Trauma
In The
Bariatric Patient

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Objectives

- Review current definitions and trends in the definition of obesity
- Discuss initial resuscitation of the obese patient
- Discuss special considerations in bariatric trauma
Incidence

- 34% of Americans are overweight
  - 35% are obese

- 17% of children are obese and 15% are overweight

- The obesity problem is increasing rapidly globally
Obesity Trends* Among U.S. Adults

BRFSS, 1990

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 1991

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 1992

(*BMI ≥30, or ~30 lbs. overweight for 5’ 4” person)
**Obesity Trends* Among U.S. Adults**

**BRFSS, 1993**

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person*)

![Map showing obesity trends among U.S. adults in 1993, with states shaded according to obesity rate categories.](image)
Obesity Trends* Among U.S. Adults

BRFSS, 1994

(*BMI ≥30, or ~30 lbs. overweight for 5’4” person)

[Map showing obesity trends among U.S. adults in 1994 with various states shaded to represent different obesity percentages.]
Obesity Trends* Among U.S. Adults

BRFSS, 1995

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BRFSS, 1999
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Obesity Trends* Among U.S. Adults

BRFSS, 2001

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 2002

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 2003

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 2004

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

BRFSS, 2005

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

*BMI ≥30, or ∼30 lbs. overweight for 5’ 4” person

BRFSS, 2006

Map showing obesity trends in the United States with different colors representing various percentage ranges.
Obesity Trends* Among U.S. Adults
BRFSS, 2007
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 2008
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 2009
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
BRFSS, 2010
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2011

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2012

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2014

*Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
<table>
<thead>
<tr>
<th>Country</th>
<th>Prevalence (%)</th>
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<tbody>
<tr>
<td>Cook Islands</td>
<td>46.6 [38.2-54.8]</td>
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<tr>
<td>Palau</td>
<td>43.1 [34.8-51.3]</td>
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<tr>
<td>Qatar</td>
<td>40 [31.0-48.1]</td>
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<tr>
<td>Nauru</td>
<td>29.7 [20.5-50.3]</td>
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<tr>
<td>Niue</td>
<td>27.7 [30.1-45.5]</td>
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<tr>
<td>Marshall Islands</td>
<td>36.9 [28.7-45.3]</td>
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<tr>
<td>Tonga</td>
<td>36.4 [28.1-45.4]</td>
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<tr>
<td>Samoa</td>
<td>36 [27.6-45]</td>
</tr>
<tr>
<td>Kuwait</td>
<td>35.5 [28.2-43.1]</td>
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<tr>
<td>Tuvalu</td>
<td>34.5 [26.4-42.8]</td>
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<tr>
<td>United Arab Emirates</td>
<td>33.8 [25.0-41.7]</td>
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<tr>
<td>Kiribati</td>
<td>32.9 [24.9-41.6]</td>
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<tr>
<td>United States of America</td>
<td>32.6 [26.7-38.7]</td>
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<td>Micronesia (Federated States of)</td>
<td>31 [23.4-39.1]</td>
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<tr>
<td>Fiji</td>
<td>30.8 [23.3-38.7]</td>
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<td>Bahrain</td>
<td>30.5 [23.2-38.2]</td>
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<td>Saudi Arabia</td>
<td>29.9 [22.9-37.7]</td>
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<tr>
<td>Bahamas</td>
<td>29.7 [21.5-38.5]</td>
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<td>Vanuatu</td>
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<tr>
<td>Andorra</td>
<td>28.5 [21.1-36.1]</td>
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<tr>
<td>Australia</td>
<td>28.4 [22.0-34.3]</td>
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<tr>
<td>New Zealand</td>
<td>27.7 [22.1-33.7]</td>
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<tr>
<td>Oman</td>
<td>27.2 [20.4-34.7]</td>
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<tr>
<td>United Kingdom</td>
<td>26.9 [22.1-32.2]</td>
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<td>Canada</td>
<td>26.8 [20.8-33.4]</td>
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<td>Libya</td>
<td>26.6 [20.3-33.5]</td>
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<td>Luxembourg</td>
<td>26.6 [19.7-33.9]</td>
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<td>Lebanon</td>
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<td>Czech Republic</td>
<td>26.2 [19.2-34]</td>
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<td>Ireland</td>
<td>25.9 [19.3-32.7]</td>
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<td>Malta</td>
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<td>Norway</td>
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<td>Slovakia</td>
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<td>Slovenia</td>
<td>24.6 [16.7-33.3]</td>
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<tr>
<td>Barbados</td>
<td>24.4 [16-34]</td>
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<td>Iceland</td>
<td>24.1 [17.1-31.9]</td>
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<tr>
<td>Trinidad and Tobago</td>
<td>24.1 [14-36.2]</td>
</tr>
<tr>
<td>Hungary</td>
<td>24 [17.2-31.8]</td>
</tr>
<tr>
<td>France</td>
<td>23.8 [17-30.9]</td>
</tr>
<tr>
<td>Argentina</td>
<td>23.6 [16.7-31.2]</td>
</tr>
<tr>
<td>Poland</td>
<td>23.5 [16.8-30.6]</td>
</tr>
<tr>
<td>Israel</td>
<td>23.5 [16.8-30.8]</td>
</tr>
<tr>
<td>Chile</td>
<td>23.3 [16.9-30.5]</td>
</tr>
<tr>
<td>Lithuania</td>
<td>23.1 [15.9-31.4]</td>
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</tbody>
</table>
Incidence

- Cost to treat: $147 billion
- Mortality in trauma patients is 7-8x higher in the obese patient
- Hospital stay is 10 days longer and ventilator days are 8 days longer
- Risk of infection is greatly increased
- Functional outcome (mobility) is much worse
Complications

- 80% of Type II diabetes
- 70% of CV disease
- 30% of gallbladder surgery is related to obesity
- 26% of obese people have hypertension
Definitions

- Overweight = BMI 25-29.9
- Obese = BMI 30-39.9
- Morbid obesity = BMI > 40
  - Or 100 lbs over normal weight
What Is BMI?

\[
\text{BMI} = \frac{\text{Weight (kg)}}{(\text{Height (m)})^2}
\]

\[
\text{BMI} = \frac{\text{Weight (lb)}}{(\text{Height (in)})^2} \times 704
\]
Definition

- More practical definition
  - Waist size
    - Men - >40 in
    - Women - >35 in
  - Waist / Hip ratio
    - > 1.0 = obese
The Problem

- Can’t fit in CT or MRI scanner
- Need 2 backboards
- Cannot raise side rails
- Unable to fit c-collar
- BP cuff won’t fit / not accurate
- Difficult to examine
The Problem

- Diagnosis and intervention more difficult
- Study interpretation more difficult
- Injury patterns are different
- Complications are more common
Initial Assessment

- Airway
- Breathing
- Circulation
- Disability
- Exposure / Environment
Airway

- Airway / Breathing
  - Resting lung capacity is decreased
  - Aspiration risk is increased
  - Landmarks for intubation or crich are hard to interpret
Circulation

- Cardiovascular system is impaired by:
  - Increased metabolic demand
  - Increased blood volume
  - Increased cardiac workload

- Difficult to:
  - Insert IVs
  - Apply BP cuff
  - Perform FAST or DPL
Disability

- Can’t fit cervical collar
- Won’t fit in CT / MRI
Environment

- Difficult to
  - Fit on stretcher
  - Move patient
  - Apply equipment (e.g. splints)
Other Issues

- Drug dosing
  - Distribution
  - Metabolism

- Vascular access
  - Both peripheral and central

- Nutrition
  - More likely to develop malnutrition
  - Mobilize more protein and less fat
Initial Management Recommendations

- **Airway**
  - Oxygen mask
  - Consider BiPap

- **Breathing**
  - Expect low sats (88-92%)
  - Expect CO2 retention (pCO2 46-52)
  - Consider baseline ABG in ED
Initial Management Recommendations

- **Circulation**
  - Try standard IV access technique first
    - Consider longer needle
  - Consider PICC later
  - Be mindful of hygiene for groin lines
    - Consider IJ instead
  - Intraosseous lines work well in the short-term
Further Assessment

- Chest xray may be easier with patient in slight Rev Trend. position
- CT chest is best evaluation
- Clear spines with CT
- Assume cardiac disease
  - Will likely need echo eval (TEE)
Further Assessment

- Foley catheter – problematic in both sexes
- NG tube mandatory to avoid aspiration
- CT scanning best diagnostic technique (if able)
Complications

- Diabetes (Type II)
- Atelectasis / pneumonia
- DVT / PE
- Wound infection
- Seroma / hematoma
- Wound dehiscence
- Pressure sores
Special Considerations
Massively Obese (>350 lbs)

- “Big Boy” bed
- Lifting / moving equipment
- SCD considerations
- Skin care
- Special dressings
  - Unusual contours
- Multidisciplinary approach
AND A DIET COKE PLEASE
Best Solution

- Develop a system!
  - EMS
  - Triage to Trauma Center
  - Have large beds / equipment available in ED and elsewhere
  - Check door size!
  - Ensure vendor response times
  - Review xray capabilities
  - Train your personnel
Best Solution

- Develop a system! (continued)
  - Extend expertise beyond ED and ICU
  - Involve social workers in system
  - Develop preferred referral facilities for discharge
  - Develop preferred home care agencies
Pediatric CT Scans Before Transfer to a Pediatric Trauma Center

CT scan is essential in diagnosing injury, although concerns for unnecessary radiation exposure are growing. These concerns are even greater in children, who may be more likely to have long-term effects from it. This makes avoiding duplication of CT scanning extremely important.

Unfortunately, there are only about 50 pediatric trauma centers in the US, so the majority of seriously injured children are seen at another hospital before transfer. Does CT evaluation at the first hospital increase the likelihood that a repeat scan will be needed at the trauma center, increasing radiation exposure and risk?

Rainbow Babies and Children’s Hospital in Cincinnati looked at 3 years of transfers of injured children from community hospitals. They then looked at how many of these children had an initial head and/or abdominal scan at the outside hospital, and whether a repeat scan of those areas was performed within 4 hours or arrival at Rainbow.

Numbers were small, but here are the results:

- 33 had an outside CT scan: 28 (88%) were repeated
- 6 had an outside abdominal scan, 2 (33%) were repeated
- 55 did not have outside scans; none were repeated at Rainbow. (This is a weird thing to look at. I would hope that the trauma center didn’t have to repeat any of their own scans within 4 hours).

Bottom line: It is critically important for referring hospitals to use radiation wisely! First, if the patient has obvious injuries that require transfer, don’t scan, just send. If you need to scan to decide whether you can keep the patient, use the best ALARA technique you can. And trauma centers, please send a copy of your CT protocols to your referring hospitals so they can get the best images possible.

*ALARA = As low as reasonably achievable (applied to radiation exposure). Also known as ALARP outside of North America (as low as reasonably practicable).

Related posts:
- Radiation exposure in pediatric trauma
- FAST exam in children

How To Read A Stab Wound

Most emergency departments do not see much penetrating trauma. But it is helpful to be able to learn as much as possible from the appearance of these piercing injuries when you do see them. This post will describe the basics of reading stab wounds.

Important: This information will allow some basic interpretation of wounds. It will not qualify you as a forensic expert by any means. I do not recommend that you document any of this information in the medical record unless you have specific forensic training. You should only write things like "a wound was noted in the midepigastrium that is 2 cm in length." Your note can and will be used in a court of law, and if you are wrong there can be significant consequences for the plaintiff or the defendant. This information is for your edification only.

1. What is the length of the wound? This does not necessarily correspond to the width of the blade. Skin stretches as it is cut, so the wound will usually retract to a length that is shorter than the full width of the blade.
2. Is the item sharp on one side or both? This can
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Michael.D.McGonigal
The End