Mestrado Profissional em Ensino em Ciências da Saúde e do Meio Ambiente

MECSMA

UniFOA Centro Universitário de Volta Redonda

TEACHING PRODUCT

REALISTIC SIMULATION

IN THE PREPARATION AND ADMINISTRATION OF MEDICATIONS IN CRITICALLY ILL PATIENTS

DIDACTIC SEQUENCE

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Educational Product Datasheet

Title

Didactic Sequence in Realistic Simulation for Nurses: Pedagogical Strategy for the Preparation and Administration of Medications.

Product origin

It emerges from the dissertation work for the Professional Master's Degree in Teaching Health and Environmental Sciences.

Level of education

Degree in nursing.

Target audience

Nursing teachers.

Category

Teaching sequence.

Purpose

pTo train nursing teachers in the preparation and administration of medication to critically ill patients using realistic simulation.

Availability

Without restriction, respecting the authorship of this product, commercial use by third parties is not permitted.

Disclosure

Digitally.

Language: English City: Volta Redonda-RJ Country: Brazil Year: 2024

Summary

Presentation

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In the continuous search for innovative and effective methodologies in the field of education, we enthusiastically present our didactic sequence as a cutting-edge educational product. Developed based on solid pedagogical foundations and aligned with contemporary demands, this sequence represents a holistic and engaging approach to the teaching and learning process.

Our primary objective is to provide educators with a dynamic and adaptable tool, capable of enhancing the construction of knowledge by students, stimulating their autonomy, creativity and critical thinking. Based on the principles of David Kolb and David Ausubel, this sequence aims not only to transmit information, but also to promote meaningful experiences that inspire the search for knowledge.

Together, let's explore new horizons in the art of teaching and learning!

Introduction

The didactic sequence for the preparation and administration of medicines, using realistic simulation as a pedagogical tool, represents a significant advance in the training of nurses and nursing technicians. Based on the theoretical principles of David Ausubel and David Kolb, this approach seeks to promote meaningful and contextualized learning, providing health professionals with an experience that is closer to clinical reality (MERCUZOT et al., 2021).

David Ausubel, with his theory of meaningful learning, highlights the importance of connecting new knowledge to existing cognitive structure, making learning more effective. In this sense, realistic simulation offers an environment where nursing professionals can apply their theoretical knowledge in simulated practical situations, facilitating the internalization of the content and its subsequent application in clinical practice (TIBAO, 2021; FILATRO, 2023).

On the other hand, David Kolb, with his theory of the experiential learning cycle, emphasizes the importance of reflecting on the experience as part of the learning process. Realistic simulation allows participants to experience different clinical scenarios, reflect on their actions and receive immediate feedback, promoting a continuous and iterative learning cycle (PRADO, 2020; MORRIS, 2020).

The master's thesis entitled “Didactic Sequence in Realistic Simulation for Nurses: Pedagogical Strategy for the Preparation and Administration of Medications” offers a theoretical and practical framework for implementing this innovative approach. By integrating the principles of Ausubel and Kolb with realistic simulation, this didactic sequence provides nursing professionals with more complete training and preparation to face the challenges of clinical practice, guaranteeing safety and quality in the preparation and administration of medicines.

Theoretical background

Realistic simulation is an effective pedagogical strategy that uses simulated scenarios and situations to promote practical and experiential learning in various areas of education, including medical education, nursing, health training, rescue, and many others. This pedagogical approach stands out for its ability to create authentic and immersive learning environments that resemble reality. Some characteristics and benefits of realistic simulation as a pedagogical strategy are: the creation of authentic learning environments; learning based on practical experience; immediate feedback and reflection; safety and absence of risks for patients; preparation for critical situations; development of communication and teamwork skills; flexibility and customization; research and evaluation of competencies; continuous training (OLIVEIRA et al., 2023).

Thus, realistic simulation is a pedagogical strategy that stands out for its ability to create an immersive and authentic learning environment, allowing students to acquire, practice and improve their skills safely and effectively. It plays a fundamental role in various areas of education, contributing to the development of more competent and prepared professionals (RYAN et al., 2022).

For this reason, it is necessary to create a registration model to carry out realistic simulation in a standardized and systematized way, in order to provide healthcare teachers with tools to facilitate the process of applicability and usability of realistic simulation. To this end, we will show the development of an interactive didactic sequence model based on the Dialectical Hermeneutic Circle (DHC) applied to realistic simulations in the preparation and administration of medicines.

The CHD allows space for dialog and exchange of information, so that with each module the student is exposed to greater complexity in relation to the first problem presented. According to Oliveira (2013) it is this process of dialog and complexity that guarantees the acquisition of knowledge.

Objectives

General

To train nursing teachers in the use of realistic simulation in the preparation and administration of medication to critically ill patients.

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

Target audience

Twelve undergraduate nursing students who have completed the basic foundation courses.

Materials

24 flacons of distilled water labeled noraepinephrine, 36 flacons of distilled water labeled epinephrine, 6 flacons of distilled water labeled dobutamine, 12 bottles of S.F 0.9% 100ml, 6 syringes of 10ml or 20ml, 6 needles 40x12, 1 infusion pump, 5 tree way, and all the equipment needed for a simulated environment.

Location

Nursing skills laboratory (set up for simulation activity (appendix 1 or realistic simulation laboratory.

Objective

Preparing vasoactive drugs for intravenous administration in critically ill patients.

Case study 1

History: A 29-year-old male was transferred to hospital reporting pain when walking in the lower abdominal region, dysuria, three episodes of emesis, dry cough, purulent rhinorrhea and headache for 48 hours. He was followed up by general surgery, where he underwent an abdominal computed tomography (CT) scan with no alterations. After hospitalization, he became disoriented two days later, slowed down and remained drowsy. He was transferred to the Intensive Care Unit (ICU) after his level of consciousness continued to drop. No comorbidities or use of medication or drugs.

Diagnosis: - Meningoencephalitis: bacterial vs. viral
- Tropical spastic paraparesis? (HTLV 1 and 2 requested)

Physical examination: Sedated, RASS: -3, bedridden, Orotracheal Tube (TOT) n: 7.5 on dial 22 on Mechanical Ventilation (MV). Enteral diet by Nasoenteral Tube (NES) (7th day) infusing 42ml/h. Central Venous Catheter (CVC) in the Right Subclavian Vein (RSVC) (5thD) with no signs of phlogiston with sterile transparent film, Invasive Arterial Pressure (IAP) in the left radial vein (4thD) with no signs of phlogiston with sterile transparent film. Dark yellow diuresis through a delayed bladder catheter (DBS) (5thD). Evacuation present in diaper. Vital Signs (VAS), PAI: 120x80mmHg, Heart Rate (HR): 143 bpm, Respiratory Rate (RR): 20irpm, Axillary Temperature (TAX): 39.4ºC, Pain Analog Scale (VAS): 0, Peripheral O2 Saturation (SPO2): 98%.

Tests:
VDRL: negative
Herpes simplex serology: 1 and 2: IgG positive and IgM negative
Cytomegalovirus serology: IgG positive and IgM negative

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

Prescription 1

High-protein, high-calorie enteral diet without fiber 1000ml flow rate - 42 ml/h	
Physiological saline (SF) 0.9% 1000 ml in 24h Intravenous (IV)	
Norepinephrine 2mg/ml - 4ml amp. + SF 0.9% 250ml (234ml + 16ml) flow rate - 1.5ml/h (IV)	
Dobutamine 250mg/20ml - 1 amp + SF 0.9% 230ml (230ml + 20 ml) flow rate - 3.0ml/h (IV)	
Propofol 20mg/ml - 50ml/amp. - 1 amp. 50ml PURE flow rate - 5ml/h (IV)	
Fentanyl 50mcg/ml - 10ml/amp. - 50ml PURE flow rate - 2ml/hour (IV)	
Oxacillin 500mg + distilled water (DW) 10ml 12/12 (IV)	
Acyclovir 250mg + 250ml SF0.9% (1 vial) 8/8 (IV)	
Omeprazole sodium 40mg/ml + 10ml diluent 1xday (IV)	
Bromopride 5mg/ml 2ml amp. IV 8/8 at the doctor's discretion (ACM)	
Dipyrone 500mg/ml 2ml 1amp. + 10ml DW 4/4 (IV)	
Glucose 50% 5 amp. if Hemoglobin test (HGT) <70mg/dl IV	
Regular Human Insulin according to SC protocol	
Enalapril 5mg 1 cp. 12/12 per nasoenteral tube	
Cholinidine 100mg 1 cp. Per nasoenteral tube	
Vital Signs (SSVV) 2/2h	

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

BRIEFING

30min - The teacher introduces him/herself and asks the students to divide into pairs along the benches. Then present students with case study 1 and give each pair a copy of the drug prescription. At this point, explain that three types of catecholamine will be prepared and administered: noraepinephrine, epinephrine and dobutamine. Explain to the students that the preparation and administration will always be done in pairs.

DEBRIEFING

3:30 - Read out the prescription and explain to the students that you are going to start preparing the **NORAEPINEFRINE** and briefly explain its indication, then ask each pair to take 4 ampoules of the medicine and 1 100ml bag of S.F 0 9%. Ask the students to dress in a cap, mask and glove. Then ask them to start preparing the drip with 4 ampoules of noraepinephrine totaling 16 ml and 1 bag containing 234 ml of 0.9% saline.

The teacher should mediate this process, always emphasizing good practice in preparing medicines and pointing out mistakes. Specific care should be taken when administering noraepinephrine.

Tell the students that the preparation of **DOBUTAMINE** is about to begin. Ask them to get 1 ampoule of this medicine containing 20ml and 1 250ml bag of 0.9% saline. While the students are preparing the medicine, the teacher should explain the indication and specific precautions for this medicine.

After clarifying any doubts, the students should administer the 2 prepared drippings to the mannequin, where the teacher should mediate on good practice during the administration of this medication, taking into account possible complications and the conduct to be taken at this time.

Examples of clinical problems involving the administration of NORAEPINEFRINE:

- Ask the students: **“If the patient has a hypertensive spike? What should you do?"**
- Expected answer: **“Immediately decrease the programmed flow rate on the Continuous Infusion Pump (CIP), thus preventing the patient from developing a stroke or AMI, and notify the medical team.”**
- Ask the students: **“If the patient has hypotension and is on noraepinephrine, what should you do?”**
- Expected answer: **“Increase the flow by around 3ml and see if the patient's blood pressure rises, then inform the medical team.”**

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

DEBRIEFING

Examples of clinical problems involving the administration of DOBUTAMINE:

- Ask the students: **“If the patient has tachycardia or arrhythmia, what should you do?”**
- Expected answer: **“Immediately reduce the programmed flow rate on the Continuous Infusion Pump (CIP), thus preventing the patient from developing myocardial fatigue and consequently AMI. Inform the medical team."**
- Ask the students: **“If the patient has bradycardia and is on dobutamine, what should you do?”**
- Expected answer: **“Increase the flow by around 3ml and see if the patient's heart rate increases. Inform the medical team."**

Answer the students' questions and start preparing the EPINEPHrine.

The teacher should ask the students to split into trios and attend to a cardiorespiratory arrest (CRA) in the patient in case study 1. One student should prepare and administer 1 ampoule of epinephrine every 5 minutes, one student should start cardiac compressions and one student should ensure ventilation according to the ACLS protocol.

The teacher should mediate the whole process, emphasizing the speed of preparation, the need to stop the administration of other drugs that were being infused intravenously, and to stop the infusion of enteral diet or water. Explain to the students that resuscitation should last 30 minutes, although the simulation will not use all that time. The teacher should mediate good practice during the administration of this drug, taking into account possible complications and the conduct to be taken at this time.

Examples of clinical problems involving the administration of EPINEPHRINE:

- Ask the students: **“If the professional doesn't salinize after administering epinephrine, what could happen?”**
- Expected answer: **“The epinephrine will remain in the catheter and will not reach the intravenous circulation.”**
- Ask the students: **“If the professional administers via the lateral injector, what precautions should they take?**
- ”Expected answer: **“When administering via the lateral injector, the professional should clamp the route that goes up into the serum bottle, otherwise the pressure during administration will cause the epinephrine to go up into the bottle and not into the bloodstream.”**

Answer the students' questions.

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

FEEDBACK

At the end of the administration, the teacher should highlight the students' mistakes and the needs for improvement that were perceived during the simulation. They should also point out to the students what they got right.

Pharmacological care

Noraepinephrine

- Install photosensitive equipment with a bottle protector or laminated paper.
- Infuse using a continuous infusion pump (BIC)
- Administer exclusively
- Identify in 3 places (bottle, BIC and equipment near the catheter)
- Change the solution every 24 hours to ensure stability.
- When suspended, do not salinize directly. First, aspirate the catheter until blood appears, discard the syringe with the blood, which also contains residual noraepinephrine, and then salinize with another syringe. This precaution avoids flushing the nora and causing a hypertensive peak.
- Monitor blood pressure frequently, preferably with invasive BP.
- Perform continuous cardiac monitoring and peripheral oxygen saturation (SPO2).
- When suspended, do not salinize directly. First, aspirate the catheter until blood appears, discard the syringe with the blood, which also contains residual noraepinephrine, and then salinize with another syringe. This precaution avoids flushing the nora and causing a hypertensive peak.
- If used in a peripheral vein and leakage occurs, there is a high risk of scarification and necrosis of the area. Therefore, if leakage occurs, the entire affected area (which is bounded by hypothermia and pallor) should be infiltrated with saline solution (10 to 15ml) with 5 to 10mg of phentolamine, which is an adrenergic blocker. Perform as soon as possible (no later than 12 hours).

Dobutamine

- Perform BIC infusion.
- Identify da in 3 places (bottle, BIC and equipment near the catheter)
- Administer via Central Venous Catheter (CVC) or Peripheral Venous Access (PVA)
- When suspended, do not salinize directly. First, aspirate the catheter until blood appears, discard the syringe and then salinize. This avoids flushing the blood and causing tachycardia.
- Do not administer with incompatible solutions such as alkaline solutions like sodium bicarbonate. Incompatible with hydrocortisone, cefazolin, penicillin and heparin.
- Change solution within 24 hours to ensure stability
- Continuous cardiac monitoring + SPO2 + PNI or preferably PAI

DIDACTIC SEQUENCE

Vasoactive drugs

Class 1/3

Pharmacological care

Epinephrine

- Salinize the venous access after administration to “push” the drug into the venous catheter.
- Elevate the limb after administration.
- Observe for signs of infiltration during administration.
- Perform continuous cardiac monitoring + SPO2 + Non-Invasive Pressure (NIBP)

DIDACTIC SEQUENCE

Sedative drugs and neuromuscular blockers

Class 2/3

Target audience

Twelve undergraduate nursing students who have completed the basic foundation courses.

Materials

Labels for the simulated medicines, flaconet of distilled water, vials of simulated medicines, 10ml or 20ml syringe, 40x12 needle, 0.9% SF serum vials, infusion pump, tree way, and all the equipment needed for a simulated environment.

Location

Nursing skills laboratory (set up for simulation activity - appendix 1 or realistic simulation laboratory.

Objetivo

Preparing sedative drugs and neuromuscular blockers for intravenous administration to critically ill patients.

Case studies 2

History: Male, 68 years old, brought in by SAMU due to dysarthria associated with hemiplegia E. After a CT scan, a cranial hemorrhage was found, evolving with a lowered level of consciousness and persistent hypertension. He was transferred to the ICU after admission from the adult emergency department. Comorbidities: hypertension and former smoker for 18 years.

Diagnosis: Intra-parenchymal hemorrhagic stroke: right nucleus-capsular + hemoventricle
Intracranial hypertension/
P.O. drainage of right intracerebral hematoma + placement of External Ventricular Shunt (EVS) with Intra-Cranial Catheter (ICP)
P.O.I. Right decompressive craniectomy performed 2 days after Hospitalization (HI) with EVD AND ICP.

Physical examination: Sedated, RASS: -3, bedridden, Orotracheal Tube (TOT) n: 7.5 on dial 17 on Mechanical Ventilation (MV). Enteral diet by Naso Enteral Tube (NES) (7th day) infusing 42ml/h. Central Venous Catheter (CVC) in VSCD (5thD) with no signs of phlogiston with tegaderm, Invasive Arterial Pressure (IAP) in left radial (4thD) with no signs of phlogiston with tegaderm. Dark yellow diuresis by delayed bladder catheter (DBS) (5thD). Evacuation present in diaper. SSVV: PAI=120x80mmHg, HR:143 bpm, FR:20irpm, Tax: 39.4ºC, EVA: 0, SPO2: 98%.

DIDACTIC SEQUENCE

Sedative drugs and neuromuscular blockers

Class 2/3

Prescription 2

High-protein, high-calorie enteral diet without fiber 1000ml flow rate - 21 ml/h	
Propofol 20mg/ml - 50ml amp. - 1 amp. 50ml PURE flow rate: 4ml/h	
Fentanyl 50mcg/ml - 10ml amp. - 50ml PURE flow rate: 4ml/h	
Enoxaparin sodium 60mg Subcutaneously (SC) 1xday	
Acetyl salicylic acid 100 mg 1 tablet 1xday by nasoenteral tube	
Simvastatin 20mg 2 tablets 1xday by nasoentera tube	
Lactulose 667mg/ml make 120ml by nasoenteral tube give 400mml after dose.	
Simethicone 75mg/ml make 40 drops by nasoenteral tube 4/4	
Bromopride 5mg/ml 2ml ampoules IV 8/8 in case of nausea and vomiting	
Clonidine 100mg 1 tablet Oral use in case of BP> 180x90mmHg	
Dipyrone 500mg/ml 2ml amp + 10ml AD 4/4 IV	
Amiodarone 50mg/ml 3ml amp. IV + SF 0.9% 232ml + 18ml flow rate: 3ml/h	
Regular human insulin SC according to SC protocol up to 150 = 0 IU 151 - 200 = 2 UI 201 - 250 = 4 UI 251 - 300 = 6 UI 301 - 350 = 8 UI 351 - 400 = 10 UI > 401 call on duty	
2/2h Vital Signs	
Respiratory physiotherapy	

DIDACTIC SEQUENCE

Sedative drugs and neuromuscular blockers

Class 2/3

BRIEFING

30min - The teacher introduces him/herself and asks the students to divide into pairs along the benches. Then present students with case study 2 and give each pair a copy of the drug prescription. At this point, explain that 2 types of sedative and 2 neuromuscular blockers will be prepared and administered: proporfol, fentanyl, suxamethonium and rocuronium respectively. Explain to the students that the preparation and administration will always be done in pairs.

DEBRIEFING

3:30 - Read out the prescription and explain to the students that you are going to start preparing **PROPORFOL** and briefly explain its indication, then ask each pair to take 1 ampoule of 100ml of the medicine. Ask the students to dress in a cap, mask and glove. Then ask them to start preparing the dripping and explain that the proportional dripping is done pure.

The teacher should mediate this process, always emphasizing good practice in the preparation of medicines and pointing out misconceptions. Specific care should be taken when administering proporfol

Tell the students that the preparation of **FENTANIL** is about to begin, ask them to find 2 ampoules of this medicine with 20ml and 1 bag of 100ml of S.F 0.9%, instruct the students to discard the SF 09% for drip preparation, where the solution should be 80ml of SF 0.9% + 20ml of fentanyl or it can be administered PURE according to the prescription. While the students are preparing the medicine, the teacher should explain the indication and specific precautions for this medicine.

After clarifying any doubts, the students should administer the 2 prepared drippings to the mannequin, where the teacher should mediate on good practice during the administration of this medication, taking into account possible complications and the conduct to be taken at this time.

Examples of questions that can be asked of students during the administration of PROPORFOL:

- Ask the students: **“What harm does propfol cause the patient?”**
- Expected answer: **“Respiratory depression, bradycardia and hypotension.”**
- Ask the students: **“If the patient reports pain at the site where proporfol is administered, what can be done to prevent this pain?”**
- Expected answer: **“Fentanyl can be administered first in order to cut off the nociceptive pain stimulus and then proporfol can be administered.”**

DEBRIEFING

Examples of clinical problems involving the administration of FENTANIL:

- Ask the students: **"If the patient presents with bradycardia after using fentanyl, what medication might the doctor order to reverse the condition?"**
- Expected answer: **"Atropine can be used to increase the heart rate."**

Answer the students' questions and start preparing **SUXAMETHON** and **ROCURON**. Explain to the students that suxamethonium will be administered as a bolus to induce intubation, so separate 1 ampoule of suxamethonium and 10 ml of distilled water for reconstitution. Rocuronium will be used to maintain sedation, ask the students to separate 6 ampoules of rocuronium and explain that it will be infused pure in a 60ml drip.

The teacher should ask the students to divide into trios and attend to a patient in induction for sedation in case study 2. The first student should prepare the simulated patient for induction of sedation, the second student should separate the materials needed for an orotracheal intubation and the third student should prepare and administer the drugs for the rapid sequence of sedoanalgesic induction.

The teacher should mediate the whole process, highlighting the speed of drug preparation, the need for proper patient positioning during intubation and the organization of the environment and supplies for safe intubation.

Examples of clinical problems involving the administration of suxamethonium:

- Ask the students: **"What risk does the patient run if suxamethonium is administered first and then the sedative?"**
- Expected answer: **"The patient will still be conscious but with immobile skeletal muscles, which leads to mental distress and anxiety."**
- Ask the students: **"What might happen in the event of an overdose of suxamethonium?"**
- Expected answer: **"Respiratory depression and consequent cardiorespiratory arrest."**
- Ask the students: **"What should be done in the event of respiratory depression?"**
- Expected answer: **"Administer atropine as prescribed by the doctor to reverse the condition."**

Answer the students' questions.

DIDACTIC SEQUENCE

Sedative drugs and neuromuscular blockers

Class 2/3

FEEDBACK

At the end of the administration, the teacher should highlight the students' mistakes and the needs for improvement that were perceived during the simulation. They should also point out to the students what they got right.

Pharmacological care

Proporfol and Fentanyl

- Infuse using a continuous infusion pump (BIC)
- Identify in 3 places (bottle, BIC and equipment near the catheter)
- Change solution every 6 hours to ensure stability.
- Perform continuous cardiac monitoring, peripheral oxygen saturation (SPO2) and blood pressure.
- Be aware of the need to refrigerate some pharmaceuticals.
- Provide flumazenil or nalaxone for rapid recovery in the event of cardiorespiratory arrest.
- Provide ventilatory support for patients who are undergoing procedures under sedation and are not intubated.

Fentanyl

- Do not administer together with fluorouracil, pantoprazole sodium, pentobarbital sodium, azithromycin, phenytoin sodium, sulfamethoxazole+trimethoprim, cefapirine, gemtuzumab, hydroxocobalamin) due to incompatibility.

Rocuronium

- Perform BIC infusion.
- Identify da in 3 places (bottle, BIC and equipment near the catheter)
- Change the solution within 24 hours due to microbiological stability, although the solution is stable for up to 72 hours.
- Provide the antidote sugammadex to reverse neuromuscular blocker intoxication.
- Perform continuous cardiac monitoring + SPO2 + PNI.
- Observe for anaphylaxis, arrhythmia, bronchospasm, edema at the injection site, hiccups, pruritus, nausea, pulmonary vascular resistance (increased), rash, snoring, shock, tachycardia, vomiting, wheezing.

DIDACTIC SEQUENCE

Hypoglycemic and thrombolytic drugs

Class 3/3

Target audience

Twelve undergraduate nursing students who have completed the basic foundation courses.

Materials

Labels for the simulated medicines, flaconet of distilled water, vials of simulated medicines, 10ml or 20ml syringe, 40x12 needle, 0.9% SF serum vials, infusion pump, tree way, and all the equipment needed for a simulated environment.

Location

Nursing skills laboratory (set up for simulation activity - appendix 1 or realistic simulation laboratory.

Objective

Preparing hypoglycemic and thrombolytic drugs.

Case studies 3

History: Female, 56 years old, brought in in a wheelchair by her daughter with a report of 1 ischemic stroke and currently with deviation of lip commissure E and hemiparetic gait for 1 hour. After a CT scan of the skull, a new stroke was diagnosed.

Diagnosis: Stroke
Diabetes and Systemic Arterial Hypertension

Physical examination: lucid, dyslalia, bed rest.
VAS: BP=140x90mmHg, HR:82 bpm, RR:18irpm, Tax:36.6ºC, VAS: 0, SPO2: 96%.

Tests: CT scan of the skull, blood count, coagulogram, TAP, PTT, INR

Case studies 4

History: Male, 22 years old, brought to the Emergency Department with nausea, emesis, abdominal pain, fatigue, drowsiness and abdominal pain. He had Diabetes Mellitus 1. VAS: 140x 80mmHg, HR: 110bpm, RR: 28irpm, tax: 36.8ºC VAS: 6 in the abdominal region, HGT: 428 mg/dl.

Diagnosis: Diabetic ketoacidosis

Physical examination: Drowsiness and disorientation, bed rest maintained. Monitored, CVC in VSCE with no phlogistic signs.

Tests: Blood count, arterial gasometry

DIDACTIC SEQUENCE
Hypoglycemic and thrombolytic drugs

Class 3/3

Prescription 3

S.F 0.9% 1500 ml in 24h IV	
Regular insulin 100UI (1ml) + 100ml SF 0.9% IV flow rate: 1.5ml/h	
Omeprazole sodium 40mg/ml + 10ml diluent 1xday IV	
Bromopride 5mg/ml 2ml amp. IV 8/8 ACM	
Dipyrone 500mg/ml 2ml 1amp. + 10ml AD 4/4 IV	
Glucose 50% 5 amp. if HGT <70mg/dl IV	
Glycemic curve	
2/2h SSVV	

Prescription 4

S.F 0.9% 1000 ml in 24h IV	
Alteplase 50mg 1 amp. IV 1st stage: bolus 5mg IV, followed by 2nd stage: in BIC 0.75mg/kg to run for 30 minutes, followed by 3rd stage: in BIC: 0.5mg/kg for another 60 minutes	
Omeprazole sodium 40mg/ml + 10ml diluent 1xday IV	
Bromopride 5mg/ml 2ml amp. IV 8/8 ACM	
Dipyrone 500mg/ml 2ml 1amp. + 10ml AD 4/4 IV	
Glucose 50% 5 amp. if HGT <70mg/dl IV	
Continuous cardiac monitoring	

DIDACTIC SEQUENCE

Hypoglycemic and thrombolytic drugs

Class 3/3

BRIEFING

30min - The teacher introduces him/herself and asks the students to divide into pairs along the benches. Then present students with case study 3 and case study 4 and give each pair a copy of the drug prescription. At this point, explain that 1 drip of insulin and 1 alteplase will be prepared and administered. Explain to the students that the preparation and administration will always be done in pairs.

DEBRIEFING

3:30 - Read out the prescription and explain to the students that you are going to start preparing the **INSULIN** and briefly explain its indication, then ask each pair to take 1 ampoule of insulin and 100ml of SF 0.9%. Ask the students to dress in a cap, mask and glove. Then ask them to start preparing the dripping.

The teacher should mediate this process, always emphasizing good practice in the preparation of medicines and pointing out mistakes. Specific care should be taken when administering insulin.

Tell the students that the preparation of **ALTEPLASE** is about to begin, ask them to find 1 ampoule of this medicine containing 50mg of the drug and 1 ampoule of the diluent containing 50ml, instruct the students to reconstitute the alteplase using the transofix.

After clarifying any doubts, the students should administer the 2 prepared drippings to the mannequin, where the teacher should mediate on good practice during the administration of this drug, also considering possible complications and the conduct to be taken at this time.

Examples of questions that can be asked of students during the administration of INSULIN:

- Ask the students: **"What are the complications of not administering SC insulin before stopping dripping?"**
- Expected answer: **"Sudden elevation of glucose."**

Examples of questions that can be asked of students during the administration of ALTEPLASE:

- Ask students: **"Why should alteplase be performed within 4.5h of the onset of stroke symptoms?"**
- Expected answer: **"This is the time needed to destroy the thrombi that have formed."**

DIDACTIC SEQUENCE

Hypoglycemic and thrombolytic drugs

Class 3/3

FEEDBACK

At the end of the administration, the teacher should highlight the students' mistakes and the needs for improvement that were perceived during the simulation. They should also point out to the students what they got right.

Pharmacological care

Insulin

- Infuse with a continuous infusion pump (BIC)
- Identify in 3 places (bottle, BIC and equipment near the catheter)
- Change solution every 6 hours to ensure stability.
- Perform continuous cardiac monitoring, peripheral oxygen saturation (SPO2) and blood pressure.
- Carry out a glucose curve.
- Change solution every 6 hours to ensure stability

Suspension of insulin dripping

- Administer via SC 30 minutes before switching off the IV insulin, the number of units the patient was receiving. E.g.: If the patient is receiving 0.5 units/h, administer 1 unit in the SC 30 minutes before switching off the insulin.
- Check capillary blood glucose every 2 hours for the first 8 hours; if stable, check every 4 hours. Goal: maintain capillary blood glucose < 150 mg/dL.

Alteplase

- Perform infusion in BIC
- Exclusive route administration
- Perform continuous monitoring
- Observe for signs of disorientation
- Watch for signs of bleeding

DIDACTIC SEQUENCE

Appendix 1

Setting the scene

Simulated patient scenario

- The scenery and the patient can be assembled following the images below:

DIDACTIC SEQUENCE

Appendix 1

Setting the scene

Simulated patient scenario

- The scenery and the patient can be assembled following the images below:

DIDACTIC SEQUENCE

Appendix 1

Setting the scene

Simulated patient scenario

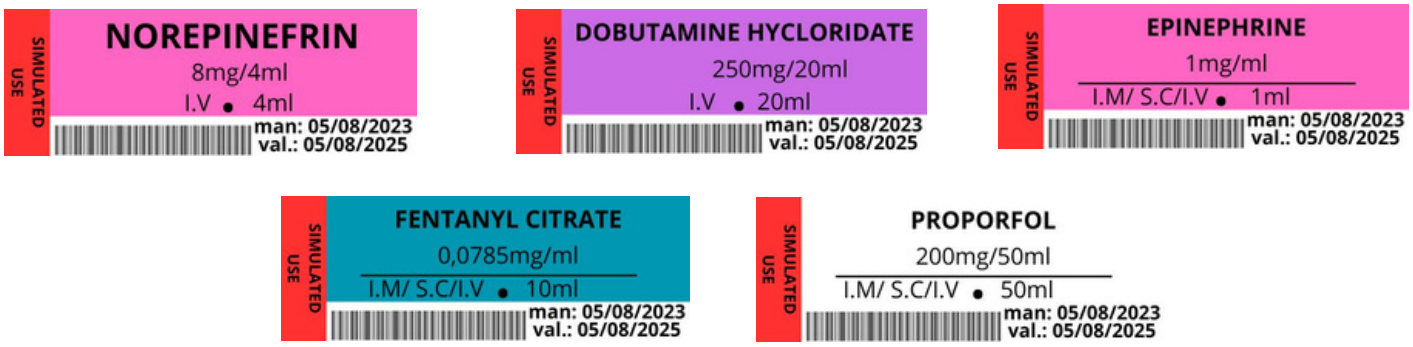
- The scenery and the patient can be assembled following the images below:

DIDACTIC SEQUENCE

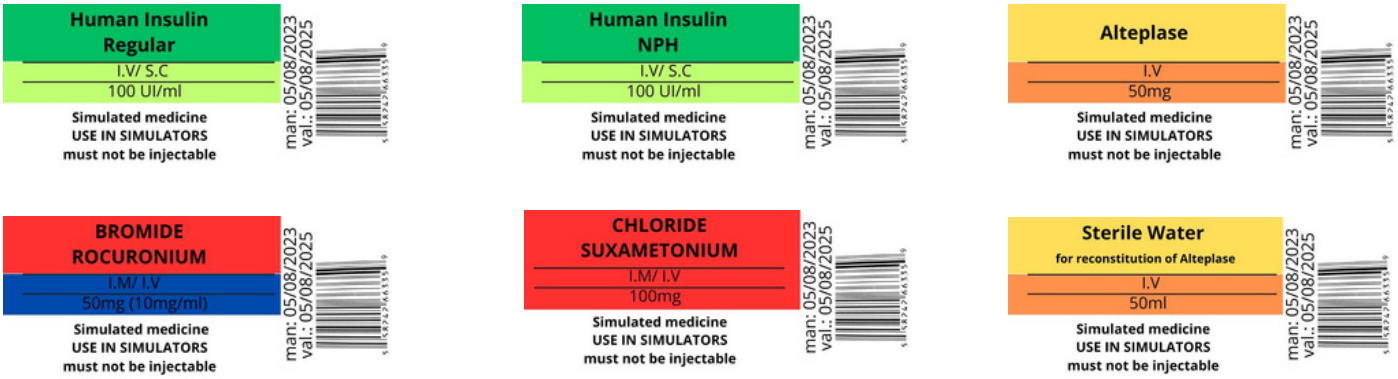
Appendix 2

Medication labels

The labels below should be printed on moisture-resistant vinyl adhesive paper in a size of 1.58 x 4.5 cm. After printing, they should be glued onto vials of distilled water to be used as simulated medicines. The images can also be downloaded from the google drive link in the icon below:



The labels below should be printed on moisture-resistant vinyl adhesive paper in a size of 6 x 2.5 cm. After printing, they should be stuck onto vials that simulate a lyophilized medicine for reconstitution. The images can also be downloaded from the google drive link in the icon below:



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