

Impact of Obesity on the Practice of Medicine

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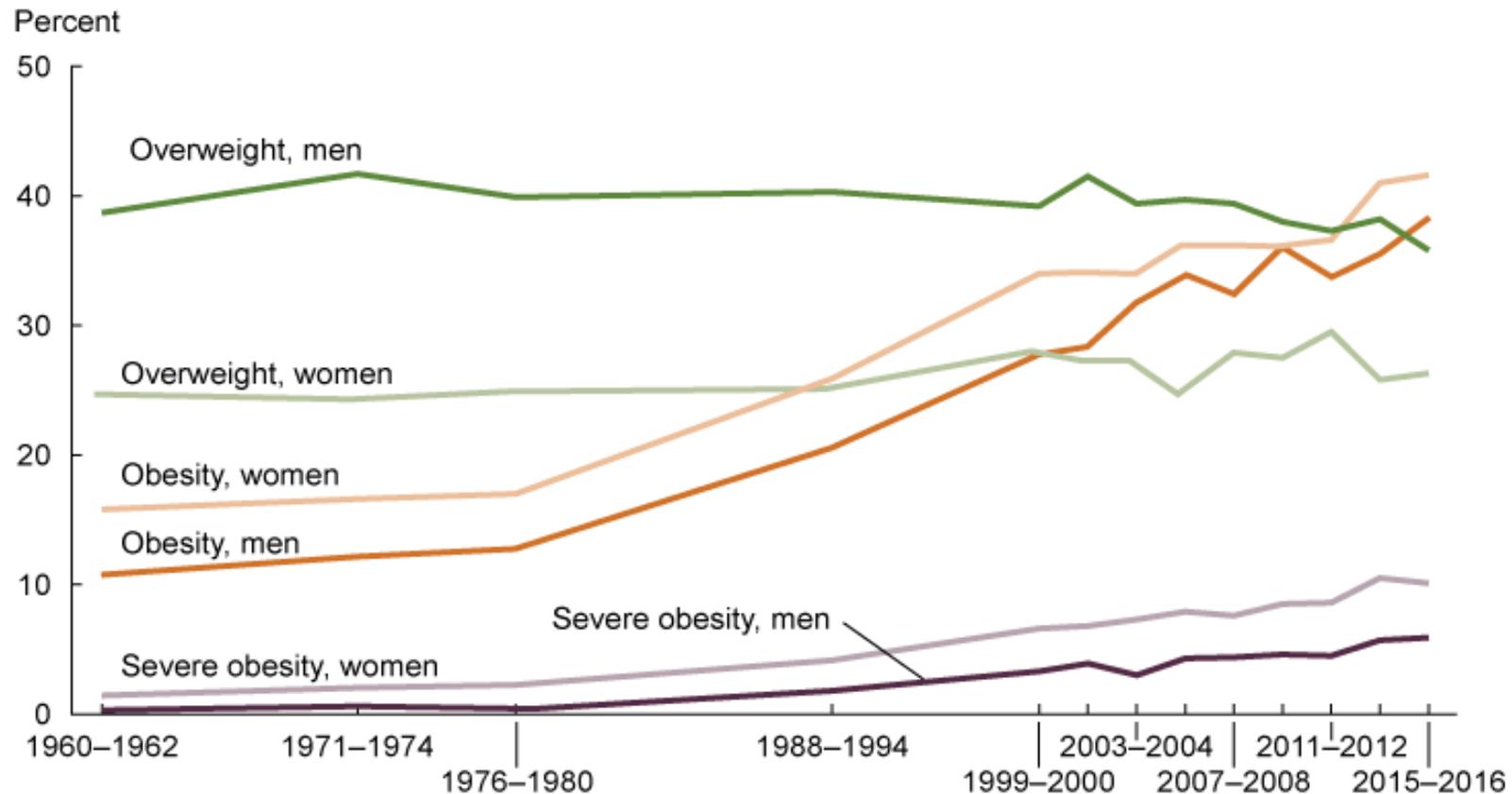
Objectives

After this presentation, participants will be able to:

- State how physicians' attitudes, knowledge, and beliefs about obesity can affect and bias thinking about diagnostics in treating the patient with obesity
- Identify ways in which inappropriate imaging for patients of size can affect the practice of medicine
- Express how inappropriate treatment paradigms can be for patients with obesity, ie, surgery dosing of meds

What is the prevalence of the population we are talking about?

US men and women aged 20-74, 1960-62 through 2015-16



Impact of obesity on the practice of medicine is divided into:

Affects Diagnosis

Knowledge, attitudes, and beliefs (patient and physician's)

Ability of the physician to perform a physical examination

Ability of imaging studies (CT scan, MRI, X-ray)

Affects Diagnosis and Treatment

Ability of office and hospital to accommodate patient with obesity (surgery)

Affects Treatment

Ability of team to prescribe therapy (medications)

Ability of third-party payers to support therapy

Diagnostic errors

There aren't statistics on how many diagnostic errors are *due to weight*, but the data for the general population is disturbing enough:

- "**Doctors make mistakes in diagnosing 10-15% of all patients**, and in half of those cases it causes real harm," Groopman says
- Based on anecdotal evidence — patients who've told her that their doctors are often too quick to blame symptoms on weight — Rebecca Puhl, PhD, director of Research and Weight Stigma Initiatives at the Rudd Center for Food Policy and Obesity at Yale University, suspects that being heavy could further increase the odds of being misdiagnosed

Weight Bias

- **Physician Attitudes and Physical Exam**
 - **Hospital**
 - **Medications and Payers**
-

Obesity bias of clinicians

As patient BMI increases, **physicians** report:

- Having less patience
- Less desire to help the patient
- Seeing patients with obesity was a waste of their time
- Having less respect for patients

Nurses

- 31% “would prefer not to care for obese patients”
- 12% “would prefer not to touch obese patients”
- 24% agreed that patients with obesity “repulsed them”

Views on Patients with Obesity:

Physicians

- Less self-disciplined
- Less compliant
- More annoying

Nurses

- Lazy
- Lacking in self-control/willpower
- Non-compliant

Medical Students

- Poor in self-control
- Less likely to adhere
- Sloppy
- Awkward
- Unpleasant
- Unsuccessful
- Responsible for symptoms

Obesity bias in training

Attitudes, beliefs, and observations among advanced trainees in professional health disciplines

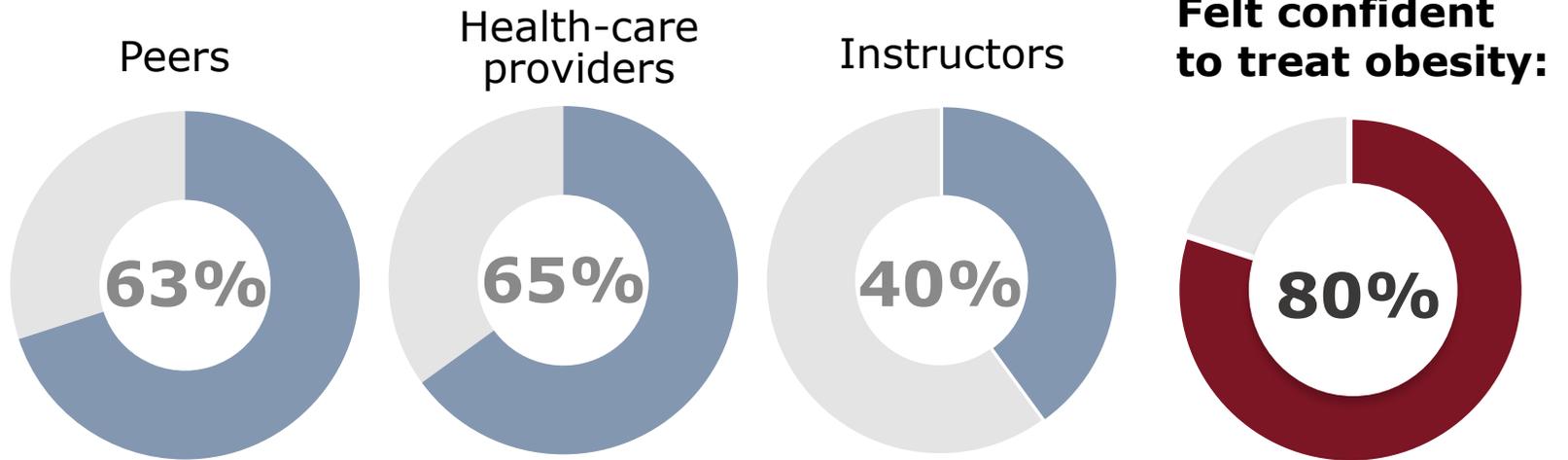
Survey of
107 Medical
Students

Enrolled in a post-graduate health discipline (physician associate, clinical psychology, psychiatric residency)

Students with higher weight bias expressed greater frustration

Results partially due to beliefs that obesity is caused by behavioral factors

Students reported that patients with obesity are a common target of negative attitudes and derogatory humor by:



Students' Beliefs Regarding Patients with Obesity



31% 32% 33% 34% 35% 36% 37%

Attribution error in medical diagnosis

- Patient with asthma and BMI 34 kg/m² sees a nurse practitioner in her doctor's office for wheezing and expects to get her asthma medication adjusted
- Instead, she was told she would feel better if she lost some weight (5'3", 195 pounds)
- ATTRIBUTION diagnostic error: Thinking is colored by a stereotype and you attribute the entire clinical picture to that stereotype
- Obesity can cause so many health problems and so it is easy to blame a variety of complaints from knee pain to breathing trouble on a patient's weight
- We must constantly ask ourselves: **"WHAT ELSE COULD THIS BE?"**

It can work the other way too...

- Physically fit male in his early 40s hiking in the woods and feels sharp pain in his chest – forest ranger; has been feeling pain for several days but this was more severe; he sat and waited for pain to go away
- Went to ER to see ER doc; doc noted muscular male with ruddy complexion; not sweating; nonsmoker; never overweight; no family hx of heart attack stroke or DM
- BP, P, PE, EKG, CXR, cardiac enzymes NORMAL
- Next AM patient came in to ER with an acute MI
- Doc's thinking was overly influenced by how healthy the patient looked and absence of risk factors
- Misdiagnosis of muscle strain was unstable angina: 50% of cases do not show up on an EKG; no damage to heart muscle yet and no failure yet

Extra Weight Can Obscure Illness

Physical Exam Inadequacy

Extra body fat can literally obscure some illnesses

Even if doctors are aware of the potential traps they can fall into when diagnosing an overweight patient, extra body fat can literally obscure some illnesses, including heart disease and different types of cancer

- **"It's more difficult to hear heart and lung sounds in heavy people,"** says Dr. Mary Margaret Huizinga, MD, MPH, director of the Johns Hopkins Digestive Weight Loss Center. "I use an **electronic stethoscope**, which works well, but I'm very aware of the issues that can crop up in overweight patients. Not all doctors have these stethoscopes — or are aware they need one."
- Dr. Jeffrey C. King, MD, professor and director of maternal and fetal medicine at the University of Louisville School of Medicine, says, **"The more tissue between the palpating hand and what you're trying to feel, the harder it is to detect a mass."**

Routine pelvic exam and women with obesity

- "The vaginal walls become lax and collapse into the middle, obscuring the cervix."
 - Dr. Jeffrey C. King, MD, professor and director of maternal and fetal medicine at the University of Louisville School of Medicine¹
- "Larger or modified speculums can help, but not all docs have them and they can make the exam more uncomfortable."
 - Dr. Lynda Wolf, MD, a reproductive endocrinologist at Reproductive Medicine Associates of Michigan¹

That may explain the disturbing finding that women with obesity are less likely to get Pap smears than normal-weight women, though doctors may be partly to blame:

83% of 1,300 physicians were reluctant to do pelvic exams on women with obesity²

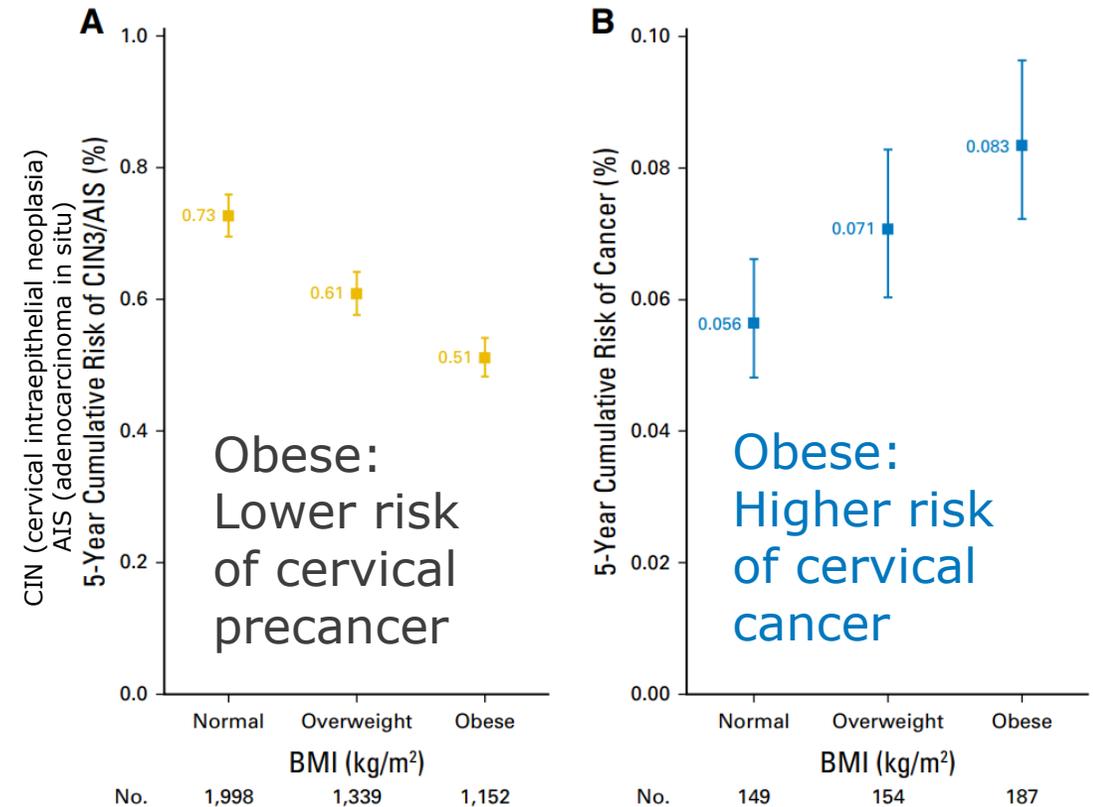
1. www.cnn.com/2010/HEALTH/01/21/obesity.discrimination/index.html

2. Adams CH, et al. *Women Health*. 1993;20(2):45-57.

Body weight increases risk of cervical cancer by decreased detection of precancer

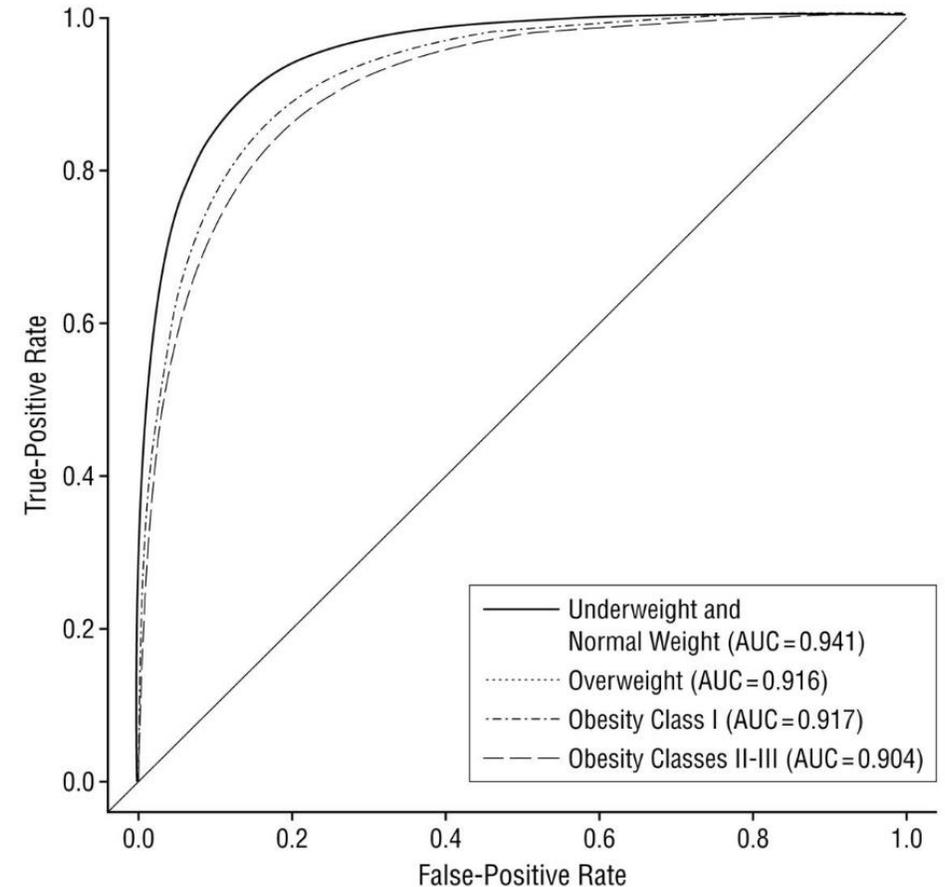
- Retrospective cohort study
- N=944,227 women aged 30-64
- Underwent cytology and human papillomavirus DNA testing (ie, cotesting) at Kaiser Permanente Northern California (Jan 2003–Dec 2015)
- RESULTS: lower risk of cervical precancer and higher risk of cervical cancer with increasing BMI likely due to underdiagnosis of cervical precancer
- Improvements in equipment and/or technique to assure adequate sampling and visualization of women with elevated body mass might reduce cervical cancer incidence

Approximately 20% of cervical cancers could be attributed to overweight or obesity in the women in our study who underwent routine cervical screening



Mammograms less accurate in women with obesity

- N=100,622 mammography exams
- Women with pre-obesity and obesity were more likely to be recalled for additional tests *after adjusting for age and breast density*
- **Women with obesity had more than a 20% increased risk of having false-positive mammography results**
- For an estimated 10 million women with obesity in the U.S., this means some 200,000 false positives. At \$600 per retest, that adds up to an extra \$120 million in U.S. health-care costs (2004)



Obesity significantly increases the difficulty of patient management in the emergency department

- 750 patients and their ED carers enrolled
- **BMI most strongly correlated with difficulty in finding anatomical landmarks, venous pressure measurement, physical examination, patient positioning and procedures generally, especially cannulation and venipuncture** (coefficient > 0.5, $P < 0.001$).
 - Doctors reported more difficulties than nurses and radiographers
 - Difficulty increased with BMI >30
- RESULTS: Patient BMI was positively correlated with all aspects of ED clinical management examined (correlation coefficient range 0.28-0.57, $P < 0.001$).
- CONCLUSION:
 - Patient obesity significantly increases the difficulty of ED patient management
 - Most staff recommendations related to issues of patient mobility including equipment, staffing and bariatric devices

Inappropriate Medical Equipment

Inadequate Imaging Affects Diagnosis

Assessing blood pressure in patients with severe obesity

- RESULTS:
Correlation between intra-arterial and forearm measures was 0.90 ($P < 0.001$) for the 2570 data (systolic and diastolic)
Compared to intra-arterial,
 - **Forearm method**
overestimated systolic (6 ± 16 mm Hg, $P < 0.001$)
underestimated diastolic (2 ± 11 mm Hg, $P = 0.03$)
 - **Upper-arm**
underestimated systolic (8 ± 16 mm Hg, $P < 0.01$) overestimated diastolic (9 ± 7 mm Hg, $P < 0.001$)

CONCLUSION:

- **Our results suggest that forearm method may be a more accurate alternative to upper-arm measurement to assess blood pressure in patients with severe obesity**

1285 measures of intra-arterial and forearm BP taken in 51 patients with severe obesity in a supine position in the operating and the recovery room

Subset of 352 upper-arm measures were taken in the recovery room and compared to the intra-arterial and the forearm methods.

Intravenous access to patients with obesity

- Complications related to central venous catheter placement due to:
 - Loss of anatomic landmarks
 - Increased depth of insertion
 - Need for multiple needle passes
 - Increased duration of cannulation
 - Difficulty in maintaining proper angle during insertion
- Increased risk of blood infection possible in femoral placement

Two-dimensional ultrasound guidance for cannulation of internal jugular veins:

- Decreases risk of failed catheter placement
- Improves first-pass success
- Facilitates faster placement vs. landmark method

Visualization of fetal anatomy decreased significantly with increasing maternal BMI

- Only **50%** of fetal anatomy surveys could be completed during the initial examination in women with obesity
- **Increasing maternal BMI limits visualization** of fetal anatomy during a standard ultrasound examination at 18 to 24 weeks
- Visualization of fetal anatomy **decreased significantly with increasing maternal BMI** for the complete survey as well as for each individual component with the exception of the fetal bladder (all $P < .001$)

10,112 women who underwent a standard ultrasound exam:
2% underweight
38% normal weight
34% overweight
26% with obesity

Diagnostic imaging and obesity

- Radiography is limited by X-ray beam attenuation resulting in decreased image contrast and amplification of noise, and increase in exposure time resulting in motion artifacts
 - Raising kilovolt (peak) and milliamperere second helps improve image quality
- **Ultrasound image quality is affected by fat more than any other imaging modality**
- Ultrasound beams are attenuated by fat at a rate of 0.63 dB/cm
 - Use of lowest frequency transducer (1.5-2.0 MHz) may partially overcome increased image attenuation

Diagnostic imaging and obesity

- For fluoroscopy, CT, and MRI, with and aperture diameter limitations of the imaging modality should be obtained before patient is transported out of ICU (see table)
- MRI scanners with a high signaling-to-noise ratio and strong gradients ($\geq 1.5T$) cannot accommodate patients 350 lbs
- A vertical-field open MRI system is needed for pts weighing up to 550 lbs and can offer a range of vertical apertures from 40-55 cm

Table 23-3 Weight and Aperture Diameter Limitations per Imaging Modality

Imaging Modality	Maximum Aperture Diameter (cm)	Weight Limit (lb)
Fluoroscopy	63	700
Vertical-field MRI	55	550
Cylindrical-bore MRI	70	550

90% of US hospitals without large capacity imaging (>450 lb limit)

Many extremely heavy people cannot fit in scanners, typical weight limit of 350 to 450 pounds

Medical Centers	Own Large Weight Capacity CT	Own Large Weight Capacity MRI
Hospitals with Emergency Departments	10%	8%
Academic Hospitals	28%	10%
Rural Hospitals	5%	-
Critical-access Hospitals	3%	-
Trauma Centers	34%	-
Stroke Centers	23%	-
Bariatric Surgery Centers	21%	-

BMI influences selection of cut-points for BNP in diagnosing acute HF

Breathing Not Properly Multinational Study

- Studies have suggested a cut-point of BNP $>$ or $=$ 100 pg/mL for the diagnosis of HF; however, there is an inverse relation between BNP levels and BMI

Conclusions

- **A lower cut-point (BNP \geq 54 pg/mL) should be used in patients with severe obesity to preserve sensitivity**
- **A higher cut-point in lean patients (BNP \geq 170 pg/mL) could be used to increase specificity**

“The major impact [of not adhering to the lower cut-points] is misdiagnosis,” said Dr. Daniels. “If you get a low-ish BNP and decide it's not heart failure, the patient might go on to be treated for other things. They might be given steroids thinking it is a COPD exacerbation, or antibiotics. If it is actually heart failure, those things won't help and might even hurt. Misdiagnosis also leads to prolonged hospital stays and increased morbidity and mortality.”

1586 patients who presented to the Emergency Dept with acute dyspnea

B-type natriuretic peptide was measured on arrival

Height and weight data were available for 1368 participants

Clinical diagnosis of HF was adjudicated by 2 independent cardiologists blinded to BNP results

Drug Dosing

Medications

Using a dosing weight correction factor (DWCF)

- In general, the extent of which obesity influences the volume of distribution of a drug depends on its lipid solubility
- Water content in adipose tissue is 20-50% of that in other tissues
- Distribution of drugs may warrant adjusting the dose in proportion to the excess in body weight with the use of a dosing weight correction factor (DWCF)

$$\text{Adjusted weight (AW)} = \text{DWCF (TBW-IBW)} + \text{IBW}$$

Not used in practice / training needed

Factors that underlie the rate and extent of drug distribution in patients with severe obesity:

- Degree of tissue perfusion
- Binding of drugs to plasma proteins
- Permeability of tissue membranes

Proposed dosing of commonly used drugs in patients with obesity

Drug	Initial	Maintenance
Lidocaine	TBW	IBW
Digoxin	IBW	IBW
Beta-blockers	IBW	IBW
Aminoglycosides	AW	AW
Vancomycin	AW	AW
Atracurium	TBW	TBW
Fentanyl	$52 / (1 + [196.4 \times e^{-0.025TBW} - 53.66] / 100)$	
Phenytoin	TBW	IBW
Corticosteroids	IBW	IBW
Cyclosporine	IBW	IBW
Aminophylline	IBW	IBW
Heparin*	ABW	–
Enoxaparin*	TBW	TBW
Drotrecogin alfa	ABW	ABW

*Dosing for treatment of venous thromboembolism.

Male: IBW = 50 kg + 2.3 kg per inch of height >5 ft.

Female: IBW = 45.5 kg + 2.3 kg per inch of height >5 ft.

AW = IBW + 0.4 (TBW – IBW).

ABW, adjusted body weight, AW, adjusted weight; IBW, ideal body weight, TBW, total body weight.

Risk

Surgery on patients with obesity

Hospitals have inadequate systems to accommodate obesity

- Have longer procedure times for some spinal surgeries (~25 mins on average)
- Spend more time under anesthesia and in the hospital
- Are more likely to be admitted to the ICU and need a ventilator
- Cost the system >\$500 more on average
- Hip surgery is more complicated and longer, and raises the risk of future dislocation
- (While rare) significantly more likely to die after colorectal cancer surgery than patients without obesity, and their hospital bills were \$15,582 greater
- Heart surgery: 2x more likely to develop a serious, potentially fatal infection of the breastbone

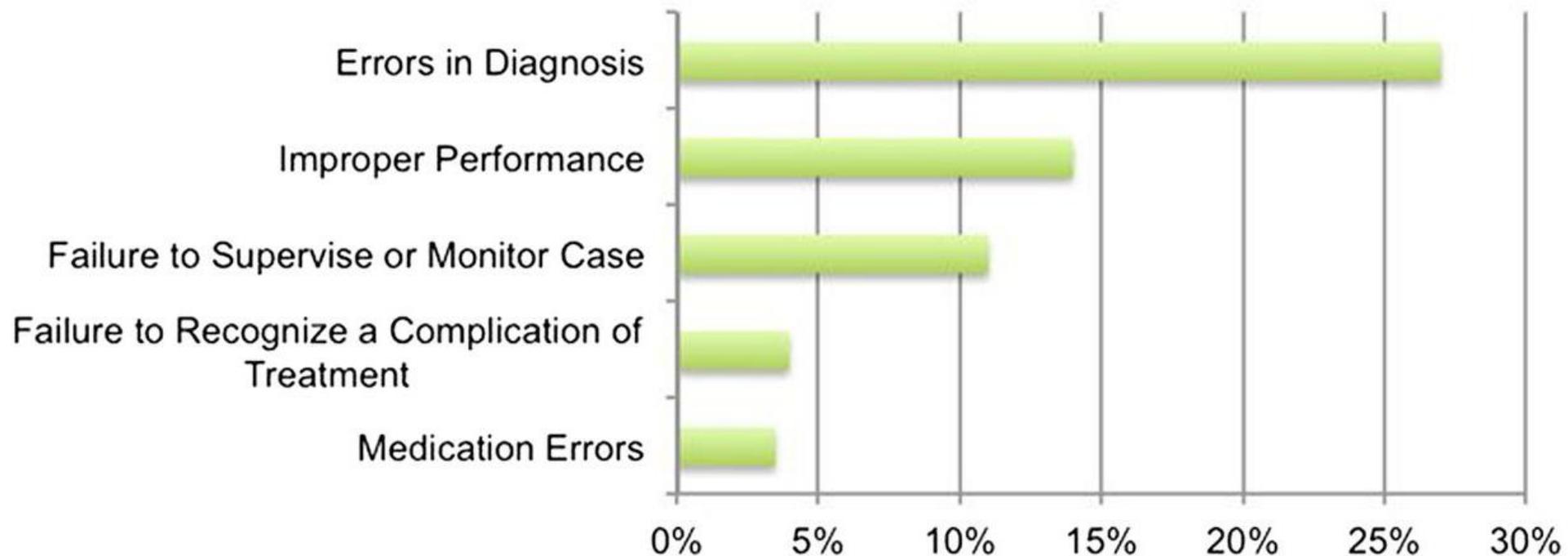
Hospitals: risk-averse

- Doctors and hospitals have become risk-averse because they **fear their ratings will fall if too many patients have complications:**
 - A lower score can mean reductions in reimbursements by Medicare
 - Poor results can also lead to penalties for hospitals and, eventually, doctors
- Survey of >700 hip and knee surgeons: 62% used BMI as cutoffs for requiring weight loss before offering surgery
 - “The numbers were all over the map,” Dr. Yates said
- 42% picked a BMI cutoff said they had done so because they were worried about their performance score or that of their hospital
- “It’s very common to pick an arbitrary BMI number and say, ‘That is the number we won’t go above,’” Dr. Yates said. Yet a person with an index of, say, 41 might be healthy and active, he said, but in terrible pain from arthritis. A knee replacement could be life transforming

Medical errors where patients expired

Top alleged medical error named in claims where the patient expired

(Physician Insurers Association of America (PIAA) Data Sharing Project Data 1985–2009, Physician Insurer, Vol 55, 2010).



The photo that changed the face of AIDS



Photo that would change the face of obesity?

- For Caroline Apovian, MD, it is an image from the year 2000 of her looking on as **Armour Forse, MD, PhD, a bariatric surgeon**, cried with a 17 year old with extreme obesity (750 pounds) who was tearful due to his hypoventilation syndrome and the fact that he was about to undergo bariatric surgery and needed to lose weight prior to surgery
- Why? Because despite the impossible odor in the room, Dr. Forse entered and examined and put his hands on the patient and made sure that I saw this — his legacy much the same as the legacy left by **Jerome Groopman, MD**, and **Davis Allen, MD**, as they drew blood from patients with AIDS without gloves with an audience of medical students, interns, and residents on a daily basis. AIDS is a disease and these are human beings who deserve to be treated with respect

Summary

- Stigma and discrimination in obesity assessment and treatment is real and ongoing
- Attribution mistakes are common in medical practice and doctors have to start thinking differently about OBESITY
- Physical exam and imaging tools have real failings
- ASK YOURSELF "WHAT ELSE COULD THIS BE?"

Resources



1. Practical suggestions for performing the physical exam in patients with obesity

Domain	What to expect	What to do
Environment	Equipment may be unsuitable	Provide high chairs w/o arms, low reinforced tables, adequate hospital beds and gowns
	Patients have decreased mobility	Enlist aide to help undress and position pt
	MDs may feel uncomfortable touching or talking about the bodies of patients with obesity	Ask pt to facilitate exam by retracting his/her own breast, pannus, etc.
	Appointments may take more time	Schedule longer appointments
Vital signs	Many scales have a weight limit of 350 lbs	Use a scale with adequate weight capacity
	Pts w/ obesity likely to be deconditioned	Seat pt quietly for 15 minutes before vitals
	Cuffs too tight produce falsely elevated BP	Ensure proper equipment sizes
	Pts w/ likely to meet criteria for Met Synd.	
Head and neck	Posterior oropharynx is hard to visualize	Use a tongue depressor or ask pt to yawn
	JVP difficult to visualize	Hepatojugular reflex may be useful but is also more difficult with obesity
	Thyroid is difficult to visualize	Ask pt to look up to stretch out neck

2. Practical suggestions for performing the physical exam in patients with obesity

Domain	What to expect	What to do
Cardio-vascular	Thick chest wall makes heart tones sound distant	Palpate carotid pulse at same time. Ask pt to lean forward to bring heart closer to chest wall. Ask recumbent pt to raise arms above head to spread out chest-wall soft tissue. Auscultate S ₂ splitting at upper left sternal edge
	Pulses may be difficult to appreciate	Have handheld Doppler available to check pulses
Breasts	Patients with obesity have large and sometimes pendulous breasts	Spend adequate time examining each breast (>3 min each) Examine breast w/pt in lateral decubitus position
Lungs	Breath sounds are diminished	Auscultate directly over exposed skin
Abdomen	Abdominal fat makes it difficult to palpate deep structures (eg, liver edge)	Use scratch test to find the liver edge
	Bulging flanks not helpful in diagnosis of ascites	Look for ascites using fluid wave or shifting dullness

3. Practical suggestions for performing the physical exam in patients with obesity

Domain	What to expect	What to do
Gynecological	Exposing introitus is difficult, making speculum insertion challenging	Encourage pt to abduct legs as much as possible. Explain difficulty to pt and ask assistant to retract vulvar tissue while inserting speculum
	Reaching cervix is difficult due to depth relative to skin	
	Palpating structures on bimanual exam is difficult	
Neurological	Deep tendon reflexes may be difficult to elicit	Ensure proper positioning, utilize distraction techniques
Musculo-skeletal	Thick, heavy limbs make anterior drawer sign and FABER difficult	Ask assistant to help position patient
Skin	Pts may be embarrassed to report skin conditions	Ask about problem areas and do a thorough exam with special attention to intertriginous folds

Cases



Case 1: 48 year old AA female with BMI = 40 and abdominal pain, then BRBPR – 3 year hx of dx:

- CT abdomen and pelvis – negative; dx of PreDM placed on metformin
- 10/31/16; follow up complains of constipation; rectal no blood in stool; ongoing hematuria; Miralax and milk of mag
- 11/17/16; Pelvic ultrasound shows fibroid, X-rays negative
- 1/5/17 urgent care for abdominal pain; IBS referred to GI; 2/8/17; GI referred to anesthesia pain clinic for injection to area dx abdominal wall pain
- 2/15/17 follow up obgyn MSK nerve damage; and 2/21/17 anesthesia dx intercostal neuralgia T5,T6,T7; sp injections 3/16/17; seen 4/12, 5/17, 7/6,7/23, 8/29
- 1/29/18; 6 mo fu bilateral axillary lymphadenopathy: reactive
- 4/23/18: urgent care LUQ pain and 4/24 back pain; EMR starts to talk about lack of adequate food and food stamps
- 6/20/18 int med BRBPR; CBC normal
- 10/24/18; BRBPR 4 episodes since Jan 2018 – GI for colonoscopy

9/29/16: 45 yr old with obesity complains of LUQ pain for 2 years now worse for 2 months, crampy, localized to L side; hx kidney stone and microscopic hematuria; diff dx nephrolithiasis, muscle spasms, IBS unlikely w/o changes in BM; she feels that pain started after taking care of her mother which required manual labor and lifting; incidental history 5/27/16 of bilateral axillary lymphadenopathy negative mammogram and neg left breast bx

Case 1: Finally

- Colonoscopy reveals several polyps and a fungating and ulcerated non-obstructing large mass in distal rectum partially circumferential involving 1/3 lumen circumference – 3.5 x 2.7 x 4.4 cm and hemorrhoids
- Pathology prox polyp: tubular adenoma; distal tubulovillous adenoma; sigmoid – tubular adenoma with high grade dysplasia; rectal bx = invasive carcinoma moderately differentiated – adenocarcinoma
- 11/20/18 Chest CT: 3 mm nodule not seen on previous 12/6/16
- Pelvis CT: Multiple enlarged perirectal lymph nodes up to 1.4 cm with central necrosis concerning for local nodal metastases
- Surgery consult: rectal mass 2 cm above dentate line Laparoscopic anterior resection vs abdominoperineal resection and colostomy; stoma and nodal dissection challenging given obesity; consider weight loss surgery followed by chemoRT
- Stage IIIB cT3N1bMO distal rectal cancer – chemo RT Xeloda and 40 lb weight loss then surgery; also in trial of FOLFOX
- Referred to Weight Management for weight loss prior to LAR attempt

Case 1: M & M rounds

- Attribution mistakes: LUQ pain due to obesity and “nerve damage”
- Attribution mistakes: bilateral lymphadenopathy and obesity
- Attribution mistakes: constipation and then BRBPR due to obesity and hemorrhoids
- Imaging and tool failures in obesity: reactive inflammation on lymph node biopsies
- Imaging and tool failures in obesity: initial CT scan and US negative for mass but positive for fibroid and prior dx kidney stone
- These attribution and exam and imaging failures delayed the diagnosis of colon cancer from May 2016 to Nov 2018 or thereabouts
- Surgeon called me: referred to patient as not understanding completely the need to lose weight and cannot get past what she perceives as a delay in her diagnosis; attribution of patients with obesity as not very smart
- Incidentally 12/12/18 after oncology appointment was crossing street and was immediately in front of a car which then hit her – overwhelmed, stress, anxiety

Case 2: 57 yr old BMI =63, R hip pain, bacteremia and inability to evaluate neurological signs due to body habitus

- 57 year old man transferred from a long term acute care facility with concern for volume overload, abnormal labs and right hip, leg and groin pain
- Receiving IV diuresis at LTAC for the 1 month since discharge from the cardiomyopathy service
- In the 5 days prior to admission noted to have rising Cr (1.26→ 2.02) and WBC (11.6→19.1) for which IV diuresis was discontinued and infectious work up started

Medical History

- Class III obesity
- HFrEF – unclear etiology, EF 25% (TTE 3/2016)
- OHS/OSA
- COPD (no PFT's)
- HTN
- BPH c/b urinary retention
- Depression
- No known drug allergies

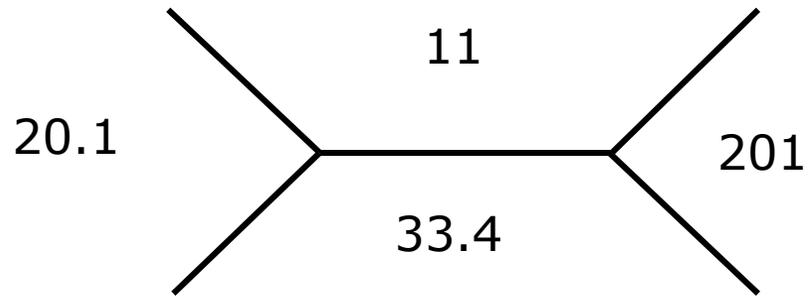
Medications

- Lasix gtt 15mg/hr via midline, losartan 25mg daily, aspirin 81mg daily, tamsulosin 0.4mg daily, heparin 7,500 units TID

Social

- Currently receiving diuresis at a long term acute care facility, previously lived with brother. Able to ambulate short distances with a walker. Smokes up to 2 packs/day, no alcohol or drugs.

Labs



78% PMN, 5% band, 4% lymphs

- Lactate 1.6
- LTAC blood cultures (10/2)
- GPC clusters → MSSA
- Blood cultures (10/3): pending



UA

2+ protein

1+ LE

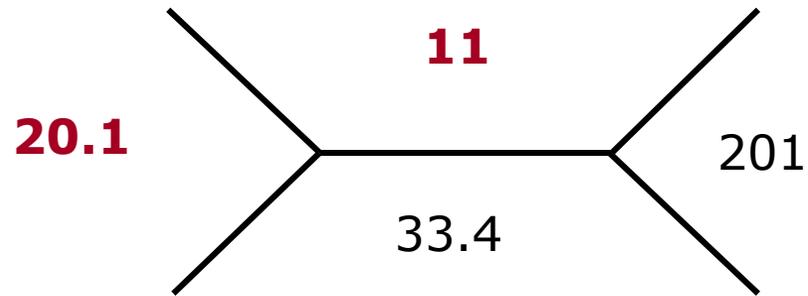
Neg blood

11-30 WBC

Pos bacteria

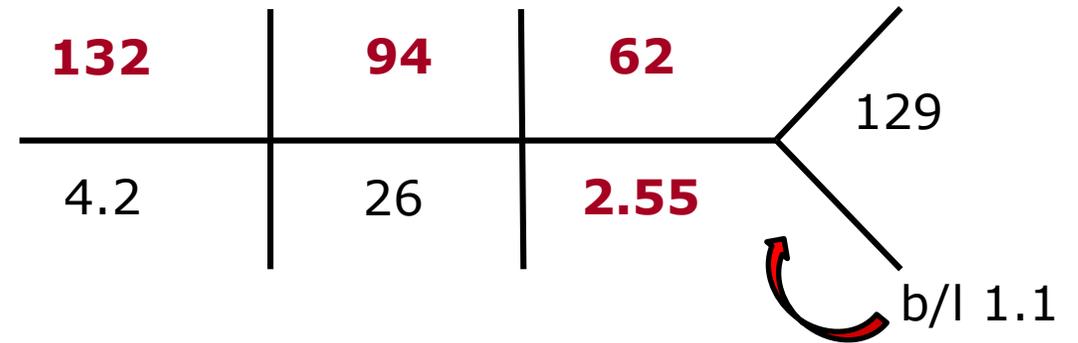
LTAC Ucx polymicrobial

Labs



78% PMN, 5% band, 4% lymphs

- Lactate 1.6
- LTAC blood cultures (10/2)
- **GPC clusters → MSSA**
- Blood cultures (10/3): pending



UA

2+ protein

1+ LE

Neg blood

11-30 WBC

Pos bacteria

LTAC Ucx **polymicrobial**

Admitting exam

97.9 F, 106/65, pulse 112, RR 21, 93% on 2LNC
Weight 496lb, BMI 63

- **Severe obesity**, unable to transfer to side without assistance
- **JVP difficult d/t body habitus and beard**
- Regular tachycardia
- **L midline**
- **Decreased BS at bases**
- Significant scrotal edema, posterior scrotum with some skin breakdown
- R leg with woody edema, trace pitting edema in left shin.
- A+Ox3. Strength UE 5/5. **RLE exam limited by pain, moving foot with flexion/extension but avoids knee flexion. LLE with 4+/5 strength.**

Initial management

- “Blood cultures now show 2/2 bottles GPC from 10/2, suspect true pathogen. Sources considered include midline vs SSTI. Unlikely UTI given polymicrobial urine culture at LTAC, will obtain scrotal and abdominal ultrasounds to assess for abscess. Spoke with radiology tech, weight limit for BMC scanner is 500lbs (patients weight 475lbs) but width must be less than 70cm.”
- Vancomycin per pharmacy protocol started, midline pulled, no fluids or IV diuresis administered given new AKI and difficult volume exam, ID consultation placed and TTE to assess for endocarditis ordered.

HD 1

- CHF note: Ultrasounds need to be done at bedside as he is too obese to travel to radiology. **Unable to get CT as he exceeds girth limitations of our scanner.**
 - ID consult: Rapid positivity on multiple cultures and the elevated ESR and CRP concerning for a more significant infection — either an endovascular source or osteomyelitis. The right hip pain, ? back pain may be worth investigating further but given his body habitus it will be a challenge.
 - PT consult: L LE grossly 3- to 3/5, R LE grossly 2-/5
- Wgt 498 lbs
 - WBC 22.8
 - Blood culture GPC clusters
 - MSSA in under 24 hours
 - ESR 102
CRP 420

HD 2

ID consult:

- Continues to have lumbar and R hip pain.
 - Unable to move R hip 2/2 positioning in bed.
 - No gross neuro deficits.
 - Would pursue ultrasound and **consider ortho eval.**
 - Reports slight *back pain but no tenderness. **If this persists, may need to find way to do open MRI to make sure there is no seeding of spine.***
 - TEE under general anesthesia to assess for endocarditis considered by CHF team but not ordered
- Wgt 425 lbs
 - **WBC 20.9**
 - **Blood culture GPC clusters**
 - **Midline tip <15 cfu MSSA**
 - **TTE negative for vegetations**

HD 3

- Continues to have pain on R hip
 - unable to move with passive and active ROM
 - Need to rule out a joint space infection
 - ***Unfortunately, given patient's body habitus, likely won't be able to get CT scan.*** Consider R hip US.
 - ID medical student note: *Called ENC CT- machine limits 475 lbs and 50cm width. Patient BMI 61, weight ~418lbs, will most likely fit in CT machine*
 - **Ortho consulted:** Recommend IR-guided hip aspiration
- Wgt 421 lbs
 - WBC 21.49
 - Blood culture
GPC clusters
 - MSSA in
under 24
hours

R hip ultrasound

- The right hip joint ***cannot definitely be visualized secondary to*** technical limitations from ***patient body habitus***
- No evidence of hematoma or soft tissue fluid collection in the visualized soft tissues anteriorly over the region of the right hip

In IR:

- Patient body habitus also limits fluoroscopic evaluation
 - Weight limit on interventional is 400 lbs, fluoroscopy 450 lbs

HD 4

- CHF note: Ortho recommend IR guided joint aspiration, however ***patient's body habitus confounding/delaying intervention. If unable to perform here, will need to consider transfer to alternate center with capability.***
 - PT consult: R LE grossly 0-1/5 difficulty to palpate contraction due to body habitus, L LE grossly 1-2-/5
 - CT chest, abdomen and pelvis without contrast order placed, cancelled by radiology as "patient exceeds weight limit"
- Wgt 454 lbs
 - **WBC 21.6**
 - Blood culture no growth

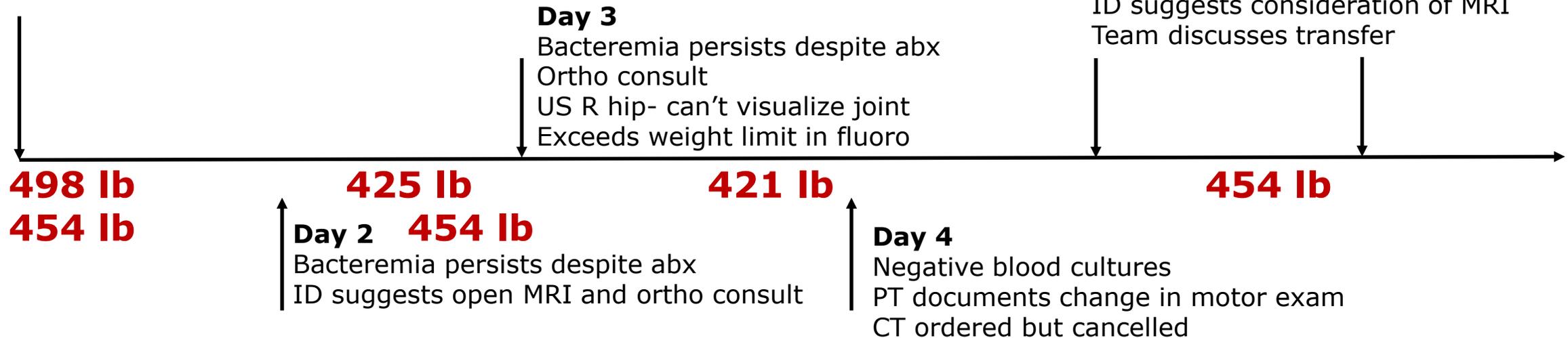
HD 5-6

- Reports no pain with log roll of leg. Would not actively flex/extend ankle/toes.
 - Still reports slight back pain but unable to find area tender to palpation. Ideally would have MRI of spine to fully evaluate.
 - Options being entertained include surgical exploration vs transfer to alternate facility for fluoro guided aspiration
 - CM Notes: Unable to conduct thorough radiological exams on patient due to body habitus. ***Team working on having testing done at an outside hospital.***
- Wgt 454 lbs
 - **WBC 21.2**
 - Blood culture **GPC clusters**
 - **MSSA after 2 days**

Hospital course to date

Day of Admission

RLE moving foot with flexion/extension
LLE with 4+/5 strength, PT exam confirms LE motor intact
Radiology says unlikely to fit in CT scanner
Midline removed, ID consulted
Recommendation for R hip and back pain investigation



HD 7

- 9:50 AM: "Patient reports R hip pain resolved...he can no longer move his bilateral LE and he has no sensation in bilateral LE. This has gradually been occurring since admission."
 - 11:55 AM: "now with increased LE weakness and apparent thoracic cord signs...Apparent neurologic deterioration c/w septic embolism to spinal cord and/or epidural abscess."
 - 12 PM: Urgent neuro consult for BLE plegia and loss of sensation, exam confirms sensory level T6-7 and BLE plegia.
 - 12:50 PM: STAT CT Thoracic and lumbar spine without contrast ordered
- Wgt 454 lbs
 - WBC 17.3
 - Cr 2.75
 - Blood culture GPC clusters
 - MSSA after 2 days

Search for resources – Transfer to another hospital at 00:35

HD 8

- MICU consulted to assist
- Radiology called again. No alternatives for imaging exist at BMC.
- MICU team calls multiple hospitals in the city
 - One hospital has large enough MRI
 - Ortho spine helps locate an a neurosurgeon at outside hospital
 - Initial difficulty locating an accepting physician at outside hospital
 - MICU team provides sign out 10 PM
- Exceeds girth limitation of MRI at outside hospital
- CT scan with contrast obtained
 - Significant paraspinal abscess from T4 to T8 abutting the aorta
- Surgery not an option in the absence of MRI
- 3 days after transfer undergoes percutaneous drainage of several cc's pus
- Patient remains without strength or sensation in the lower extremities

Case 2: Window of opportunity missed – bias clouding judgment

- Opportunities for improvement in the case of patients with obesity
- Adequate teaching opportunities for the physical examination and understanding PE limitations and adaptations
- Adequate resources for imaging patients with obesity
- Recognizing unconscious bias from reading the EMR:
 - “Patient very obese requiring multiple persons to turn and position, hold up pendulous abdominal folds... it is very easy and quickly occurs for patient to develop malodorous odors in his condition and his size makes it difficult to prevent even with best hygiene implementation.”
 - “Would not actively flex/extend ankle/toes.”
 - “Unable or unwilling to provide any motor strength in bilateral LE.”