Diabetes Mellitus Type I/DKA

UNFOLDING Reasoning

Jack Anderson, 9 years old

Primary Concept		
Glucose Regulation		
Interrelated Concepts (In order of emphasis)		
• Fluid and Electrolyte Balance • Acid-Base Balance • Clinical Judgment • Patient Education • Communication • Collaboration		
NCLEX Client Need Categories	**Percentage of Items from Each Category/Subcategory**	**Covered in Case Study**
Safe and Effective Care Environment		
✓ Management of Care	17-23%	✓
✓ Safety and Infection Control	9-15%	
Health Promotion and Maintenance	6-12%	✓
Psychosocial Integrity	6-12%	✓
Physiological Integrity		
✓ Basic Care and Comfort	6-12%	✓
✓ Pharmacological and Parenteral Therapies	12-18%	✓
✓ Reduction of Risk Potential	9-15%	✓
✓ Physiological Adaptation	11-17%	✓

History of Present Problem:

Jack Anderson is a 9-year-old boy who presents to the emergency department because he has been more sleepy and his breathing is "not normal;" it is deeper and faster, according to his parents. Jack was sick with a respiratory virus two weeks ago but has since recovered. Jack began feeling more tired a few days ago when he started to complain of abdominal pain, headache, muscle aches, and consistently being hungry and thirsty. He is urinating more frequently during the day and at night. His mother reports a normal full-term pregnancy and Jack has been healthy with no known medical conditions.

Personal/Social History:

Jack lives with both parents and two siblings; a younger sister four years old and a 12-year-old brother. Both parents work as middle school teachers in the community. Jack is in the 4th grade and earns above-average marks. He is physically active and plays soccer on the school team.

What data from the histories are RELEVANT and must be interpreted as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential)

RELEVANT Data from Present Problem:	**Clinical Significance:**
9-year old boy "not normal" breathing Recent illness with respiratory virus two weeks ago tiredness, abdominal pain, headache, muscle aches, excessive thirst, hunger, and urination.	Client is experiecing polyphagia, polydipsia, and polyuria which are symptioms of diabetes mellitus type 1. Client is also experiencing Kussmaul's respirations after a recent respiratory virus.
RELEVANT Data from Social History:	**Clinical Significance:**
Jack is physically active and plays sports Lives with both his married parents and two siblings	Jack is an active child, so experiencing such issues with his health is abnormal for his age. The respiratory virus may have been transmitted from sports, school, or from his family.

Patient Care Begins:

Current VS:	**P-Q-R-S-T Pain Assessment:**	
T: 100.4 F/38.0 C (oral)	**P**rovoking/Palliative:	Made worse with solid food.
P: 136 **(**regular)	**Q**uality:	Dull and aching
R: 44 (deep/rapid)	**R**egion/Radiation:	Confined to abdomen, generalized within abdominal region
BP: 80/48	**S**everity:	He states his pain is a 4/10 on the numeric scale.
O2 sat: 98% on RA	**T**iming:	States, "All the time"
Weight: 64.0 lbs/29.1 kg		

What VS data are RELEVANT and must be interpreted as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Health Promotion and Maintenance)

RELEVANT VS Data:	**Clinical Significance:**
Temp: 100.4 Pulse: 136 RR: 44 Pain is a 4/10, "All the time".	Temp is indication of a fever Pulse is tachycardic Respiratory rate indicates tachypnea Learn more about his constant pain.

Current Assessment:	
GENERAL SURVEY:	Lying on the bed with eyes closed, whimpers with touch, recognizes mom and dad. Fruity odor to the breath.
NEUROLOGICAL:	Lethargic, responding to parents with one-word phrases. Alert & oriented to person, place, time, and situation (x4); muscle strength 5/5 in both upper and lower extremities bilaterally.
HEENT:	Head normocephalic with symmetry of all facial features. PERRLA, sclera white bilaterally, conjunctival sac pink bilaterally. Eyes appear “sunken,” mucus membranes dry, tacky mucosa, chapped lips.
RESPIRATORY:	Breath sounds clear with equal aeration on inspiration and expiration in all lobes anteriorly, posteriorly, and laterally, respirations are deep and rapid
CARDIAC:	Pink, warm & dry, no edema, heart sounds regular, pulses slightly weak/thready, equal with palpation at radial/pedal/post-tibial landmarks, cap refill 2 seconds. Heart tones audible and regular, S1 and S2, noted over A-P-T-M cardiac landmarks with no abnormal beats or murmurs.
ABDOMEN:	Abdomen round, soft, and tender to light palpation. BS active in all four quadrants, feeling nauseated
GU:	Voiding large amounts of clear light yellow urine
INTEGUMENTARY:	Skin warm, dry, itchy, flushed, intact, normal color for ethnicity. No clubbing of nails, cap refill <3 seconds, Hair soft-distribution normal for age and gender. Skin integrity intact, skin turgor nonelastic, tenting present.

What assessment data is RELEVANT and must be interpreted as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Health Promotion & Maintenance)

RELEVANT Assessment Data:	Clinical Significance:
Whimpers with touch Fruity odor to breath Lethargic Eyes appear "sunken", dry lips and mucosa region Clear breath sounds, deep and rapid respirations Voiding large amounts of clear light yellow urine Skin is itchy and flushed.	Whimpers upon tough indicaties the client is feeling sensitive possibly due to fever and lethargy Fruity odor to breath is a sign of diabetes mellitus. Clear breath sounds after reports of difficulty breathing shows theres no airway obstruction. The skin being itchy and flushed is another indication of diabetes and mellitus.

Based on the clinical cues collected so far by the nurse, what additional data is needed ASAP to determine the most likely problem and identify the nursing priority? What orders should the nurse anticipate?

Additional Clinical Data Needed:	Orders to Anticipate:
Check Jack's glucose Order labs	Accu-check CBC, BNP, urinalysis

Lab Results:

Complete Blood Count (CBC)					
	WBC	HGB	PLTs	% Neuts	Bands
Current:	6.2	16.1	252	58	0
Most Recent:	7.2	14.2	210	52	0

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Physiologic Adaptation)

RELEVANT Lab(s):	**Clinical Significance:**	**TREND: Improve/Worsening/Stable:**
WBC's Platelets Neutrophills HGB	Body is currently fighting an infection, also indicative by fever. Hemoglobin is rising due to increase in respirations,	Jack is worsening, but the body is compensatig.

Basic Metabolic Panel (BMP)					
	Na	K	Gluc.	Creat.	CO2 (Bicarb)
Current:	130	5.5	680	1.4	16
Most Recent:	138	4.1	118	0.7	22

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Physiologic Adaptation)

RELEVANT Lab(s):	**Clinical Significance:**	**TREND: Improve/Worsening/Stable:**
Na K Glucose Creatinine	Sodium is low Potassium is increasing Glucose is extremely high Creatinine levels are rising due to stress on the kidneys and frequent urination	ALL WORSENING

Misc.					
	Magnesium	Phosphorus	Beta-hydroxybutyrate		
Current:	2.4	2.8	Positive		

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Physiologic Adaptation)

RELEVANT Lab(s):	**Clinical Significance:**
Beta-hydroxybutyrate Magnesium Phosphorus	Indicative of Ketosis 2.4 is a high mag level Phosphorus is low, not retaining.

	Urinalysis + UA Micro											
	Color:	Clarity:	Sp. Gr.	Protein	Gluc.	Ket.	Nitr.	LET	RBCs	WBCs	Bact.	Epi.
Current:	Lt. yellow	Clear	1.015	Neg	4+	4+	Neg	Neg	0	3	None	none

What lab results are RELEVANT and must be recognized as clinically significant by the nurse?
(NCSBN: Step 1 Recognize cues/NCLEX Reduction of Risk Potential Reduction of Risk Potential/Physiologic Adaptation)

RELEVANT Lab(s):	Clinical Significance:
Light yellow of the urine Glucose Ketones	Urine is being diluted Glucose and Ketones found in the urine are signs of Diabetic Ketoacidosis

Lab Planning: Creating a Plan of Care with a PRIORITY Lab:

(Reduction of Risk Potential/Physiologic Adaptation)

Lab:	Normal Value:	Clinical Significance:	Nursing Assessments/Interventions Required:
Potassium **Value:** **5.5**	**Critical Value:**	Indicative of hyperkalemia, may cause abnormal and dangerous heart rhythms	Monitor electrolye levels

Lab:	Normal Value:	Clinical Significance:	Nursing Assessments/Interventions Required:
Glucose **Value:** **680**	**Critical Value:**	Very high glucose level: indicative of DKA, diabetic coma, stroke, and death	Insulin IV as ordered

Clinical Reasoning Begins…

1. ***Interpreting relevant clinical data, what is the primary problem(s)? What primary health-related concepts does this primary problem represent?*** *(NCSBN: Step 2 Analyze cues/NCSBN: Step 3 Prioritize hypotheses Management of Care/Physiologic Adaptation)*

Problem(s):	Pathophysiology of Problem in OWN Words:	Primary Concept:
DKA	The body does not have enoguh insulin to provide for the body's needs. The liver then breaks down the fat for fuel to compensate but by doing this, the body produces ketones which are then also found in the urine.	Hyperglycemia, dehydration, electrolyte imbalances (decrease in Na, K, Mg, and P).

2. Is this patient at risk for a change in status that could lead to an adverse outcome due to age, susceptible host, or other factors? *(NCSBN: Step 2 Analyze cues/Management of Care)*

Risk Factors for Developing Complication:	**Rationale:**
Diabetic Ketoacidosis in pediatric client	Ketones and glucose in the urine.

3. What is the worst possible/most likely complication(s) to anticipate based on the primary problem of this patient? *(NCSBN: Step 2 Analyze cues/Reduction of Risk Potential/Physiologic Adaptation)*

Worst Possible/Most Likely Complication to Anticipate:	Death, diabetic coma	
Nursing Interventions to PREVENT this Complication:	**Assessments to Identify Problem EARLY:**	**Nursing Interventions to Rescue:**
Treat the clients glucose levels, rehydrate with fluids	High Glucose	Administer insulin, fluidsm prescribed medications, monitor electrolyte levels, provide comfort to client and family.

Collaborative Care: Medical Management

4. State the rationale and expected outcomes for the medical plan of care. *(Pharm. and Parenteral Therapies)*

Care Provider Orders:	**Rationale:**	**Expected Outcome:**
Establish two large bore peripheral IVs	Fluids and medication	Client will no longer complain of dryness amd dehydration
Admit to the Pediatric ICU	To monitor client	Client will recieve more focused care
NPO	Control intake	Vital signs will improve/show other related symptoms of DKA.
Vital signs every 30 minutes with neurological checks every hour	Monitoring for worsening symptoms	
Continuous cardiac monitor	Potassium level is increaing	Glucose levels will remain at a comfortable limit
STAT finger stick for blood glucose then every one hour	Monitor blood glucose levels	
Administer NS 20 mL/kg IV BOLUS (over one hour) then begin ½ NS with 20 mEq KCL at maintenance rate (1,000 mL for first 10 kg + 500 mL for next 10 kg over 24 hours)	Fluids for stabilization	Glucose will decrease and client will present stable symptoms
After fluid bolus start IV Regular insulin infusion at 0.05 unit/kg/hour Once blood glucose level is less than 300 mg/dL or the blood glucose fall is more than 100 mg/dL, change IV fluids above to Dextrose 5% in 0.45 NaCl	For glucose decreasing To help treat symptoms of DKA	

with 20 mEq KCL Strict I &O and daily weight Ondansetron 2 mg/mL IV push prn every 4 hours nausea Acetaminophen suppository per rectum 350 mg PRN every 4 hours comfort or temp > 38.5 C (>101.3 F)	Monitor I&O to validate how much fluid the client is losing To treat nausea For pain and fever	Treat nasea, pain, and

PRIORITY Setting:

5. Which Orders Do You Implement First and Why? *(Management of Care)*

Care Provider Orders:	Order of Priority:	Rationale:
• Obtain finger stick blood glucose • Start IV insulin after bolus is given and monitor blood glucose carefully • Obtain VS • Accurate I and O • Place on a cardiac monitor • Initiate two large bore IVs and administer fluid bolus followed by maintenance/replacement	Initiate two large bore IVs and administer fluid bolus followed by maintenance/replacement Obtain finger stick blood glucose Start IV insulin after bolus is given and monitor blood glucose carefully Obtain VS Place on a cardiac monitor Accurate I and O	Check glucose, administer fluids, check for abnormal findings, monitor for arrhthmias, and help the client return to a stable living condition.

Collaborative Care: Nursing

6. What nursing priority (ies) will guide your plan of care? *(NCSBN: Step 4 Generate solutions/Step 5: Take action Management of Care)*

Nursing PRIORITY:		
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**
Provide fluids	Keep the client from experiencing worsening signs of dehydration.	Fluid levels are maintained and dehydration is managed.

7. What body system(s) will you assess most thoroughly based on the primary/priority concern?
(Reduction of Risk Potential/Physiologic Adaptation)

PRIORITY Body System:	PRIORITY Nursing Assessments:
Cardiac System	Client is at risk for arryhthmias, stroke, diabetic coma, or possibly death.

8. What psychosocial/holistic care PRIORITIES need to be addressed for this patient?
(Psychosocial Integrity/Basic Care and Comfort)

Psychosocial PRIORITIES:	Include family during care	
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**
CARE/COMFORT:	Children in a hospital setting may feel scared and frantic, having the family around will help him feel safer,	Parent(s) and sibling will be/visit the client.
EMOTIONAL (How to develop a therapeutic relationship):	Provide therapeutic communication to the client, help him feel at home, express feeling and fears to nurse.	Develope a good nurse-client relationship.

Dosage Calculations

- Weight 64 lbs. Convert to kg: 29.03 kg
- Administer 0.9% NS 20 mL/kg bolus over one hour. Calculate IV bolus: 580
- Administer regular insulin infusion at 0.05 units/kg/hour. Calculate units/hour: 1.5
- Regular insulin IV is 250 units/250 mL 0.9% NS. Calculate hourly IV drip rate: 1 gttp

Evaluation: Four hours later…

Evaluate the response of your patient to nursing and medical interventions during your shift. All physician orders have been implemented that are listed under medical management.

Jack has been transferred from the ED to pediatric ICU two hours ago. His blood glucose is now 442 (this is an appropriate value based on the average of 50-75 mg/dL/hour correction). His insulin gtt is infusing at 1.5 units/hour. You just collected the following clinical data:

Current VS:	**Admission (4 hours):**	**Current PQRST:**	
T: 98.9 F/37.2 C (oral)	**T:** 100.4 F/38.0 C (oral)	**P**rovoking/Palliative:	
P: 92 (reg)	**P:** 136 **(**regular)	**Q**uality:	Dull and aching
R: 24 (reg)	**R:** 44 (deep/rapid)	**R**egion/Radiation:	Confined to abdomen, generalized within abdominal region
BP: 100/60	**BP:** 80/48	**S**everity:	2/10 numeric scale
O2 sat: 98% on RA	**O2 sat:** 98% on RA	**T**iming:	States "All the time"
Blood Glucose: 442			

Current Assessment:	
GENERAL SURVEY:	Pleasant, in no acute distress, calm, body relaxed, no grimacing, appears to be resting comfortably.
NEUROLOGICAL:	Alert & oriented to person, place, time, and situation (x4); muscle strength 5/5 in both upper and lower extremities bilaterally.
HEENT:	Head normocephalic with symmetry of all facial features. PERRLA, sclera white bilaterally, conjunctival sac pink bilaterally. Lips, tongue, and oral mucosa pink and moist.
RESPIRATORY:	Breath sounds clear with equal aeration on inspiration and expiration in all lobes anteriorly, posteriorly, and laterally, nonlabored respiratory effort on room air.
CARDIAC:	Pink, warm & dry, no edema, heart sounds regular, pulses strong, equal with palpation at radial/pedal/post-tibial landmarks, brisk cap refill. Heart tones audible and regular, S1 and S2 noted over A-P-T-M cardiac landmarks with no abnormal beats or murmurs.
ABDOMEN:	Abdomen round, soft, and nontender. BS active in all 4 quadrants
GU:	Voiding without difficulty, urine clear/yellow
INTEGUMENTARY:	Skin warm, dry, intact, normal color for ethnicity. No clubbing of nails, cap refill <3 seconds, Hair soft-distribution normal for age and gender. Skin integrity intact, skin turgor elastic, no tenting present.

1. What data is RELEVANT and must be interpreted as clinically significant by the nurse?

(NCSBN: Step 1 Recognize cues/Reduction of Risk Potential/Health Promotion and Maintenance)

RELEVANT VS Data:	**Clinical Significance:**	**TREND: Improve/Worsening/Stable:**
Pleasant and in no distress, body relaxed Equal aeration on inpiration and expiration in all lobes pulses strong Voiding without difficuty	Client has stabilized	Improved
RELEVANT Assessment Data:	**Clinical Significance:**	**TREND: Improve/Worsening/Stable:**
All assessment data is relevent	Client has stabilized	Improved

2. ***Has the status improved or not as expected to this point? Does your nursing priority or plan of care need to be modified in any way after this evaluation assessment?*** *(NCSBN: Step 6 Evaluate outcomes/Management of Care, Physiological Adaptation)*

Evaluation of Current Status:	**Modifications to Current Plan of Care:**
Improved	· No modifications, continue providing comfort measures and monitoring.

3. ***Based on your current evaluation, what are your CURRENT nursing priorities and plan of care?***
(NCSBN: Step 4 Generate solutions/Step 5: Take action/Management of Care)

CURRENT Nursing PRIORITY:	Continue fluids	
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**
IV Fluids	Dehydration	Client's dehydration symptoms will improve.

It is now the end of your shift. Effective and concise handoffs are essential to excellent care and, if not done well, can adversely impact the care of this patient. You have done an excellent job to this point; now finish strong and give the following SBAR report to the nurse who will be caring for this patient:
(Management of Care)

Situation:

Name/age: Jack Anderson: 9-years-old

BRIEF summary of primary problem: Jack came into ED complaining of tiredness and "not normal" breathing.

Background:

Primary problem/diagnosis: Diabetes Mellitus

RELEVANT past medical history: Jack Anderson is a 9-year-old boy who presents to the emergency department because he has been more sleepy and his breathing is " not normal; " it is deeper and faster, according to his parents. Jack was sick with a respiratory virus two weeks ago but has since recovered. Jack began feeling more tired a few days ago when he started to complain of abdominal pain, headache, muscle aches, and consistently being hungry and thirsty. He is urinating more frequently during the day and at night. His mother reports a normal full-term pregnancy and Jack has been healthy with no known medical conditions.

RELEVANT background data:

Assessment:

Most recent vital signs: T: 98.9 F/37.2 C (oral)
P: 92 (reg)
R: 24 (reg)
BP: 100/60
O2 sat: 98% on RA
Blood Glucose: 442

RELEVANT body system nursing assessment data: The cient's endocrine immune system and cardiac.

RELEVANT lab values:	Glucose, creatinine, potassium, Sodium,
TREND of any abnormal clinical data (stable-increasing/decreasing):	STABLE
How have you advanced the plan of care?	Contine fluids and monitoring.
Patient response:	Client reports he is relaxed and is in no acute distress.
INTERPRETATION of current clinical status (stable/unstable/ worsening):	STABLE
Recommendation:	
Suggestions to advance the plan of care:	Continue with plan of care

Education Priorities/Discharge Planning

What educational/discharge priorities will be needed to develop a teaching plan for this patient and/or family? *(Health Promotion and Maintenance)*

Education PRIORITY:	Diabetes Mellitus type 1
PRIORITY Topics to Teach:	**Rationale:**
Teach client about insulin and what he will need to do in order to "feel better". Teach disease process and why it may have happened or if there is any family history they should be concerned about. Diet and glucose monitoring How to give accu-checks and self monitor the signs and symptoms and adverse effects by not staying compliant.	The client and family will need to know how to take care of their son, and later in life Jake will need to know how to take care of himself.

Caring and the "Art" of Nursing

What is the patient likely experiencing/feeling right now in this situation? What can you do to engage yourself with this patient's experience, and show that he/she matters to you as a person? (*Psychosocial Integrity)*

What Patient is Experiencing:	**How to Engage:**
The client is most likely feeling, anxious, scared, and sadness knowing how his life is going to have to be adjusted to his current condition.	Trusting nurse-client relationship, therapeutic communication, listening and open feelings about how the client feels.

Use Reflection to Develop Clinical Judgment

What did you do well in this case study?	What knowledge deficits did you identify?
I believe I did well in diagnosing and assesmment data.	Insulin and glucose managment
What did you learn?	**How will you apply learning caring for future patients?**
I learned about DM, associated signs and symptoms, assessment data, and the relevent information needed to carry a care plan through.	This case study helped me understand what I should look for when caring for future patients, even before their diagnosis.