and reactivity. Different assessment and monitoring tool can be used. The level of consciousness can be classified using the mnemonic ***AVPU***: **A**lert, responsive to **V**erbal commands, responsive to **P**ainful stimuli*,* or **U**nresponsive, details at **Table 1** [22]. The Glasgow Coma Scale (GCS) is the most widely used method of evaluating neurologic function, details of it and useful adaptation for children is at **Table 2** [23]. Unlike the GCS, the AVPU scale is not developmentally dependent. The posture should also be looked at.

In head injuries the primary direct cerebral injury occurs within seconds of the event and is irreversible. Secondary injury is caused by subsequent anoxia or ischemia. Our goal is to minimize secondary injury by ensuring adequate oxygenation, ventilation, and perfusion, and maintaining normal intracranial pressure (ICP). A child with Glasgow Coma Score of 8 or less, benefits from ICP monitoring and should be intubated. Evaluation should be done for craniotomy.

3.1.5 Exposure and environmental control

- Exposure is the final component of the primary assessment. This is performed only after the child's airway, breathing, and circulation are stable or have been stabilized through simple interventions.

- Exposure *has to be efficient.* Purpose is to assess for previously unidentified injures. Care has to be taken that exposure in a cold environment does not cause hypothermia and cardio-pulmonary instability.

A	The child is awake, alert, and interactive with parents and care providers.
V	The child responds only if the care provider or parents call the child's name or speak loudly.
P	The child responds only to painful stimuli, such as pinching the nail bed of a toe or finger.
U	The child is unresponsive to all stimuli.

Table 1.
AVPU neurologic assessment.

EYE OPENING (TOTAL POSSIBLE POINTS 4)			
Spontaneous	**4**		
To voice	3		
To pain	2		
None	1		
VERBAL RESPONSE (TOTAL POSSIBLE POINTS 5)			
Older Children		**Infants and Young Children < 2 years**	
Oriented	5	Cooing/ Babbling/Appropriate words	5
Confused	4	Irritable cry	4
Inappropriate	3	Crying to pain	3
Incomprehensible	2	Moaning to pain	2
None	1	None	1
MOTOR RESPONSE (TOTAL POSSIBLE POINTS 6)			
Obeys	6		
Localizes pain	5		
Withdraws	4		
Flexion	3		
Extension	2		
None	1		

Table 2.
The Glasgow coma scale and adaptation for children.

- Temperature should be checked on arrival and monitored. If required warming is done using overhead lamps or radiant heaters as well as heated blankets and warmed intravenous fluids and blood.

3.2 The current concepts & future 🤔

- Care of the injured patient is a dynamic process. Combat trauma provides multiple opportunities for improvement [24]. Hemorrhage remains the primary cause of preventable death after trauma.

- Although literature is emerging regarding the benefits of permissive hypotension, hemostatic resuscitation, and damage control surgery for adult trauma patients, currently there is no pediatric data [25], and research needed for review and refinements of our practices.

- Balanced massive transfusion (1, 1, 1 of fresh frozen plasma, packed red blood cells, and platelets ratio) has not yet been demonstrated to have the same mortality benefits in pediatric trauma patients as in adults. Similarly, tranexamic acid (TXA) has strong evidence to support its use in adult trauma and some evidence in pediatric trauma [26].

- Further research is required for use of balanced resuscitation, massive transfusion, adjuncts such as tranexamic acid or factor VII in resuscitation in the pediatric trauma population. Technological advancements such as hemoglobin-based oxygen carriers to increase survival should also be studied.

4. Provisioning

- An ideal first aid box that will suit all terrains, all ages, & all emergencies is yet to be devised. However we should continue to improve our planning with our experiences.
- Availability of necessary equipment is a vital part of an emergency response. If in military medical appreciation treating children is anticipated then medical equipments mentioned in **Table 3** should be included. An appreciation of a situation, whether written, verbal or mental, is a logical process of reasoning & analysis leading to the best course of action. **Table 4** gives details of Pediatric Resuscitation Medications & doses. Recognition of the potential for pediatric casualties is required to facilitate appropriate planning, training & equipping of medical units deployed on future operations [27].
- Systematic planning for scientific practice should be done

- The resuscitation cart or kit should be checked regularly, for presence and functionality of its components. Out-dated medications, a laryngoscope with a failed light source or an empty oxygen tank represents a catastrophe in a resuscitation setting.
- Matos *et al* have commented that "*Providing forward-deployed medical staff with paediatric-specific equipment for the acute care of young children with severe traumatic injuries may improve outcomes in this population*" [10]. This comes from their observations of increased mortality rates of young children with traumatic injuries at a US army combat support hospital.
- Another area of concern is peri-operative and subsequent care provisioning. Both emergency and elective surgeries are performed. *Neff et al* have commented "*Elective paediatric surgical care in a forward deployed setting is feasible; however, limitations in resources for perioperative care and rehabilitation mandate prudent patient selection particularly with respect to procedures that require prolonged post-operative care*" [28].

Storage cart for equipment/materials	
Airway equipment	Low pressure suction device, Yankauer tonsil tip suction, bulb syringe, suction catheters sizes 5-16F
	Oropharyngeal airways (sizes 00–5)
	Nasopharyngeal airways (sizes 12-30F)
	Magill forceps (pediatric, adult)
	Nasogastric tubes (sizes 6-14F)
	Laryngoscope handle with extra batteries, bulbs
	Laryngoscope blades– Miller straight 0, 1, 2, 3 & MacIntosh curved 2,3
	Endotracheal tubes (uncuffed 2.5–5.5; cuffed 6.0–8.0) and stylets
	Esophageal intubation detector or end-tidal carbon dioxide detector
	Nebulizer (or metered-dose inhaler with spacer/mask)
Breathing equipment	Clear oxygen masks, breather and non-rebreather, with reservoirs (infant, child, adult)
	Bag-valve-mask (450 mL and 1,000 mL)
	Oxygen and delivery system
Cardiac equipment	Cardiac arrest board for compressions
	Butterfly needles (19–25 gauge)
	Catheter-over-needle device (14–24 gauge)
	Arm boards, tape, tourniquet,
	IV adapters, T connecters, stopcocks
	Intraosseous needles (16 and 18 gauge)
	Intravenous tubing, micro-drip
	IVs, butterflies, intraosseous needles
	Tapes, alcohol, sponges
	Cutdown tray
	Umbilical catheter tray
	Defibrillator/portable ECG monitor
	Military antishock trousers kit
	Various crystalloid and colloid fluids
Monitoring equipment	Pulse oximetry, ECG, end-tidal CO_2, Sphygmomanometer (infant, child, adult, thigh cuffs)
Miscellaneous	Stiff neck collars (small/large)
	Heating source (overhead warmer/infrared lamp)
	Tactical Combat Casualty Care oriented Broselow tape
	General minor surgical procedure tray
	Tracheostomy tray
	Chest tube tray
	Pleurovac pump
	Warm packs, sandbags and so on
IV fluids	Normal saline (0.9 NS) *or* lactated Ringer solution (500 mL bags)
	5% dextrose, 0.45 NS (500 mL bags)
Medications	Albuterol for inhalation, epinephrine, antibiotics, anticonvulsants (diazepam/lorazepam), corticosteroids (parenteral/oral), dextrose (25%), diphenhydramine (parenteral), atropine, naloxone, sodium bicarbonate

Table 3.
Supplies: Pediatric emergency care.

Medication	Dose	Remarks
Atropine	• 0.02 mg/kg IV/IO • 0.03 mg/kg ET* • Repeat once if needed • Minimum dose: 0.1 mg • Minimum single dose: Child, 0.5 mg Adolescent, 1 mg	
Calcium chloride (10%)	20 mg/kg IV/IO (0.2 mL/kg)	Slowly
Calcium Gluconate (10%)	60 mg/kg IV/IO (1–2 mL/kg)	Slowly
Epinephrine	• 0.01 mg/kg (0.1 mL/kg 1: 10,000) IV/IO • 0.1 mg/kg (0.1 mL/kg 1: 1,000) ET* • Maximum dose: 1 mg IV/IO; 10 mg ET	May repeat q 3–5 min
Glucose	0.5–1 g/kg IV/IO	D10W: 5–10 mL/kg D25W: 2–4 mL/kg D50W: 1–2 mL/kg
Sodium bicarbonate	1 mEq/kg/dose IV/IO slowly	After adequate ventilation

**Flush with 5 mL of normal saline and follow with 5 ventilations.*

Table 4.
Pediatric resuscitation medications & doses.

5. Secondary survey

- The purpose of the secondary survey is to identify all injuries and perform a thorough & systematic head to toe examination. The injuries pointed out in the anatomical peculiarities section above should be especially looked for. Extreme vigilance in monitoring and re-evaluation must be ensured. Also research suggests that a third survey is one of the best ways to detect injuries that were missed during primary or secondary assessments [29–31].

6. Extremity trauma & fracture biomechanics

- This needs special mention. Extremity fractures may initially be missed in a severely injured patient as clinicians attend to more life-threatening injuries.

- Modern war ballistics and blast injuries inflict devastating extremity injuries, violating soft tissue, bone, and neurovascular structures [32].

- Children suffer injuries different than that of adults, due to differences in their skeletal system. The important differences as compared to adults are (i) periosseous cartilage presence (ii) physes presence (iii) a thicker, stronger, and more osteogenic periosteum. This produces new bone called callus more rapidly and in greater amounts (iv) a disproportionately large head (v) pliable rib cage (vi) open epiphyseal plates (vii) low density and more porosity. The low density is due to lower mineral content and the increased porosity due to increased number of haversian canals and vascular channels.

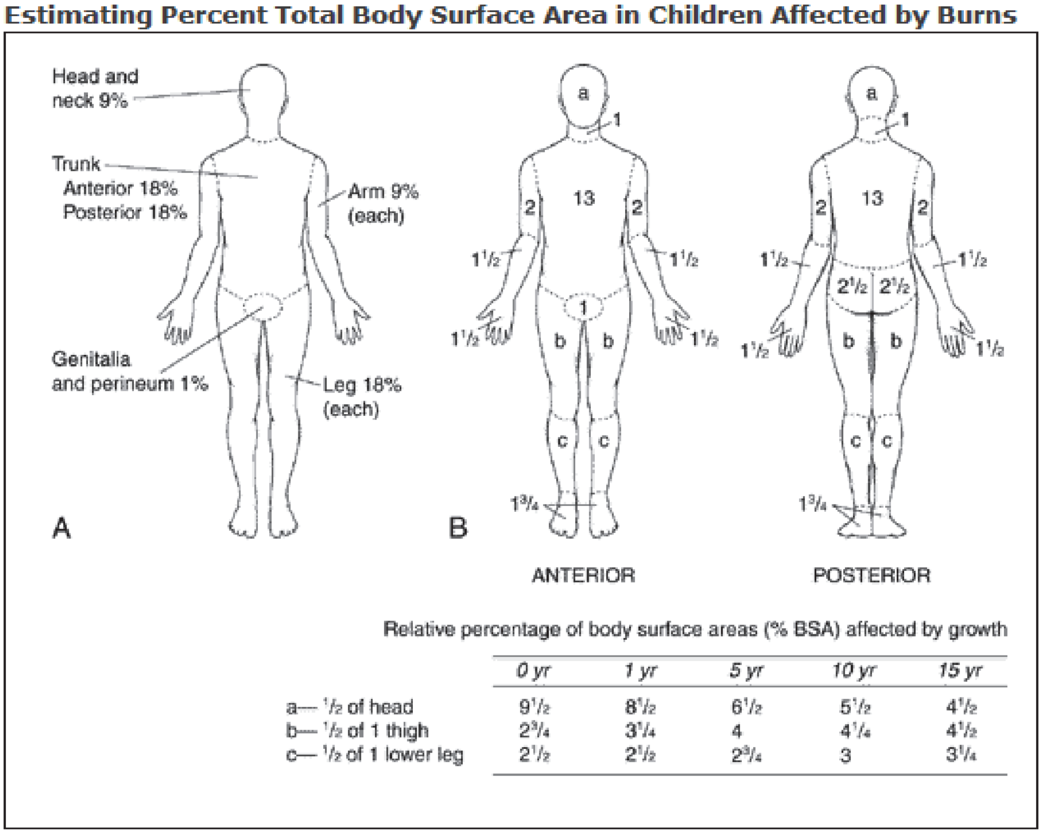
These differences result in a comparatively lower modulus of elasticity and lower bending strength. The bone in children may fail either in tension or in compression. The fracture lines do not propagate as in adults, and hence less chances of comminuted fractures in children.

7. Burns

- Wartime burn care is important. Thermal injury historically constitutes approximately 5%–20% of conventional warfare casualties [33]. In a recent study of pediatric wartime admissions burns was the second leading cause of pediatric mortality at the Combat Support Hospital, & burns cases also had a high case fatality rate [5]. Thus burns care is essential, & expertise in care required for saving lives.

- Proper triage & treatment requires assessment of the extent and depth of the injury. Infants have thinner skin, therefore they get deep burns. The extent of burns is determined by the Wallace rule of nines in adults. In pediatric age group the Lund and Browder chart provides Body Surface Area (BSA) proportions at different ages, with decreasing percentage BSA for the head and increasing percentage BSA for the legs as the child ages (**Figure 1**). This is

Estimating Percent Total Body Surface Area in Children Affected by Burns



Relative percentage of body surface areas (% BSA) affected by growth

	0 yr	1 yr	5 yr	10 yr	15 yr
a— ½ of head	9½	8½	6½	5½	4½
b— ½ of 1 thigh	2¾	3¼	4	4¼	4½
c— ½ of 1 lower leg	2½	2½	2¾	3	3¼

(A) Rule of "nines"
(B) Lund-Browder diagram for estimating extent of burns

Figure 1.
The Lund and Browder chart. All numbers are percentages.

useful in pediatric burns. In near future we should be using newer imaging technologies like Forward-Looking Infra-Red (FLIR) for burn assessments [34].

- Children with burns of >15% of BSA should receive IV fluids, as in children there is risk of gastric distension with oral fluids. Several different formulas are used to calculate fluid requirements. Urine output remains the best indicator of volume status, with minimum target value of 1 mL/kg/hr. in children (in adults it is 0.5 mL/kg/hr). If carbon monoxide poisoning is suspected 100% oxygen should be administered.

8. Mental health

- Armed conflicts can adversely affect the mental health of children. Many mental disorders can occur, especially posttraumatic stress disorder (PTSD). A recent study has highlighted the need for intervention programs, for the detection, prevention, and treatment of PTSD symptoms for all children, regardless of exposure type, in areas affected by conflict [35].

- We must ensure proper psychological support in emergency, and always plan for psychological monitoring and rehabilitation.

9. Conclusions

- The combat casualty care being provided today is on the basis of experience in previous wars and the information generated by integrated research during and between conflicts. Continuation of such research is desirable. Research results refine our practices. All this will ensure ongoing progress and further improvements in the outcomes of both military and civilian casualties.

- A progressive outlook, proclivity to change opinion, & practice in the light of new developments will allow great advances to be achieved.

- The mortality and morbidity rates in pediatrics are considered to be the most important indicators of the health status of a community and level of living of people in general. If we are able to care for children in war also then it will be par excellence.

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Conflict of interest

"The authors declare no conflict of interest."

Thanks

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Author details

Sunil Jain
Professor and Head, Department of Paediatrics, Command Hospital (Northern Command), India

*Address all correspondence to: sunil_jain700@rediff.com

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