SAMPLE ASSIGNMENT FOR A PEDIATRIC CASE STUDY

All students read Nicole. Answer the questions. One group of students will research support groups for parents of children with cancer. One group will suggest specific recommendations to assist Nicole in developing coping mechanisms that are age appropriate for her. The third group will identify what the possible signs and symptoms might have presented related to the CVAD line infection. Each group will present and lead a discussion on their topics in post conference.

Additional cases provide the opportunity to introduce cultural diversity, economic hardship and other variables into the situations. Students are able to experience enriched clinical experiences, even in those situations where time is very limited. The cases are interesting, easy to read and remember. The student has the questions and answers available to provide a knowledge foundation prior to going to the clinical area. Instructors can expand the cases and students can relate them to what they are seeing. The cases become the basis for teaching critical thinking.
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Reviewers

Jane H. Barnsteiner RN, PhD, FAAN
Professor of Pediatric Nursing
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Philadelphia, Pennsylvania

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Preface

Thomson Delmar Learning’s Case Studies Series was created to encourage nurses to bridge the gap between content knowledge and clinical application. The products within the series represent the most innovative and comprehensive approach to nursing case studies ever developed. Each title has been authored by experienced nurse educators and clinicians who understand the complexity of nursing practice as well as the challenges of teaching and learning. All of the cases are based on real-life clinical scenarios and demand thought and “action” from the nurse. Each case brings the user into the clinical setting, and invites him or her to utilize the nursing process while considering all of the variables that influence the client’s condition and the care to be provided. Each case also represents a unique set of variables, to offer a breadth of learning experiences and to capture the reality of nursing practice. To gauge the progression of a user’s knowledge and critical thinking ability, the cases have been categorized by difficulty level. Every section begins with basic cases and proceeds to more advanced scenarios, thereby presenting opportunities for learning and practice for both students and professionals.

All of the cases have undergone expert review to ensure that as many variables as possible are represented in a truly realistic manner and that each case reflects consistency with realities of modern nursing practice.

How to Use This Book

Every case begins with a table of variables that are encountered in practice, and that must be understood by the nurse in order to provide appropriate care to the client. Categories of variables include age; gender; setting; ethnicity; pre-existing conditions; coexisting conditions; cultural, communication considerations, disability, socioeconomic, spiritual, pharmacological, psychosocial, legal, ethical, prioritization, and delegation considerations; and alternative therapy. If a case involves a variable that is considered to have a significant impact on care, the specific variable is included in the table. This allows the user an “at a glance” view of the issues that will need to be considered to provide care to the client in the scenario. The table of variables is followed by a presentation of the case, including the history of the client, current condition, clinical setting, and professionals involved. A series of questions follows each case that ask the user to consider how she would handle the issues presented within the scenario. Suggested answers and rationales are provided for remediation and discussion.

Organization

The cases are grouped into parts based on topics. Within each part, cases are organized by difficulty level from easy, to moderate, to difficult. This classification is somewhat subjective, but they are based upon a developed standard. In general, difficulty level has been determined by the number of variables that impact the case and the complexity of the client’s condition. Colored tabs are used to allow the user to distinguish the difficulty levels more easily. A comprehensive table of variables is also provided for reference, to allow the user to quickly select cases containing a particular variable of care.
Praise for Delmar, Cengage Learning’s Case Study Series

I would recommend this book to my undergraduate students. This would be a required book for graduate students in nursing education, women’s health, or maternal-child programs.

—PATRICIA POSEY-GOODWIN, M.S.N, R.N., Ed.D (c)
Assistant Professor,
University of West Florida

This text does an excellent job of reflecting the complexity of nursing practice.

—VICKI NEES, RNC, MSN, APRN-BC
Associate Professor,
Ivy Tech State College

...the case studies are very comprehensive and allow the undergraduate student an opportunity to apply knowledge gained in the classroom to a potentially real clinical situation.

—TAMELLA LIVENGOOD, APRN, BC, MSN, FNP
Nursing Faculty,
Northwestern Michigan College

I commend the effort to include the impact of illness on the growth and development of the child, on the family’s cohesiveness and on the subsequent health problems that will affect the child in years to come. Inclusion of questions that focus on the nurse’s perceptions, biases and beliefs are extremely important when training nurses to provide comprehensive care ... Often one system illness will affect another health system and this has been demonstrated numerous times [in this text].

—DIANA JACOBSON, MS, RN, CPNP
Faculty Associate,
Arizona State University College of Nursing

These cases and how you have approached them definitely stimulate the students to use critical-thinking skills. I thought the questions asked really pushed the students to think deeply and thoroughly.

—JOANNE SOLCHANY, PhD, ARNP, RN, CS
Assistant Professor,
Family & Child Nursing,
University of Washington, Seattle.

The use of case studies is pedagogically sound and very appealing to students and instructors. I think that some instructors avoid them because of the challenge of case development. You have provided the material for them.

—NANCY L. OLDENBURG, RN, MS, CPNP
Clinical Instructor, Northern Illinois University
[The author] has done an excellent job of assisting students to engage in critical thinking. I am very impressed with the cases, questions and content. I rarely ask that students buy more than one pediatrics book ... but, in this instance, I can’t wait until this book is published.

—DEBORAH J. PERSELL, MSN, RN, CPNP
Assistant Professor,
Arkansas State University

This is a groundbreaking book that ... will be appropriate for undergraduate pediatric courses as well as a variety of graduate programs ... One of the most impressive features is the variety of cases that cover situations from primary care through critical care and rehabilitation. The cases are presented to develop and assess critical-thinking skills ... All cases are framed within a comprehensive presentation of physical findings, stimulating critical thinking about pathophysiology, developmental considerations, and family systems. This book should be a required text for all undergraduate and graduate nursing programs and should be well-received by faculty.

—JANE H. BARNSTEINER, PHD, RN, FAAN
Professor of Pediatric Nursing,
University of Pennsylvania School of Nursing

Note from the Author

These case studies were designed to assist nursing students of all levels develop and strengthen their critical thinking skills to provide the best care for this very special client population. I have thoroughly enjoyed writing this work of heart.

About the Author

Dr. Broyles began her nursing career in 1968, working as a student nursing assistant while pursuing her Bachelor of Science degree in nursing from The Ohio State University in Columbus, Ohio. She graduated with her BSN in 1970 and continued for the next 13 years staffing and teaching on obstetrics and gynecology. From 1972 to 1976, she taught in the Associate Degree Nursing Education program at Columbus Technical Institute (which is now Columbus State). During her 5-year position as Patient Teaching and Discharge Planning Coordinator for Obstetrics and Gynecology at Mt. Carmel Medical Center in Columbus (1976–1981), she published her first professional writing. At this juncture, she decided to expand both her mind and nursing skills into the medical-surgical arena of nursing where she has staffed and taught nursing since that time to present. With her husband, Roger, she moved to North Carolina in 1985. She has been an educator in the nursing education department of Piedmont Community College in Roxboro, North Carolina since 1986 and is currently the course coordinator for Maternal-Child Nursing (teaching the pediatric component of the course), Adult Nursing II, and Pharmacology. Dr. Broyles received her Master of Arts in Educational Media from North Carolina Central University in 1988, and her Doctorate of Education in Adult Education from LaSalle University in 1996. Her dissertation research concerned critical thinking in Associate Degree Nursing Students and was the largest study published on this topic. In 2004, Dr. Broyles received her PhD from St. Regis University with further study in adult education. Dr. Broyles has published nursing texts in the areas of pediatrics, medical-surgical nursing, and pharmacology.
The author wishes to express her appreciation to all who contributed to the development of these cases. Without the love, support, encouragement, and diligence of my husband Roger this project as with those past would not be the success I believe this will be. I also thank the many friends and colleagues who helped me through their love, support, encouragement, and expertise. Thank you, Mama Lou, Papa Joe, Pat, Alisa, Kelly, and Colman.

The author also wishes to acknowledge the Associate Degree Nursing Education students who serve as continuing inspiration to produce student-friendly textbooks that help them learn this most important content for their safe nursing practice.

For the opportunity to be involved in this project, the author wishes to thank the people at Thomson Delmar Learning for their support, encouragement, and editorial guidance during the writing of the Pediatric Case Studies. Special thanks go to Matt Kane, who continues to believe in me as a nursing author, and to Michelle Leavitt, whose enthusiasm and flexibility helped make this project so enjoyable.

Finally, the author wishes to thank the reviewers of this work for their time and expertise evident in their constructive comments and suggestions. Having been a book reviewer for 5 years, the author appreciates the time and effort of the reviewers as they share their knowledge and expertise to help make this edition a worthy educational tool.

Bonita E. Broyles
Comprehensive Table of Variables
### Comprehensice Table of Variables

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**Part One: The Digestive and Urinary Systems**

1. F 4 Home/clinic White American
2. M neonate Hospital White American
3. F 4 months Clinic White American
4. M 4 Hospital Black American
5. M 18 months Hospital Black American
6. M 2 days Hospital White American
7. M 6 Hospital Black American
8. F neonate Hospital Spanish American
9. F 14 Home/clinic/hospital White American
10. F 14 Hospital White American

**Part Two: The Respiratory System**

1. F 2 months Hospital White American
2. M 6 Hospital Black American
3. F 9 months Hospital White American
4. F 8 Hospital White American
5. F 4 Hospital White American
6. M 4 Hospital Black American
7. F 10 months Clinic White American

**Part Three: The Cardiovascular System and the Blood**

1. F 14 Hospital Black American
2. M 8 Clinic/hospital White American
3. M 11 months Hospital White American
4. M 1 month Hospital White American
5. F 9 Hospital Black American
### Part Four: The Skeletal, Muscular, and Integumentary Systems

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### Part Six: The Lymphatic System

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Case Study 5
Nicole

Gender: F
Age: 13
Setting: Hospital
Ethnicity: Middle Eastern

Cultural Considerations

Preexisting Conditions
- Leukemia
- Alopecia
- CVAD

Coexisting Conditions

Significant History

Communication

Disability

The Lymphatic System

Level of difficulty: Difficult
Overview: This case requires knowledge of chemotherapy, growth and development, as well as an understanding of the client’s background, personal situation, and parent–child relationship.
Case Studies

THE LYMPHATIC SYSTEM

Client Profile

Nicole is a 13-year-old with leukemia. She lives at home with her parents and younger siblings and for the past 3 months has been receiving chemotherapy. She has a central venous access device (CVAD) that is cared for by her parents and herself. Nicole has experienced a number of absences from school as a result of her hospitalizations, chemotherapy, and the effects of her chemotherapy regimen, although she has had a tutor at home to keep her current with her studies. Nicole has alopecia and has been hospitalized with a line infection, stomatitis and esophagitis, and bleeding requiring platelet replacement. She refuses to see her friends although she speaks with them frequently on the phone. She tells them her refusal is based on the fact that she is prone to infection and doesn’t want to risk exposure and have to be hospitalized again.

Case Study

Nicole is admitted to the pediatric unit of the local hospital with a temperature of 38.8° C (101.8° F) that did not respond to the acetaminophen that she has been taking every 4 hours since yesterday. Her admission assessment indicated that Nicole’s lung sounds are clear, heart sounds are strong and regular, she is in no apparent distress, has alopecia, and has evidence of white patches in her mouth. Her laboratory values include:

- Hematology:
  - Hemoglobin: 10.1 g/dL
  - Hematocrit: 25%
  - Platelets: 50,000/mm³
  - White blood cell count: 2,000/mm³
  - Differential: Neutrophils 20%

Questions

1. Discuss the significance of Nicole’s laboratory findings.
2. What other assessment data would be helpful for the nurse to have to prepare Nicole’s care plan?
3. What are the priorities of care for Nicole on admission?
4. Discuss the common complications (adverse effects) of chemotherapy.
5. What nursing actions address the adverse effects associated with chemotherapy?
6. Nicole is receiving cyclophosphamide intravenously. Discuss this agent including any nursing interventions necessary specifically related to its use.
7. Nicole is diagnosed with a CVAD line infection. Discuss how these infections occur and why.
8. Nicole’s mother is staying with Nicole during her hospitalization and expresses concern about Nicole refusing to see her friends and that Nicole seems “down” since her last chemotherapy. Discuss your impressions about Nicole’s mother’s statements, considering Nicole’s level of growth and development.
9. Nicole tells the nurse that her mouth and throat are so sore she cannot drink or eat anything. Discuss your impressions about Nicole’s complaints and the appropriate nursing actions to help Nicole.
10. Nicole is prescribed intravenous antibiotic therapy to treat her line infection. The health care provider prescribes gentamicin sulfate 100 mg IV q8h, vancomycin hydrochloride 500 mg IV every
6 hours, and cefoxitin sodium 1 g IV every 6 hours. Nicole weighs 40 kg (88 lb). Discuss these agents and if the doses prescribed are safe for Nicole.

**11.** The pharmacy schedules Nicole’s antibiotic therapy as follows:

- **Gentamicin:** 2400h 0600h 1200h 1800h
- **Vancomycin:** 0200h 0800h 1400h 2200h
- **Cefoxitin:** 2400h 0600h 1200h 1800h

Discuss this schedule and what alterations the nurse should make, if any.

**12.** Calculate the rates of administration via a volumetric intravenous infusion pump for the following:

- **Gentamicin sulfate:** 100 mg in 100 mL of 5% dextrose in water to infuse over 30 minutes
- **Vancomycin hydrochloride:** 500 mg in 250 mL of 0.9% normal saline
- **Cefoxitin sodium:** 1 g in 50 mL of 5% dextrose in water to infuse over 15 minutes
Answers

Case Study 5  Nicole

1. Discuss the significance of Nicole’s laboratory findings. Nicole’s lab values indicate adverse effects of chemotherapy. The most common adverse effect of chemotherapy is myelosuppression. Antineoplastics target fast-growing cells including cells with normal function, erythrocytes, leukocytes, and platelets. This
results in anemia, neutropenia, and thrombocytopenia which leads to decrease tissue perfusion, high risk of infections, and high risk for bleeding. Nicole’s laboratory findings exemplify all three of the problems. The normal hemoglobin for an adolescent girl is 12–16 g/dL and the normal hematocrit for her age group is 38% to 47%. Nicole’s values indicate anemia that occurs when the hematocrit falls below 28%. The normal white blood cell count for Nicole is 4,100–10,800/mm³ and neutrophils should account for 58% to 67%. Nicole’s indicate neutropenia, which is defined as neutrophil count <500 cells/mm³. The normal platelet count for 13- to 18-year-old girls is 150,000–450,000/mm³; Nicole is at risk for bleeding with her platelet count of 50,000, as thrombocytopenia occurs when the platelet count falls below 50,000 cells/mm³ and creates a high risk for bleeding.

2. What other assessment data would be helpful for the nurse to have to prepare Nicole’s care plan?
   a. Urine specific gravity
   b. Urine for blood
   c. Hemoccult of stools
   d. Assessment of central venous access device (CVAD) for redness, swelling, purulent discharge, pain
   e. Urine culture and sensitivity
   f. Chest x-ray
   g. Oxygen saturation via pulse oximetry
   h. Peripheral blood cultures and cultures from CVAD

3. What are the priorities of care for Nicole on admission?
   a. Ineffective protection related to neutrophil count
   b. High risk for injury and bleeding related to platelet count
   c. Risk for ineffective tissue perfusion related to hemoglobin and hematocrit values
   d. Impaired oral mucous membranes related to presence of mouth lesions
   e. Acute pain related to presence of mucositis
   f. Risk for nausea related to the effects of chemotherapy on gastrointestinal (GI) mucosa
   g. Disturbed body image related to alopecia
   h. Deficient knowledge related to Nicole’s current condition, treatment, and home care

4. Discuss the common complications (adverse effects) of chemotherapy. Myelosuppression is the most common complication of chemotherapy and results from the nondifferentiating effects of the agents on fast-multiplying cells, both normal and abnormal. As noted in question 1, this results in a risk for neutropenia, thrombocytopenia, and neutropenia. Because antineoplastic are most toxic to rapidly growing cells, hair follicle cells are rapidly destroyed, creating a condition called alopecia. Nausea and vomiting are common because of the toxic action on the epithelium of the gastrointestinal tract and mucositis occurs as a result of the destruction of normal flora in the upper GI tract. In addition, mucositis is a result of the effect of chemotherapy on rapidly dividing cells. These agents are detoxified in the liver and can potentially lead to impaired hepatic function. Also, they are primarily eliminated through the renal/urinary system so may be contraindicated in the presence of renal insufficiency. Because the urinary bladder is the one area in the body in which antineoplastics are not in perpetual movement, they can destroy the urinary bladder lining through
constant and concentrated contact. Other complications occur including those that are agent specific, for instance, methotrexate can cause uric acid neuropathy and Adriamycin is associated with cardiotoxicity. Alkylating agents, especially ifosfamide and cyclophosphamide, carry a high risk for hemorrhagic cystitis. Extravasation with the local destruction of tissue can result in amputation or the need for plastic surgery to correct. NOTE: Because peripheral administration of vesicant agents is not appropriate for children, this risk is primarily for adults receiving peripheral chemotherapy; however, it can occur at the site of non-tunnelled CVADs because of the short length of the catheter. Edema and fluid retention are common in the use of corticosteroids as a part of many chemotherapy regimens.

5. What nursing actions address the adverse effects associated with chemotherapy?
   a. Myelosuppression
      (1) Place on Compromised Host precautions.
      (2) Monitor temperature every 4 hours during hospitalization.
      (3) Maintain patency of CVAD, monitoring hourly.
      (4) Use sterile technique for CVAD dressing and line changes using approved protocols.
      (5) Monitor laboratory values and report abnormal findings immediately.
      (6) If reddened area on skin appears, notify the health care provider immediately.
      (7) Administer antimicrobials and blood products as prescribed.
      (8) Assess oral mucous membranes, nares for bleeding.
      (9) Monitor platelet count and place on bleeding precautions if platelet counts falls below 50,000
      (10) Hemoccult stools
      (11) Collaborate with health care provider for prescription for stool softeners to prevent straining.
      (12) Monitor urine for blood.
      (13) If hematocrit falls below 25%, institute falls precautions.
      (14) Monitor red blood cell count.
      (15) Assess for signs and symptoms of anemia.
      (16) Monitor for bleeding.
      (17) Draw labs from CVAD as prescribed.
   b. Nausea
      (1) Premedicate child with antiemetics prior to administering chemotherapy as prescribed.
      (2) Administer prescribed proton pump inhibitors every 4 hours for 24 hours following chemotherapy.
      (3) Administer lorazepam as prescribed for breakthrough nausea.
      (4) Eliminate offensive odors in environment.
   c. Alopecia (see Fig. A-20)
      (1) Assess child and parent’s knowledge of alopecia.
      (2) Stress to child that alopecia is temporary and following chemotherapy, hair will grow back.
      (3) Encourage child and family to express feelings and concerns.
      (4) Actively listen, providing empathetic therapeutic responses to questions.
      (5) Provide information concerning local wig retailers if appropriate, depending on child’s desire.
(6) Discuss use of scarves or turbans as alternatives to wearing a wig.

d. Acute pain associated with mucositis (stomatitis, esophagitis)
   (1) Assess oral mucous membranes.
   (2) Administer nystatin swish and swallow or swish and spit as prescribed.
   (3) Assess pain level baseline using appropriate pain assessment tool.
   (4) Administer morphine sulfate (drug of choice) PCA (patient-controlled analgesia) using both continuous intravenous infusion and PCA dosing as prescribed until acute pain controlled, which usually takes 48–72 hours.
   (5) Assess pain level hourly to evaluate effectiveness of prescribed analgesic.
   (6) Encourage intake of cool liquids during the acute phase, if possible.
   (7) If the child has esophagitis, enteral feedings may be required.

e. Vesicant extravasation risk with peripheral intravenous administration of chemotherapy
   (1) Assess intravenous site for patency and placement prior to administering chemotherapy.
   (2) Monitor intravenous site every 15–30 minutes during chemotherapy infusion.
   (3) Caution the client to inform the nurse immediately if intravenous site causes any discomfort or swelling.
   (4) If vesicant extravasation occurs, stop infusion immediately, remove access, flush site with sterile fluid (as determined by facility protocol), notify the health care provider.

6. Nicole is receiving cyclophosphamide intravenously. Discuss this agent including any nursing interventions necessary specifically related to its use? Cyclophosphamide is an alkylating neoplastic agent that acts by inhibiting DNA synthesis that works in all phases of the cell cycle; however, it is most effective in the S cycle and changes the internal acid–base balance in the cell. It is used as a component of numerous chemotherapy regimens to treat acute and chronic leukemia in children. Alkylating agents cause myelosuppression, with their greatest impact on the production of white blood cells (leukocytes), especially neutrophils, resulting in neutropenia. Because these agents are most toxic to rapidly growing cells, hair follicle cells are rapidly destroyed, creating a condition called alopecia. Nausea and vomiting are common because of the toxic action on the epithelium of the GI tract, and mucositis occurs as a result of the...
destruction of normal flora in the upper GI tract. These agents are detoxified in the liver and can potentially lead to impaired hepatic function. Because of the toxic effects on epithelial tissue that line the mucous membranes, two alkylating agents, ifosfamide and cyclophosphamide, can result in hemorrhagic cystitis, a potentially life-threatening bleeding complication, especially in the presence of thrombocytopenia. Because of its potential for extravasation, cyclophosphamide should be administered via a central venous access (CVAD). As a result of the risk of hemorrhagic cystitis, the rescue agent mesna should be prescribed and the first dose administered immediately following the completion of each cyclophosphamide administration. Mesna rescues the urinary bladder from the effects of cyclophosphamide. Mesna dosing is continued for 24 hours following the first dose. The urine should be tested each void for blood as well as specific gravity. In addition, the hyperhydration prior to and following administration of the agent is critical. Antiemetics, ondansetron (or other serotonin blocking setrons) should be prescribed prior to cyclophosphamide administration in addition to dexamethasone. Ondansetron dosing should continue every 4 hours for 24 hours following cyclophosphamide administration. Lorazepam is the drug of choice for breakthrough nausea and vomiting. Laboratory values must be monitored closely (at least every 24 hours) to detect myelosuppression and the child should be placed on compromised host precautions. Alopecia can have a potentially harmful effect on the child’s body image, especially for adolescent girls. Teenage boys have fared better with alopecia because of the impact of professional sports where the participants often shave their heads and it is a part of their image (Broyles, 2005).

7. Nicole is diagnosed with a CVAD line infection. Discuss how these infections occur and why. Although tunneled CVAD catheters have an antibacterial filter to protect the line from microorganisms traveling down the catheter from the insertion site, line infections are a risk with any CVAD. The primary source of line infection is pathogenic organism growth at the proximal tip of the catheter and is fostered by fibrin formation that can occur at this site. Fibrin provides an excellent media for bacterial growth. These can be prevented by proper flushing of CVAD and maintaining positive pressure at the proximal tip of the catheter. Infection is the greatest risk with CVADs and in the presence of myelosuppression, the risk increases.

8. Nicole’s mother is staying with Nicole during her hospitalization and expresses concern about Nicole refusing to see her friends and that Nicole seems “down” since her last chemotherapy. Discuss your impressions about Nicole’s mother’s statements, considering Nicole’s level of growth and development. Although Nicole’s reason for not wanting to see her friends (risk of exposure to infection) is plausible, her level of growth and development would support that Nicole is having difficulty adjusting to her alopecia. For adolescents, peers are the primary source of a sense of belonging and it is vital to them to be like their peers to foster this belonging. Girls at this age are particularly sensitive about their appearance, and hair styles are a major focus. Baldness is not an acceptable trait for them. Although teenagers can make cruel and hurtful comments about other teenagers, they also can express sensitivity. The greatest fear of teenagers is being ostracized by others their age. School represents a time of continuous contact with peers and Nicole probably feels that by staying at home, she can protect herself from being shunned by her friends. Talking with Nicole about
her concerns should be suggested to her mother so that she can realize that true friends accept people as they are. If Nicole remains convinced that her friends would not accept her with her alopecia, encouraging her to purchase a wig or wearing a hat may result in improved self-esteem. The scenario does not address how Nicole’s family reacts to her appearance. If they are not accepting, the nurse should focus on their perceptions first.

9. Nicole tells the nurse that her mouth and throat are so sore she cannot drink or eat anything. Discuss your impressions about Nicole’s complaints and the appropriate nursing actions to help Nicole. The lesions in Nicole’s mouth probably represent mucositis, a very painful condition resulting from the destruction of oral normal flora by chemotherapy. Collaborating with the health care provider for prescriptions including nystatin swish and spit (for stomatitis) or swish and swallow (for esophagitis) and intravenous morphine sulfate, both continuous infusion and PCA dosing, have proven effective in treating mucositis. Her hydration can be maintained with intravenous fluids until her pain is controlled, at which time cool liquids should be offered. These should include supplements of high-protein and high-carbohydrate drinks, citrus fruits should be avoided because their acid content is irritating to the sensitive and injured mucous membranes of the mouth and esophagus.

10. Nicole is prescribed intravenous antibiotic therapy to treat her line infection. The health care provider prescribes gentamicin sulfate 100 mg IV q8h, vancomycin hydrochloride 500 mg IV every 6 hours, and cefoxitin sodium 1 g IV every 6 hours. Nicole weighs 44 kg (96.8 lb). Discuss these agents and if the doses prescribed are safe for Nicole. Gentamicin sulfate is an aminoglycoside that acts as an antimicrobial by inhibiting protein synthesis in the bacterial cell wall. This causes the cell to die. The adverse effect specific to this classification is ototoxicity. Vancomycin hydrochloride is classified as a miscellaneous antimicrobial or tricyclic glycopeptide that is a highly potent antimicrobial used to treat many gram-positive infections that are not responsive to other less toxic agents. The most serious complication specific to this agent is renal failure. Cefoxitin sodium is a second-generation cephalosporin that acts on gram-positive and some gram-negative bacteria by interfering with cell wall synthesis. The most serious adverse effect of cephalosporins is allergic or sensitivity reaction that can lead to anaphylaxis. All of Nicole’s dosages are safe. The safe dosage range for gentamicin is 6.0–7.5 mg/kg every 24 hours (Gahart and Woods, 2005, 592–593) so Nicole’s safe dose every 8 hours would be 80–100 mg IV. The safe dosage range of vancomycin for children is 60 mg/kg every 24 hours (Gahart and Woods, 2005, 1145). Nicole’s safe dose should not exceed 600 mg every 6 hours. The safe dosage range of cefoxitin is 13.3–26.6 mg/kg per dose (Gahart and Woods, 2005, 254). Nicole’s safe dose is 532–1,064 mg.

11. The pharmacy schedules Nicole’s antibiotic therapy as follows:

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Time</th>
<th>Time</th>
<th>Time</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>2400h</td>
<td>0600h</td>
<td>1200h</td>
<td>1800h</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>0200h</td>
<td>0800h</td>
<td>1400h</td>
<td>2200h</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>2400h</td>
<td>0600h</td>
<td>1200h</td>
<td>1800h</td>
</tr>
</tbody>
</table>

Discuss this schedule and what alterations the nurse should make, if any. This schedule is possible; however, changing the cefoxitin schedule to 0100–0700–1300–1900 would eliminate the overlap of drug administration. Nurses
must realize that the time of administration for medications is part of the seven rights of medication administration—Right Time. Some nurses do not want to use this schedule because of the 0700 dose being at the time of morning change of shifts, and on units where nurses work 12-hour shifts, it affects both shift times; however, nurses should first consider what is best for the client. In most health facilities, a 30-minute window for administration is policy (drugs can be administered 30 minutes prior to or after the scheduled time) so if the aforementioned schedule cannot be changed, the nurse should administer the cefoxitin sodium before the gentamicin because it infuses in 15 minutes versus the 30-minute administration time for gentamicin; thus both could be administered within the 30-minute window.

12. Calculate the rates of administration via a volumetric intravenous infusion pump for the following:

   - Gentamicin sulfate 100 mg in 100 mL of 5% dextrose in water to infuse over 30 minutes
   - Vancomycin hydrochloride 500 mg in 250 mL of 0.9% normal saline
   - Cefoxitin sodium 1 g in 50 mL of 5% dextrose in water to infuse over 15 minutes

Using the formula of

\[
\frac{\text{Time}}{\text{Volume}} = \frac{\text{Time}}{\text{Volume}}
\]

The hourly rate for gentamicin is 200 mg/hour

\[
\frac{30 \text{ minutes}}{100 \text{ mL}} = \frac{60 \text{ minutes}}{X}
\]

The hourly rate for vancomycin is not stated in the prescription because the nurse should note that to prevent renal adverse effects, it must be administered over a minimum of 60 minutes (250 mL/hour). Common practice in pediatrics is infusing it over 2 hours so the rate should be 125 mL/hour. The hourly rate for cefoxitin is 200 mL/hour.

References


Centers for Disease Control and Prevention. [http://www.cdc.gov](http://www.cdc.gov)


Intravenous Therapy. [http://www.nursewise.com](http://www.nursewise.com)


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