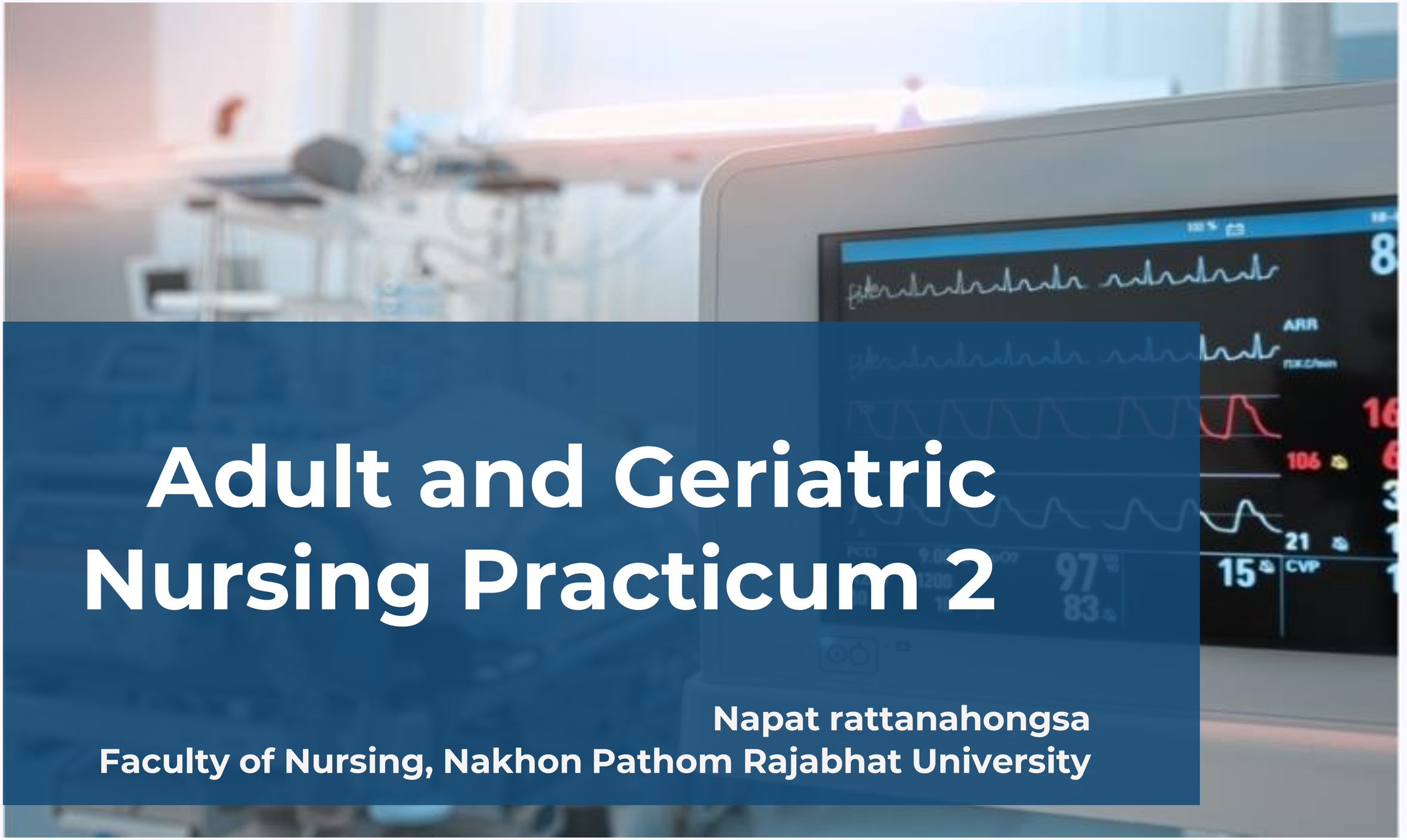
มหาวิทยาลัยราชภัฏนครปฐม



Adult and Geriatric Nursing Practicum 2

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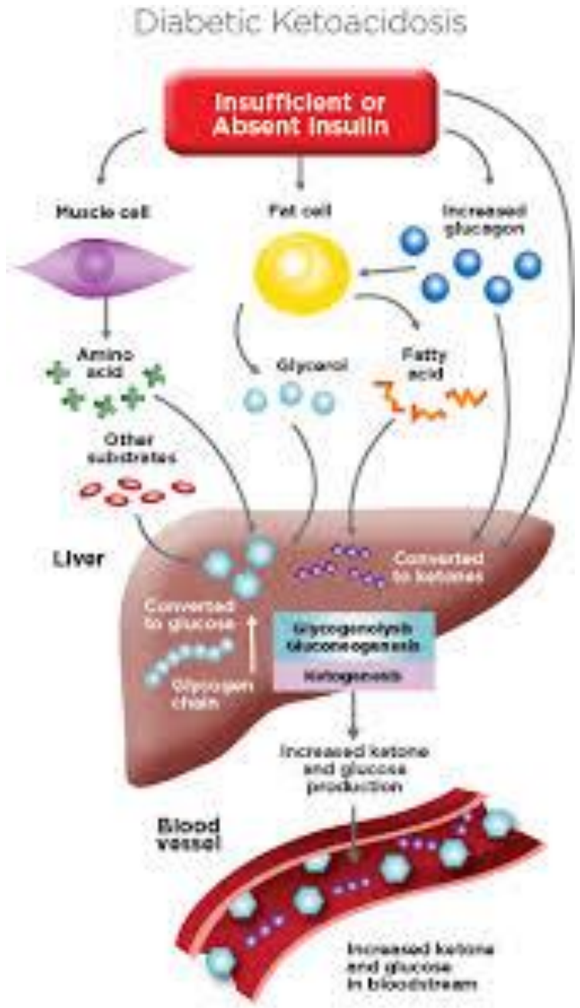
Hyperglycemic emergencies

Diabetic Ketoacidosis (DKA)

- insulin deficiency
- has excess levels of hormones that act opposite to insulin, including glucagon, catecholamines, cortisol and growth hormone,
- high blood sugar levels
- metabolic acidosis from ketoacidosis.

(Gosmanov et al., 2021)



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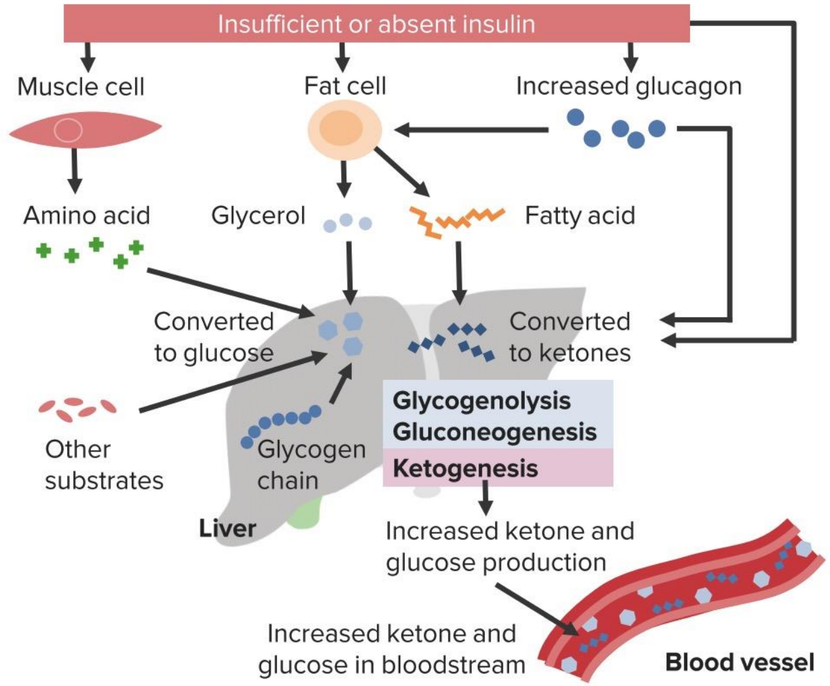
Hyperglycemic emergencies

Hyperosmolar Hyperglycemic State (HHS)

- Type 2 diabetes
- non ketoacidosis
- Glucose > 600 mg./dl.
- Polyuria ≈ 8-9 L
- Dehydration
- Hypernatremia, serum osmolality > 320 mOsm/kg
- Alteration of consciousness



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(Gosmanov et al., 2021)

Hyperglycemic emergencies

DKA vs HHS

Diabetic ketoacidosis		Hyperosmolar hyperglycaemic state
More common in type 1 diabetes mellitus	**Association**	More common in type 2 diabetes mellitus
Relatively lower	**Mortality rate**	Relatively higher
Abdominal pain, polyuria, polydipsia, dehydration, Kussmaul breathing, acetone-smelling (sweet) breath	**Presentation**	Fatigue, altered level of consciousness, hyperviscosity (increases risk for MI and stroke), hypotension
Hours	**Onset**	Days
1. Glucose >11.1mmol/L 2. pH <7.3 or bicarbonate <15mmol/L 3. Ketone >3mmol/L or urine ketone ++ on dipstick	**Diagnostic criteria**	1. Hypovolaemia 2. Marked hyperglycaemia (>30mmol/L) without significant ketonuria or acidosis 3. Significantly raised serum osmolality (>320mosmol/kg)
• Fluid replacement • IV insulin (0.1unit/kg/h) • Potassium replacement	**Management**	• Normalised the osmolality gradually • Replace fluid and electrolyte • No insulin unless significant ketonuria or acidosis
Thromboembolism, gastric stasis, arrythmias secondary to hyper/hypokalaemia, ARDS, AKI Iatrogenic (due to incorrect fluid therapy): cerebral oedema, hypokalemia, hypoglycaemia	**Complication**	MI, stroke, peripheral arterial thrombosis, Rare: seizure, cerebral oedema, central pontine myelinolysis

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DKA vs HHS management

Treatment

IV fluid

Type: balance crystalloid solution, 0.9%NaCl
Rate: 500-1,000 ml/hr during first 2-4 hr then depend on state of hydration
** (HF, ESRD on HD) bolus 250 ml & frequent assess of hemodynamic status
(Replace 50% fluid deficit in first 8-12 hr)
If BG <250 mg/dL: add 5-10%dextrose
Euglycemic DKA: ให้ 5-10% dextrose คู่กับ 0.9%NaCl/crystalloid

Bicarbonate

If pH<7.0: $NaHCO_3$ 100 mmol + sterile water 400 ml IV in 2 hr then repeat VBG until pH>7.0

Insulin

DKA: (Mild): rapid acting insulin SC 0.1 U/kg q 1 hr
(Moderate-severe): short acting insulin IV 0.1 U/kg bolus then 0.1 U/kg/hr
BG drop 50-70 mg/dL/hr
EDKA fix rate insulin 2-3 u/hr with D10w keep BG 120-180 mg%
HHS: short acting insulin IV 0.05 U/kg/hr, BG drop 90-120 mg/dL/hr
If BG<250 mg/dL: reduce short acting insulin to 0.05 U/kg/hr
keep BG 150-200 mg/dL (DKA), 200-250 mg/dL (HHS)

Potassium

keep K 4-5 mmol/L

K <3.5 mmol/L: add 10-20 mmol/hr until K>3.5 mmol/L
K 3.5-5.0 mmol/L: add 10-20 mmol/L
K >5.0: **start insulin**, do not give K

Before K supplement
Adequate renal function?
(urine output >0.5 ml/kg/h)

Phosphate

Give phosphate if muscle weak, respiratory compromise + phosphate <1.0 mmol/L

Calculate

Calculated total serum Osm: $2Na(mmol/L) + \frac{BG(mg/dL)}{18} + \frac{BUN(mg/dL)}{2.8}$

Corrected Na: serum Na + $\frac{(BG(mg/dL) - 100)}{100}$ x 1.6 [ถ้า BG >400 mg/dL: ใช้ 2.4 คูณแทน 1.6]

BHB: β-hydroxybutyrate
BG: blood glucose
HCO_3^-: bicarbonate

Follow	q 1-2 hr: BG q 4 hr: (DKA) elyte, PO4, Cr, plasma ketone, VBG Until resolution	q 1-2 hr: BG q 4 hr: BG, Cr, elyte, serum osm Until resolution
Resolution criteria	Serum ketone <0.6 mmol/L + venous pH ≥ 7.3 or HCO_3^- ≥ 18	Serum Osm <300 mOsm/kg, corrected hyperglycemia, urine output >0.5 ml/kg/hr, improve cognitive status, BG <250 mg/dL

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Intravenous insulin infusion

- Regular insulin 0.1 U/kg IV bolus then Regular insulin 0.1 U/kg/hr. IV drip
- Regular insulin 0.14 U/kg/hr.

Close monitoring
Record V/S q 1-2 hr.

Hypoglycemia: Tiredness, tremor or shaking, sweating, heart palpitations, rapid or irregular heart rate, dizziness and weakness, Nausea, confusion, seizures, nightmares, fainting, coma
Record V/S, I/O
Monitor DTX q 1 hr.
Monitor Lab K

(Gosmanov et al., 2021)

dilusion in NSS

Regular insulin 100 u + 0.9%NaCl 100 ml (RI 1:1)

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