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:**
Headache Polyuria Abdominal pain Muscle aches Hungrier than usual Recent respiratory virus	The patient has unusual symptoms. The patient has symptoms and wants further investigation to provide more evidence and information.
RELEVANT Data from Social History:	**Clinical Significance:**
Lives with his parents and two siblings Physically active Earns above average marks in school	The patient living at home with both of his parents and two siblings means that he has a good support system and has a family who can help him.

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:**
Constant abdominal pain rating 4/10 RR of 44 Temperature of 100.4	Constant pain is a priority, and we want to start thinking about ways to reduce patient pain and what actions to take first. Administering pain reliever should be the nurses first priority.

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:**
Foul odor of the breath Wincing in pain Lethargic RR deep and rapid Abdomen is tender to light palpation Skin turgor nonelastic Nauseated	The patient in pain and nausea is the priority. The patient being lethargic is unusual for the patient which could be related to the patient being in pain.

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:**
I would like to see a complete blood cell count to look at WBCs to see if there are any signs of infection. Basic metabolic panel to see kidney function and urinalysis to look for a UTI infection. Check glucose	Administer pain med and zofran for the nausea. CMP CBC Urinalysis and urine culture Start IV with normal saline to hydrate

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	The white blood cell count of 7.2 is on the higher side for a child but is still within normal range. However, the WBC is rising which could indicate an infection in the body.	Worsening

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 CO2	Low High High High Low	Improved Improved Improved but still high Improved CO2 Improved but still low

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:

Magnesium Phosphorus Beta hydroxybutyrate	Magnesium is slightly elevated Phosphorus is low for a child Beta hydroxybutyrate is positive

		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:
Glucose Ketones	Glucose and ketones would be present due to diabetes. Ketones in your urine could indicate DKA.

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: >5.5	Irregular heart rhythm	Monitor heart rhythm.

Lab:	Normal	Clinical Significance:	Nursing Assessments/Interventions Required:

	Value:		
Glucose Value: 680	Critical Value: >200	Could be DKA	Monitor glucose levels routinely

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 with new diagnosis of diabetes 1	The issue occurs when the body is unable to create enough insulin. Sugar is a vital source of energy for muscles and other tissues, and insulin is crucial in facilitating its entry into body cells. Insufficient insulin causes the body to start using fat as fuel. As a result, the bloodstream begins to accumulate ketones, which are acids. The accumulation might cause diabetic ketoacidosis if it is not managed.	If diabetes is left untreated, in can turn into DKA.

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:
Pediatric and DKA	A person with type 1 diabetes is usually found at an early age. If diabetes 1 is left untreated, it can turn into DKA. DKA in kids is extremely dangerous.

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:	Polyuria, polydipsia, polyphagia Worst case scenario is death	
Nursing Interventions to PREVENT this Complication:	**Assessments to Identify Problem EARLY:**	**Nursing Interventions to Rescue:**

Monitor vitals Do frequent urine cultures Check glucose levels routinely	Altered level of consciousness Behavior changes Low BP Elevated RR Elevated HR	Notify the provider

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	Rehydrate the patient	The pt is hydrated
IVs AdmittothePediatric ICU	Focused care since the patient is younger	Pt will receive more precise care
NPO	Control fluid intake and output	Pt will tolerate NPO
Vitalsigns every 30 minutes with neurological checks every hour	Check for worsening symptoms	Vitals maintain stable
Continuous cardiac monitor	Check for arrhythmias due to potassium levels	Pt tolerates cardiac monitor
STAT fingerstick for blood glucose then every one hour	Monitor glucose levels	Glucose levels stay within the normal range
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)	Rehydrate the patient	Hydrate the pt
After fluid bolus start IV Regular insulin infusion at 0.05unit/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	It will help lower glucose levels	Glucose remained stable

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 the input and output to monitor how much the patient is losing. To prevent nausea Help the patient with pain	Maintain fluid balance You do not want the patient throwing up and becoming more dehydrated. Help pt feel more comfortable

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	3	Check the glucose routinely
• Start IV insulin after bolus is given and monitor blood glucose carefully	4	Fluids for DKA
• Obtain VS	5	To assess the patient
• Accurate I and O	6	Monitor for retaining any fluid f
• Place on a cardiac monitor	2	Monitor heart rhythm because potassium levels are high
• Initiate two large bore IVs and administer fluid bolus followed by maintenance/replacement	1	Rehydrate patient

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:	Rehydrating the patient	
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**

Administer fluids	If the patient becomes dehydrated, it can lead to further complications within the body.	Patient handles the fluids well and shows no signs of dehydration.

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:**
Endocrine	Checking glucose levels and keeping the head of the bed elevated.

8. What psychosocial/holistic care PRIORITIES need to be addressed for this patient?

(Psychosocial Integrity/Basic Care and Comfort)

Psychosocial PRIORITIES:	Making sure the patient feels safe and comfortable.	
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**
CARE/COMFORT:	Patient may feel more comfortable with his parents in the room and allow the patient to watch a show to relax him even more.	The pt will be able to watch a show and have his parents in the room with him.
EMOTIONAL (How to develop a therapeutic relationship):	Make sure the patient feels safe and that it is okay to ask questions. Gain the patient's trust.	The pt trusted his nurse and felt confident in asking questions.

Dosage Calculations

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

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:**
No discomfort or distress	Patient is stable	Improved
RELEVANT Assessment Data:	**Clinical Significance:**	**TREND: Improve/Worsening/Stable:**
The head to toe assessment all looks clear and normal.	Patient is stable	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:**
Patient is improving and handling the treatment plan well.	None

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:	Keep breathing steady and observe for breathing difficulties	
PRIORITY Nursing Interventions:	**Rationale:**	**Expected Outcome:**
IV fluids	Prevent dehydration	Dehydration will not occur

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's parents took him to the emergency room due to abnormal breathing and increase of drowsiness.

Background:

Primary problem/diagnosis: Diabetes Mellitus

RELEVANT past medical history: Kussamul's respirations, recent respiratory virus, tiredness, increase in hunger and thirst, frequent urination, abdominal pain, and muscle aches.

RELEVANT background data: His mother reports Jack has been healthy with no known medical conditions.

Assessment:

Most recent vital signs: HR: 92, RR: 24, BP: 100/60 T: 98.9 F orally, 02: 98% on room air

RELEVANT body system nursing assessment data: Endocrine

RELEVANT lab values: Glucose, creatinine, BUN **TREND of any abnormal clinical data (stable increasing/decreasing):** Stable **How have you advanced the plan of care?** Doing a detailed head to toe assessment and obtaining priority labs **Patient response:** Patient is responding well with no concerns. **INTERPRETATION of current clinical status (stable/unstable/ worsening):** Stable
Recommendation: Continue with the current plan of care.
Suggestions to advance the plan of care: Continue with the current 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:	Signs and symptoms of DKA, insulin administration
PRIORITY Topics to Teach:	**Rationale:**
Glucose testing Insulin administration Type 1 diabetes diet and care Sign and symptoms of hyper/ hypo glycemia.	The patient will be testing their own glucose routinely. Pt will be giving themself insulin daily. How to properly care for type 1 diabetes to further into DKA. Inform pt on the sign and symptoms that are serious enough to seek medical help.

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:**

Fear Anxiety	Using therapeutic communication for this patient will be the best form of communication. The pt is most likely nervous regarding this new diagnosis. The pt is nine years old which puts him at a higher risk for fear and anxiety.

Use Reflection to Develop Clinical Judgment

What did you do well in this case study?	**What knowledge deficits did you identify?**
I did well in the labs and noticed if they were abnormal or not.	This was my first case study on a pediatric patient.
What did you learn?	**How will you apply learning caring for future patients?**
I learned about diabetes and DKA in more detail.	Caring for patients is what a nurse does. Every patient wants to be treated with the best care.

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