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| **Maryland Next Gen NCLEX Test Bank Project****September 1, 2022** |
| **Case Study Topic**: (& stand-alone bow-tie) | Pre-Eclampsia with magnesium toxicity | **Author:** | Christine Schlaerth, PhD, RN, CNM, WHNP-BCCarroll Community College |

**Case Summary**

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| A client diagnosed with preeclampsia is admitted at 35 weeks gestation to labor and delivery. Magnesium sulfate is administered for seizure prophylaxis, and magnesium toxicity develops. Learner should recognize s/s of magnesium toxicity and implement appropriate nursing interventions. |

**Objectives**

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| 1. Recognize s/s magnesium toxicity
2. Recognize trends and changes in client conditions/vital signs and intervene as needed
3. Provide care for clients experiencing complications of pregnancy/labor and or delivery
4. Evaluate and document actions taken to counteract side effects of medications and parenteral therapies
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| **Case Study Link** | **Case Study QR Code** |
| <https://umaryland.az1.qualtrics.com/jfe/form/SV_eyabT2E95Uker4O> |  |
| **Bow-tie QR Code** | **Bow-tie Link** |
|  | <https://umaryland.az1.qualtrics.com/jfe/form/SV_5svaq0CHkK9aRT0> |

**Case References**

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| 1. Agency for Healthcare Research and Quality (2017). Safe medication administration: Magnesium sulfate. Retrieved from: <https://www.ahrq.gov/hai/tools/perinatal-care/modules/strategies/medication/tool-safe-mgso4.html>
2. Bristol, T.J., Herrman, J.W, and Stephenson, W. (2019). Hypertensive Disorders of Pregnancy. In *NurseThink for Students: NCLEX-RN Conceptual Review Guide (pp. 46).* NurseTim, Inc.
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**Case Study Question 1 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

* Click to highlight the 4 findings that are most significant.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30ml | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

Key

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| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30ml | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |

**Scoring Rule: +/-**

**Rationale**: Magnesium toxicity is characterized by respiratory depression, decreased urinary output, and loss of deep tendon reflexes. Cutaneous flushing and sweating are expected side effects of magnesium administration and are not concerning. Blood pressure at 0900 is expected since the client has severe preeclampsia. Magnesium infusion can cause hypotension.

**Case Study Question 2 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30ml | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

* What additional assessment data should the nurse obtain? Select all that apply.
* Fetal status\*
* Breath sounds\*
* Pupils
* Level of consciousness\*
* Sensation
* Capillary refill

**Scoring Rule: +/-**

Rationale: Any time the client is experiencing a complication the fetus should be assessed. Patients with preeclampsia and magnesium toxicity can experience pulmonary edema and changes in LOC, which would provide the nurse with additional assessment data.

**Case Study Question 3 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30m; | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

* Drag the most appropriate word from the choices to fill in the blank of the following sentence.

The nurse should recognize that the client is most likely experiencing

|  |
| --- |
| Word Choices |
| Placental abruption |
| Magnesium toxicity\* |
| Eclampsia |
| Pulmonary embolism |

**Scoring Rule: 0/1**

Rationale: Trends are consistent with magnesium toxicity. Abruption would be accompanied by abdominal pain, uterine tenderness, potentially vaginal bleeding, and fetal distress. Seizures are required for eclampsia. Pulmonary embolism would be accompanied by chest pain.

**Case Study Question 4 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30ml | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

* For each potential intervention, click to specify whether the intervention is indicated or not indicated to include in the plan of care.

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| Action | Indicated | Not indicated |
| Stop magnesium infusion | * \*
 |  |
| Administer calcium gluconate | * \*
 |  |
| Place client in supine position |  | * \*
 |
| Activate rapid response | * \*
 |  |
| Provide oxygen | * \*
 |  |
| Monitor fetus | * \*
 |  |
| Administer anti-seizure medication |  | * \*
 |
| Draw serum magnesium level | * \*
 |  |
| Check for medication error | * \*
 |  |
| Elevate extremities |  | * \*
 |

**Scoring Rule: 0/1**

**Rationale:** When magnesium toxicity is suspected the infusion should be stopped, a rapid response activated, and calcium gluconate administered. The patient should receive oxygen because of respiratory depression. The fetus should be assessed any time there is a complication with the mother. Serum magnesium would confirm toxicity. Checking for medication error is necessary after medication-related complications. Supine position could make shortness of breath worse. Anti-seizure medication would be necessary for eclampsia, which this client does not have. Elevation of extremities is unrelated to magnesium toxicity.

**Case Study Question 5 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35 | 30 | 30 | 20 |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

* Which 3 actions should the nurse take first?
* Stop magnesium infusion \*
* Monitor fetus
* Check for medication error
* Provide oxygen
* Administer calcium gluconate \*
* Draw serum magnesium level
* Activate rapid response\*

**Scoring Rule: 0/1**

**Rationale**: Priority actions are to get help, stop the infusion, and administer the antidote calcium gluconate. The other interventions are warranted but not the immediate priority.

**Case Study Question 6 of 6**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 | 1215 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g | 0 |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 | 108/75 |
| Heart rate | 72 | 71 | 72 | 102 | 103 |
| Respirations | 18 | 18 | 17 | 11 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA | 93% on 10L |
| Urine Output | 35ml | 30ml | 30ml | 20ml | Not measured |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA.1205. Infusion stopped; rapid response activated. Calcium gluconate given. STAT serum magnesium drawn. Fetal HR to 105 bpm with moderate variability. Client placed in left lateral position. Lungs clear to auscultation bilaterally; client given oxygen via non-rebreather at 10L/min.1210. Fetal HR return to baseline, moderate variability, no decelerations.1220. BP 108/75, RR 11, pulse ox 93% on 10L, shortness of breath continues. Fetal HR 125 bpm with moderate variability. |
| **Orders** |  |
| 1. Stop magnesium infusion
2. Calcium gluconate 10% 1g IV over 10 mins
3. Serum magnesium level STAT
4. Administer oxygen via non-rebreather to keep oxygen saturation >95%.
 |

The nurse reassesses the client 15 minutes after implementing the treatment plan.

* Complete the following sentence by choosing from the list of options.

|  |  |
| --- | --- |
| The nurse determines the client’s status is  | Select |
| Improving |
| deteriorating  |
| unchanged\* |
| The nurse should now  | Select |
| request an additional dose of calcium gluconate\* |
| resume magnesium sulfate infusion |
| transfer patient to intensive care unit |

**Scoring Rule: 0/1**

**Rationale:** Calcium gluconate is the antidote for magnesium toxicity and can be administered more than once if there is no improvement in client condition. Client has not improved, and magnesium sulfate infusion would be contraindicated. ICU is not warranted at this time.

**Bowtie**

The nurse is caring for a client admitted to the labor and delivery unit at 35 weeks gestation with preeclampsia.

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| **Admission Note** |
| 0845. Client is a 29-year-old primigravida at 35 weeks gestation admitted with severe preeclampsia. Plan is magnesium sulfate x 24 hours, followed by induction of labor. |
| **Flowsheet** |
| Time | 0900 | 1000 | 1100 | 1200 |
| Magnesium sulfate dose | 4g | 2g | 2g | 2g |
| Reflexes present | Yes +2 | Yes +2 | Yes +2 | No |
| Blood pressure | 159/89  | 139/84 | 131/85 | 109/72 |
| Heart rate | 72 | 71 | 72 | 102 |
| Respirations | 18 | 18 | 17 | 11 |
| Pulse oximetry | 99% on RA | 99% on RA | 98% on RA | 92% on RA |
| Urine Output | 35ml | 30ml | 30ml | 20ml |
| Other drugs or observations | None | Nausea | Nausea, cutaneous flushing, sweating  | Shortness of breath |
| 0900. 4g loading dose magnesium sulfate IV started, to be run over 20 minutes. Second nurse verified pump settings. Client educated on medication side effects. Client complains of headache rated 7/10, no nausea/vomiting, no epigastric pain, no visual disturbances. Current BP 159/89. Fetal monitor shows baseline heart rate 130 bpm, moderate variability, accelerations present, decelerations absent. 0920. Magnesium sulfate loading dose complete. Magnesium rate rate changed to 2g/hr continuous infusions. Second nurse verified pump settings.1100. Client noted to have cutaneous flushing and sweating. Fan brought to bedside.1200. Absent patellar reflex, RR 11, with complaints of shortness of breath. Pulse oximeter 92% on RA. |

* Complete the diagram by dragging from the choices below to specify what condition the client is most likely experiencing, 2 actions the nurse should take to address that condition, and 2 parameters the nurse should monitor to assess the client’s progress.

|  |  |  |
| --- | --- | --- |
| Action to take |  | Parameter to monitor |
|  | Condition most likely experiencing |  |
| Action to take |  | Parameter to monitor |
|  |  |  |
| **Actions to take** | **Potential conditions** | **Parameters to monitor** |
| Stop the infusion\* | Placental abruption | Capillary refill |
|  Administer aAntiseizure medication | Magnesium toxicity\* | Respiratory status\* |
| Supine position | Eclampsia | Deep tendon reflexes\* |
| Administer calcium gluconate\* | Pulmonary embolism | Blood glucose |
| Reduce stimuli |  | Pulses |

**Scoring Rule: 0/1**

**Rationale:** The client is experiencing magnesium toxicity. The most important actions are to stop the infusion and give calcium gluconate, the antidote for magnesium sulfate. Respiratory status and deep tendon reflexes are critical to monitor when concerned about magnesium toxicity.