Creating a culture of confidence: Providing PACU Burn Care to pregnant and postpartum women

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PERINATAL CLINICAL OUTCOME MANAGER

AUGUSTA UNIVERSITY MEDICAL CENTER, AUGUSTA, GA

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Joseph M. Still Burn Center

- The largest Burn Center in the US (Adults: 40 ICU beds, 20 stepdown, 40 floor beds; 8 Peds floor beds, Outpatient Center seeing 125 pts/day)
- Increasing volume of complex patients needing specialized burn and wound care
- Therefore, special PACU developed

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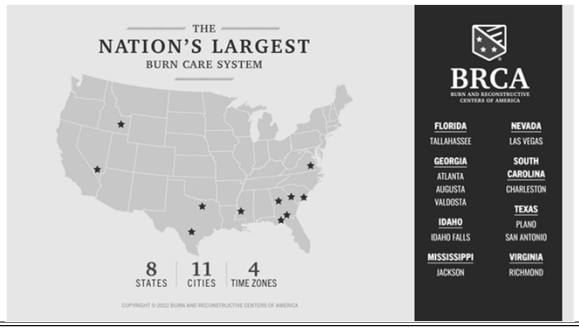

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Why does a PACU RN need to know about burn and wound care?

- These patients can present any time, anywhere, to any PACU
- Vast majority of adult burns are 10% total body surface area (TBSA) or less and can be cared for without referral to a Burn Center
- Pediatric burns are more often referred to a burn center regardless of TBSA
- JMS is a regional referral center, most patients as transfers from other hospitals
  - Resources not available at a referring hospital
  - Larger burns require specialized care

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Burn PACU at JMS Burn Center

STANDARD PACU BAY

ISOLATION ROOM

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Staffing and scheduling

Census almost impossible to predict
• average 30 – 40 cases/day M-F • 25/day weekends and holidays • Many cases are add-ons (50% of schedule)   • 10-15% added on from Burn/wound clinic

Staffing
• Charge RN in at 0700, cases start at 0800 • Short cases, rooms emptying to PACU rapidly • All equally trained for any case that presents to Burn PACU • Staggered shifts running up to 2100

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Equipment needs

FORCED AIR WARMING BLANKETS

From 3M rep

BURN HEMORRHAGE CART

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Isolation rooms needed or not needed?	6 feet needed for contact isolation (pull curtains around bay)
	Common burn germs: Acinetobacter, MRSA, Proteus, Enterobacter, Pseudomonas
	RN only takes care of 1 patient at a time
	Everything wiped down between patients
	Nonsterile gloves, mask, hat worn continuously at patient bedside – this protects the nurse and patient from inadvertent cross contamination

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A **real** isolation room is needed	Symptomatic COVID+ anytime
	If asymptomatic and < 10 days since testing COVID +
	TB, influenza, chickenpox, active shingles, MDRO
	Gloves, isolation gown, N95, hat worn continuously
	EVS terminally cleans isolation room

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Competencies	BLS ACLS PALS  ABLS (Advanced Burn Life Support) not required but recommended ◦ Program of the American Burn Foundation OB skills (fetal monitoring and specific OB assessments) ◦ Coordinate with OB staff

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Basic burn and wound education

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Why does a PACU RN need to know about burn and wound care in pregnant and postpartum patients?	◦ These patients can present any time, anywhere, to any PACU ◦ Vast majority of burns are 10% total body surface area or less and can be cared for without referral to a Burn Center ◦ 4% of burns in US > 40% TBSA ◦ Pregnant patients make up 3-7% of burn patients in the US ◦ Pregnant patients with increasing rates of infections = more wound cases (obesity, diabetes, increasing C/S rates, community acquired MRSA)

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2005-2014 Burn admissions to burn centers (ABA National Burn Repository 2015)

Survival rate 96.8%

Ethnicity
- 59% Caucasian
- 20% African-American
- 14% Hispanic

Gender
- 68% male 32% female

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2005-2014 Burn admissions to burn centers (ABA National Burn Repository 2015)

Place of occurrence
- 73% home
- 8% occupational
- 5% street/highway
- 5% recreational/sport
- 9% other

Admission cause
- 86% thermal burns
  - 43% fire/flame
  - 34% scald
  - 9% contact with hot objects
- 4% electrical, 3% chemical
- 7% other

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What kind of burn is it and what we do about them?

WARNING: SOME PHOTOS ARE GRAPHIC

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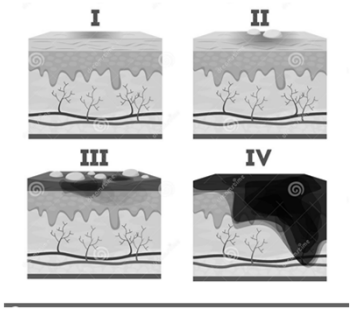

Staging of burns

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First degree burn (superficial)

Red and dry without blisters

Epidermis (top layer of skin)

Generally, will not require grafting and will heal without intervention

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Second degree (partial thickness)

Red, swollen, painful and blistered, wet appearance

Blisters indicate AT LEAST a second degree burn

Involves top and middle layers of skin, skin blanches

Requires debridement and maybe grafting

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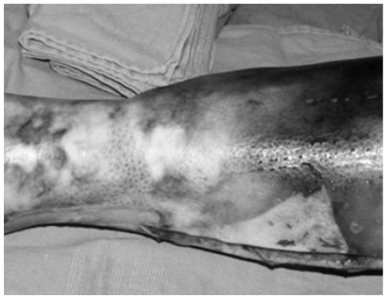

Photo from BRCA

Third degree (full thickness)

Dry, tight, leathery, waxy pearly white, brown, tan

Involves epidermis, dermis and subcutaneous fat

Will require grafting

Scars as it heals

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BRCA

Fourth degree (deep full thickness)

- Charred skin
- Extends below dermis and fat
- Involves muscle, bone or tendon
- Will require grafting and possible amputation

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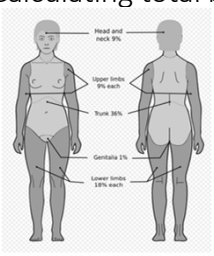
Calculating total burn surface area (TBSA)



Lund and Browder Chart - Burn Estimate – Age vs. Area

Area	0-1yr	1-4 yr	5-9 yr	10-14 yr	15 yr	Adult	2nd Degree	3rd Degree	4th Degree	TBSA %
Head	19%	17%	13%	11%	9%	7%				
Neck	2%	2%	2%	2%	2%	2%				
Anterior Trunk	13%	13%	13%	13%	13%	13%				
Posterior Trunk	13%	13%	13%	13%	13%	13%				
Right Buttock	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%				
Left Buttock	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%				
Genitalia	1%	1%	1%	1%	1%	1%				
Right Upper Arm	4%	4%	4%	4%	4%	4%				
Left Upper Arm	4%	4%	4%	4%	4%	4%				
Right Lower Arm	3%	3%	3%	3%	3%	3%				
Left Lower Arm	3%	3%	3%	3%	3%	3%				
Right Hand	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%				
Left Hand	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%				
Right Thigh	5.5%	6.5%	8%	8.5%	9%	9.5%				
Left Thigh	5.5%	6.5%	8%	8.5%	9%	9.5%				
Right Leg	5%	5%	5.5%	6%	6.5%	7%				
Left Leg	5%	5%	5.5%	6%	6.5%	7%				
Right Foot	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%				
Left Foot	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%				
						Totals:				

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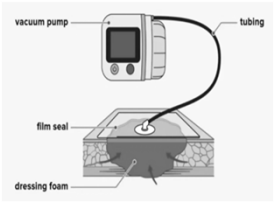
Negative pressure therapy



Healthline.com

BRCA

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uptodate.com

Escharotomies

Full thickness burns form tough outer layer

Performed to:

Releases pressure

Facilitates circulation

Allows better ventilation (if a chest burn)

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Skin grafting: allografts

Temporary skin substitutes to protect dermis and promote healing

Initial treatment

Cost-effective

Reduces pain and infection

Never intended to be permanent

Can be from humans, pigs or artificially developed

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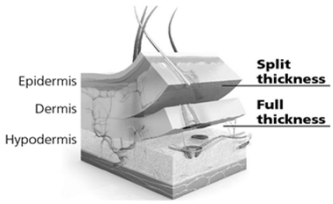
Skin grafting: autografts for 3rd and 4th degree burns

Split thickness skin graft
- Epidermis and part of dermis

Full thickness skin graft
- Epidermis and entire dermis

blood vessels in these skin grafts are necessary for healing



michaelkimmd.com
Plastic surgeon SW Florida

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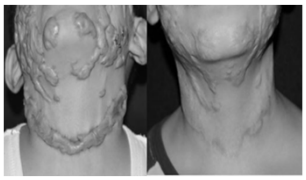
Laser therapy: before and after



Dermatology Advisor, 9/20/19

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Body image: before and after tattoos (burns from a MVA

Now comfortable wearing short sleeves for the first time in 10 years

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Why do I need to know about pregnancy and burns?

PREGNANT PATIENTS GET BURNED ALSO AND YOU HAVE TWO PATIENTS NOT ONE

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Augusta University Medical Center/Children's Hospital of Georgia

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What scares PACU RN's about pregnant patients?

- Patient is going to have her baby in PACU
- Patient is going to bleed A LOT
- Patient is going to miscarry
- I am going to hurt her baby if I give her ANY medicine
- I don't know how to make sure that baby is ok

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60 second OB triage in PACU

- How far along are you?
- Are you having any vaginal bleeding? (20% of all pregnancies)
- Has your water broken?
- Are you having contractions?
- Is your baby moving? (starts around 20 weeks)

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Spontaneous Abortions (miscarriage) signs and symptoms

- Heavy menstrual flow
- Bleeding, spotting
- Cramping (may become severe as gestational age progresses)
- Passing clots, tissues

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Know phone numbers of your OB resources
- L&D Charge Nurse (they will mobilize resources for you quickly)
- L&D Unit (handles most OB emergencies)
- OB MD (patient's MD or OB on call MD if patient's MD does not have privileges at your hospital)
- Continuous fetal monitoring at 24 weeks gestation for significant burns (OB RN at bedside or watching by fetal monitoring telemetry)

Know who to call for help

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If patient pregnant and c/o
- Bleeding
- Ruptured membranes
- Contractions
- Pressure, feel like the baby is coming

When to notify OB MD or L&D

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Between 3-7% are pregnant

Most occur at home and are accidental

Open flame or scald burns, electrical, explosions, MVA, meth explosions

2005 study: 87% fetal death and 80% maternal death amongst 90 patients third trimester

Pregnant burn injury data

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Pregnant burn injury data

Maternal/fetal mortality rates approach 50% with a 40-60% TBSA
- No change in mortality rates since 1960's
- As TBSA increases, so does mortality

Mortality rates for non-pregnant women and men are much lower with comparable TBSA in some studies and the same in some studies

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Predictors of maternal/fetal mortality

- TBSA
- Presence/amount of inhalation injury
  - Hypoxia strongly correlates with maternal/fetal death
- Hypovolemia
- Sepsis

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Basic burn therapy in pregnancy for significant burns

Early surgical burn debridement

Aggressive fluid resuscitation
- Urinary catheter
- 3 mL/kg/TBSA (modified Parklands)
- Dehydration increases risk of contractions
- Overhydration = pulmonary edema/ARDS

Antibiotic administration

Sufficient nutrition

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Parkland formula

Developed by Dr Charles Baxter, ED Director at Parkland Hospital in Dallas in the 1960's, still in use today

4 mL x weight kg x % TBSA
- 4 x 100 x 50 = 20,000 mL/24 hours

50% infused in first eight hours

50% over next 16 hours

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Airway changes in pregnancy

Larynx more anterior, mucosal lining edematous

Diaphragm displaced upward (more difficult to bag)

Nasal stuffiness and increase in bloody noses (due to edema)

Airway edematous, use 0.5-1 smaller tube

Increased risk of aspiration (intubate ASAP), 30% chance of death with aspiration

Cricoid pressure acceptable in pregnant women

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Inhalation injuries

Second biggest correlation with mortality after TBSA
- Vital lung capacity decreases
- Mucosal edema, oxygen consumption and minute ventilation increase

Consider emergent intubation
- Edematous airway in pregnancy
  - (Higher rate of failed intubation, 1:300 pregnant population, 8X higher than general population)
- Compounded by facial edema from burns
- Airway edema can be delayed

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Smoke inhalation
- Closed and structural fires emit smoke with CO and cyanide
  - Carbon monoxide crosses placental barrier and affects fetus
  - Highest levels four hours after exposure
  - 100% oxygen via ventilator or non-rebreather for at least 6 hours (reduces half life of carbon monoxide

Inhalation injuries

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Respiratory changes in pregnancy

Oxygen consumption increased by 15-20%

Decreased basal breath sounds (lungs shorten by 4 cm)

Rib cage circumference increases

Maternal oxygen demands increase

Relatively minor changes in maternal pH can cause major changes in fetal pH (state of compensated respiratory acidosis)

Airway resistance decreased due to progesterone
- 35% decrease in tidal volume
- 15% increase in respiratory rate

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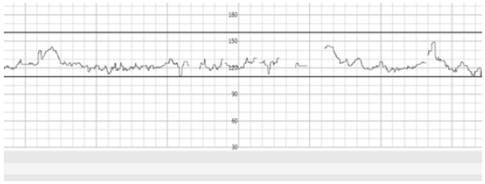
Impact of maternal oxygenation on fetal heart rate

COVID-19 patient with goal oxygen saturation of 95% or greater



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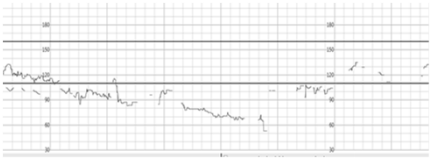
Maternal oxygen saturation decreased to 80's

Fetal heart rate deceleration



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Pregnant patients prone to DIC (normal pregnancy is a hypercoagulable state)
- Abruptio placenta
- Hemorrhage
- Fetal demise
- Hypertensive disorders of pregnancy

Coagulopathy in pregnancy/DIC

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Coagulopathy in pregnancy/DIC

Burns patient also prone to DIC
- Inflammatory process with initial injury
- Sepsis
- No consensus on treatment of Burn DIC in pregnant women

Massive transfusion therapy common (1:1:1, add cryo)

Prefer O neg if no blood type yet

Heparin/Lovenox

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VTE prevention

Chemical prophylaxis for all burn patients

Pregnant patients hypercoagulable + bedrest = increased risk of DVT's

Prefer Heparin if close to delivery (half life of 60-90 minutes)

Note: increased dosing of Lovenox (enoxaparin) often required with burns may be required to achieve target anti-coagulation

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Heparin and Lovenox

VTE 5th leading cause of maternal mortality

Reasons patients may be on Heparin and Lovenox (Coumadin is teratogenic)

- Valve replacement
- DVT history
- Pregnancy loss history

Antepartum patients hospitalized > 3 days at a 12-18X higher risk for VTE

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Cardiovascular

Heart rate increases 10-20 beats/min (15% increase by 32 weeks)

BP decreases during second trimester

WBC increased

May lose 30-35% of blood volume before vital signs change

Transient murmurs not uncommon

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Blood volume increased by 40-60 %

- 1200-1600cc (45% increase in plasma volume and 20-30% increase in RBC volume = dilutional anemia)
- 50-100% increase in blood volume in multiple gestations
- Hgb/Hct decreased
- Ensures adequate tissue perfusion when erect or supine
- Provides a reserve to compensate for PP blood loss

Cardiovascular

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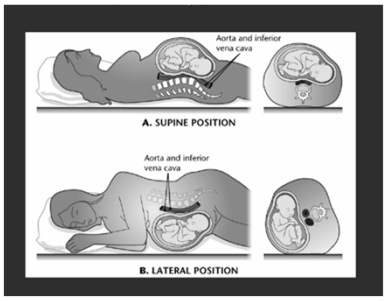

Supine hypotension

Used with permission from AWHONN

Importance of at least a 15% tilt

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GI

Nausea/vomiting common due to hormonal changes

Constipation/heartburn not uncommon due to delayed gastric emptying, hormonal changes and iron supplements

Peristalsis is delayed leading to delayed gastric emptying **(a pregnant woman is always considered to have a full stomach)**

Gastric ulcer prophylaxis given

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Medications and anesthesia in pregnancy

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Burn meds safe in pregnancy

- Mupirocin
- Nystatin
- Silvadene
- Bacitracin
- Antenatal corticosteroids for lung maturity
- PCN
- Carbapenems
- Cephalosporins
- Clindamycin
- Vancomycin
- Metronidazole (hold if breastfeeding)

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Anesthesia Drugs

Valium, Versed (cross placenta)
- Avoid in first trimester totally
- Avoid at delivery (Moms want to remember the delivery usually)
- No research that states these drugs really safe in pregnancy
- Valium connected with cleft palate formation if given during organogenesis

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Anesthesia modality

Majority of burn/wound procedures done under general anesthesia

Regional anesthesia preferred if applicable in pregnant patient
- Axillary block
- Spinal
- Femoral blocks

Some very minor burns done under MAC

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Other medications

Ketamine
- Generally safe in all trimesters

Anti-hypertensives (Labetalol, Hydralazine)
- Large drops in BP can influence placental perfusion

Ativan
- Crosses placenta
- Can cause transient hypotonia in infant

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Breastfeeding and Meds

Very few medications are contraindicated in pregnancy (some psych meds)

No need for patients to “pump and dump”

Manual expression or breast pump for engorgement, “move the milk”

HIV+ patients cannot breastfeed due to risk of transmission to baby, not because of HIV medications

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Pain medications

Fentanyl

Hydrocodone

Morphine

Oxycodone

Hydromorphone

All opioids with concern for neonatal withdrawal

Potential for neonatal respiratory depression if given within 4-6 hours of delivery

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Pain Medications in Pregnancy

Surgery is painful. No need to withhold <u>needed</u> pain medication.

In general, try to avoid all medication in pregnancy especially in first trimester (first thirteen weeks)

Avoid NSAID's after 28 weeks (premature closure of the fetus' ductus arteriosus/decreased amniotic fluid)

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Anti-emetics in Pregnancy

Phenergan, Zofran, Reglan, Decadron

Currently considered safe in pregnancy. Even first trimester if absolutely necessary

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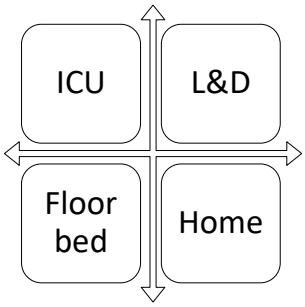
Where do they go after PACU?



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Types of burns and wounds seen in pregnancy/PP

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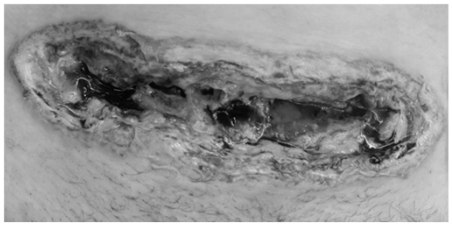
Types of wounds (incisional C/S)



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Labial/vulvar abscess & hematoma

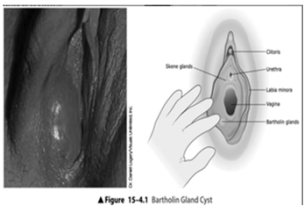

Figure 15-4.1 Bartholin Gland Cyst

from Quizlet

@inproceedings{Shilpa2017VulvarHH, title={Vulvar Hematoma following precipitate delivery : A case report}, author={Naik Shilpa and Thakur Ruchi and Verma Akanksha}, year={2017} }

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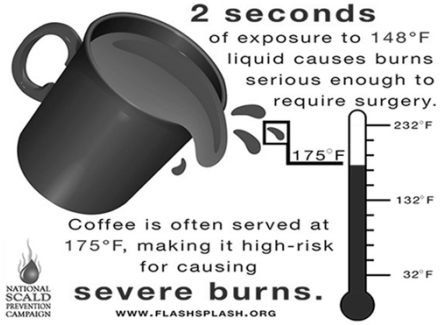

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Brown recluse spider bite

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Fetal Assessment

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Fetal heart tone (FHT) monitoring

Normal range of FHT between 110-160 beats/minute

More premature babies typically have higher heart rates

Babies closer to due date can have fetal heart rates as low as 110-120

Prior to surgery and in PACU (or per MD orders)

Need to consult OB (or patient's obstetrician) for orders

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FHT and contraction monitoring

Less than 23 weeks: Doppler (by PACU or OB RN or MD) or ultrasound by MD

23 weeks or greater (viable baby) Needs to be done by qualified nurse (usually an OB RN)

- Monitor fetal heart tones and contractions for at least 20 minutes prior to surgery to assess fetus before surgery and anesthesia
- Post-op will need monitoring for at least 20-30 minutes or until patient is awake from general anesthesia
- Some procedures may require extended monitoring in L&D

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OB Emergencies: major trauma, cardiac arrest, respiratory arrest

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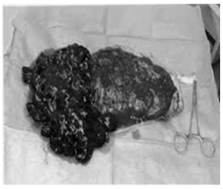
Placental abruption due to trauma



Fetal death due to hypoxia

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Priorities identical to non-pregnant patient

ACOG: no restriction of usual diagnostic, pharmacologic or resuscitative measures

Fetal survival depends on maternal survival

Stabilization of mother improves fetal survival

Trauma Stabilization

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CPR Summary

Airway: intubate ASAP-use smaller tube,

Breathing: ventilate faster (18-22/min)

Circulation: Higher hand placement on chest wall, femoral pulse checks to confirm efficacy of compressions

Displacement: left uterine

Defibrillate: remove fetal monitors before defibrillating, joules per ACLS

- (***no need for EFM, time better spent on mom***)

Drugs: per ACLS

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Perimortem C/S

Perimortem C/S within 5 min of arrest (Maternal cardiac output increases by 30% after delivery)

- No indication at < 20 weeks (uterus not large enough to compromise resuscitation)
- 20-24 weeks: delivery will benefit mother only (fetus is non-viable)
- > 24 weeks: will benefit mom and may allow for fetal survival

Decreased placental perfusion with maternal hypotension/hypoxia

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Case studies

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Case study #1 from 3M

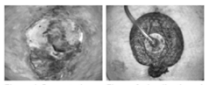

Figure 1. Presentation of dehisced abdominal wound.

Figure 2. Application of 3M™ V.A.C.® Therapy with 3M™ Dermatac™ Drape.

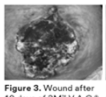

Figure 3. Wound after 10 days of 3M™ V.A.C.® Therapy.

Figure 4. Wound after 6 weeks of 3M™ V.A.C.® Therapy.

Figure 5. Application of STSG.

Figure 6. 3M™ V.A.C.® Therapy was used as a bolster over the STSG.

Figure 7. At 1-week post-STSG.

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Case study #2: I&D of abscess

29 y/o G3 P1011 at 32.4 weeks

6 days s/p "bug" bite, had come to a head and she had "picked" at it

Presented to local ED, given one dose of IV antibiotics, sent home

Returned next day with larger reddened area, given one dose of IV antibiotics and transferred to tertiary center

Presented to L&D with 20 cm red area

80

Case study: I&D of abscess

Taken to OR for I&D, L&D RN for fetal monitoring

Large amount purulent, malodorous fluid, 2 incisions, penrose drain placed

47 minutes in PACU, L&D RN at bedside, fetus still under effects of general anesthesia

To L&D for remainder of recovery, discharged two days later afebrile

Drain removed, two days after discharge

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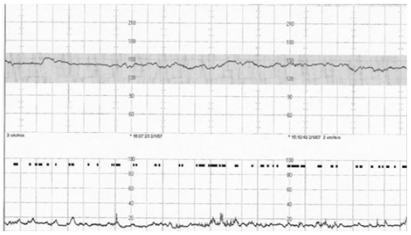
Normal healthy fetal heart rate



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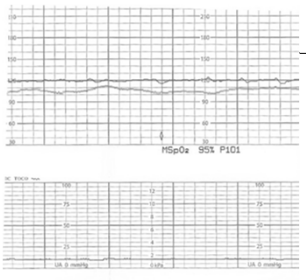

FHR in PACU: patient to L&D for extended monitoring due to effects of general anesthesia

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90 minutes later

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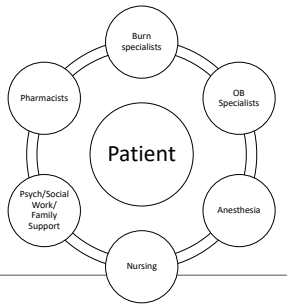
It takes a team



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Masters Saturday in Augusta, GA

Photo by Katie Bragg, RNC-OB

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Questions?

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