

Evidence-Based Practice Paper: Leukemia

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Abstract

The purpose of this paper is to discuss the blood cancer Leukemia, and will entail a detailed description of the condition, etiology, risk factors, medical care, nursing care, healthy people 2020 clinical recommendations and any other practice guidelines or recommendations. Due to the variety of forms of Leukemia, this paper will only focus on the four main types of leukemia: acute myeloid, acute lymphoblastic, chronic myeloid and chronic lymphocytic. Most of the research was accessed electronically through Auburn University Libraries and the nursing database, Cumulative Index to Nursing and Allied Health Literature (CINAHL). This research evaluates signs, symptoms, etiology and treatments of managing specific types of leukemia. Clinical recommendations are proposed based on findings from the Institute of Medicine and goals from Healthy People 2020.

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Leukemia is a cancer of the blood that affects around 44,000 people a year (Leukemia and Lymphoma society, 2011). Although many people live normal, happy lives after being diagnosed, there is a 54% mortality rate after 5 years for leukemia (Leukemia and Lymphoma society, 2011). It is more commonly seen among Caucasians, and more men are diagnosed than women (Leukemia and Lymphoma Society, 2011). Due to the vast number of people affected by this condition, research for early diagnosis and effective treatment is ongoing and must continue to be explored. This paper will provide a broad overview of the condition itself and the most appropriate ways to manage care.

Description of Condition

Leukemia is a blood disorder mainly affecting the bone marrow and the production of leukocytes which are produced by stem cells in the long bones. In most cases there is an overgrowth of the immature leukocytes, lymphoblasts, that leads to an undergrowth of the normal leukocytes, erythrocytes and platelets due to overcrowding; this can lead to a variety of signs and symptoms that varies with each kind of leukemia. Most leukemia cases are discovered during normal blood work or a check-up with a physician (Leukemia and Lymphoma society, 2011). There are four main kinds of leukemia: acute myeloid leukemia, acute lymphoblastic leukemia, chronic myeloid leukemia and chronic lymphocytic leukemia (Leukemia and Lymphoma Society, 2011). The different leukemias can be acute, with a quick onset and short duration or chronic, with a slow onset and symptoms lasting for years (Byar, 2010). They are further classified by cell type. Leukemic cells can descend either from the lymphoid pathway,

leading to a lymphocytic/lymphoblastic leukemia, or the myeloid pathways, leading to a myelocytic leukemia (Byar, 2010).

Acute Myeloid Leukemia (AML) is the most common form of infant and adult onset leukemia (Leukemia and Lymphoma society, 2011). Furthermore, it is responsible for 1/5 of all leukemias in children. It presents with pale skin, petechiae, bleeding from minor cuts, lack of energy, and mild fever and aches in the joints or bones (Leukemia and Lymphoma Society, 2011). After a complete blood count, there will be findings of a decreased number of erythrocytes and platelets (Leukemia and Lymphoma Society, 2011).

Acute Lymphoblastic Leukemia (ALL) is the most common form of cancer in children ages 1 to 7 years old, and the most common form of leukemia from infancy to age 19. It presents with enlarged lymph nodes, unexplained bruising, muscle or bone cramping, unexplained weight loss, petechiae, and excessive bleeding. After a complete blood count, one will find decreased numbers of erythrocytes and platelets (Leukemia and Lymphoma Society, 2011).

Chronic Myeloid Leukemia (CML) affects mainly adults, but children can also be diagnosed. There are three phases: chronic, accelerated and blast. Chronic is slow progressing, and will respond to treatment very well, containing less than 10% lymphoblast cells. The accelerated phase exhibits progressive symptoms and does not respond to normal treatment. It may contain 10-30% of lymphoblast cells. The blast phase contains more than 30% of blast cells and will progress rapidly (Byar, 2010). The symptoms of CML are fatigue, shortness of breath during activity, pain in the left upper quadrant due to an enlarged spleen, night sweats, heat intolerance, an unexplained weight loss, decreased erythrocytes and an abnormal number of platelets (Leukemia and Lymphoma Society, 2011).

Chronic Lymphocytic Leukemia (CLL) is the most common type of leukemia in adults and can either be slow or fast growing (Leukemia and Lymphoma Society, 2011). It does not occur in children and is prevalent in adults over 50 (Leukemia and Lymphoma Society, 2011). The average survival time ranges from less than 19 months to 10 years depending on the stage in which it is diagnosed (Byar, 2010). The slower growing form will present with an increased number of lymphocytes but a normal or decreased number of erythrocytes, platelets, and neutrophils in the blood. It can remain stable for years. In the faster growing form there will be a decreased number of erythrocytes and platelets (Leukemia and Lymphoma Society, 2011). It may present with few or no symptoms, but commonly found are fatigue, enlarged lymph nodes, frequent infections, enlarged spleen, night sweats, low grade fever and shortness of breath during activity are commonly seen (Leukemia and Lymphoma Society, 2011). If any abnormalities are found in the complete blood count, diagnosis is confirmed with a bone marrow biopsy or aspiration (Leukemia and Lymphoma Society, 2011). Those are then sent to a hematologist to decipher the cell shape and type of leukemia (Leukemia and Lymphoma Society, 2011).

Etiology and Risk factors

There are many different origins and risk factors for the four main kinds of leukemia and while some may be directly linked, there are others that show small linkage to anything at all. AML has no main risk factors, but does have a few potential risk factors like excessive exposure to benzene, a chemical found in cigarette smoke and work places (Leukemia and Lymphoma Society, 2011). Also, it has been linked to genetic disorders like down syndrome, past chemotherapy or radiation treatments from other cancers, and a history of blood cancers or disorders like thrombocytopenia, polycythemia vera and myelofibrosis. Furthermore, anyone over the age of sixty is also at risk for developing AML (Leukemia and Lymphoma Society,

2011). AML starts with a mutation of a single stem cell and the production of myeloblasts. These mutation cells block and crowd the other cells, thus blocking the production of normal erythrocytes and platelets (Leukemia and Lymphoma Society, 2011).

There are few risk factors associated with ALL. One of the main factors is previous radiation or chemotherapy. Another risk factor is a higher socioeconomic status; people in first world countries are more likely to have ALL. Another link has been found in the drug Phosphocol P32 that is a non-FDA approved treatment for bleeding between the joints caused by hemophilia (Leukemia and Lymphoma Society, 2011). When infants are diagnosed, the condition can often be traced back to gestation (Leukemia and Lymphoma Society, 2011). ALL starts in the bone marrow but can progress to the central nervous system, lymph nodes and the testes in rare circumstances (Leukemia and Lymphoma Society, 2011). It is developed when the immature leukocytes, lymphoblasts, grow out of control and block the production of the leukocytes, erythrocytes and platelets (Byar, 2010).

CML has two main risk factors: high exposure to radiation, and radiotherapy to treat lymphoma (Leukemia and Lymphoma Society, 2011). It also has been linked to an abnormal gene called the Philadelphia chromosome and develops a cancer causing gene called the oncogene (Leukemia and Lymphoma Society, 2011). Some suggest that many individuals are genetically predisposed to CLL and only after exposure to radiation does it appear (Lichtman 2008). This oncogene gives rise to a mutated protein that gives rise to CML. CML begins with one mutation of a stem cell in the bone marrow that then mutates or produces many more CML cells. These cells are released into the blood and survive longer than normal cells. They do not completely block production of the leukocytes, erythrocytes, or platelets, so it is less severe than many acute cases (Leukemia and Lymphoma Society, 2011).

CLL has few factors besides family history; however, one additional cause is exposure to an herbicide such as Agent Orange during the Vietnam War (Predoux). CLL occurs when the immature leukocytes, lymphoblasts, grow out of control in the marrow and are then released into the bloodstream. They tend to accumulate in the lymph nodes and bone marrow, and as the cancer progresses, crowd the leukocytes, erythrocytes and platelets in the bloodstream (Leukemia and Lymphoma Society). As other chronic leukemias, it does not necessarily block the production, which makes the symptoms less severe and more treatable (Leukemia and Lymphoma Society, 2011).

Medical Care

Due to accelerated research and advances in oncology medicine in recent years, there are several forms of treatment available for patients with leukemia. The main types of treatment selected for most patients with leukemia today are chemotherapy, radiation, and stem cell transplantation (Litin, 2003). The type of treatment selected by the patient and doctor is based on many factors including the type of leukemia, the age of the patient, and other health issues or problems the patient may have.

There are a few different treatments recommended for AML depending on the severity and the individual patient. A combination of chemotherapy drugs is the most popular initial treatment. Antibiotics may also be recommended to prevent infection which is very common in this disease. During remission or relapse, some patients may also receive allogenic stem cell plantation (Rogers, 2010).

There are two different phases of treatment recommended for ALL. The first phase is induction therapy. Aggressive chemotherapy is the main choice of treatment for this phase. The purpose of this phase is to kill as many leukemia cells as possible and to place the patient in

remission where the patient shows no signs or symptoms of the disease. The second phase is continuation therapy. This phase takes place during remission, and the goal is to kill any remaining leukemia cells (Litin, 2003). There is also a third line of treatment with a new drug called Chlofarabine. It is part of a class of agents that interferes with DNA synthesis to slow or even prevent the reproduction of malignant cells (McDonald, 2006).

The only proven curative treatment for CML is allogenic stem cell transplantation, which is the process of removing stem cells from a donor and transplanting them into the patient, giving the patient more healthy stem cells to enable him/her to endure chemotherapy (Litin, 2003). This treatment appears to be most successful in younger patients with a matched sibling donor (Frame, 2006). Oral medications such as Imatinib mesylate have not been proven to cure leukemia, but may be used to stop the growth of abnormal white blood cells (Litin, 2003).

At this time, there is no recommended treatment for CLL if the only abnormality is an increased lymphocyte count (Litin, 2003). If the patient is having other symptoms, he/she may receive chemotherapy treatment if necessary (Litin, 2003). This is usually considered a palliative treatment in order to slow the process or alleviate symptoms rather than to cure the disease (Elphee, 2008).

Nursing Care

The most common problem for leukemia patients receiving chemotherapy or stem cell transplantation is fatigue (Kim, 2005). This problem is seen most in adolescent leukemia patients. The nurse should attempt to prevent unnecessary strains by keeping personal items close to the bed and limiting visitors or activity, especially, while the patient is in the middle of treatment. However, some patients also blame fatigue on “doing too little, being bored, and

sitting around too much,” (Erickson, 2010, p. 450), so it is also important to provide some activities and exercise as appropriate.

Many patients undergoing cancer treatments have suppressed immune systems, and should be closely monitored for signs of infection. Nurses should assess the patient for minute signs of infection such as a rise in temperature. Antibiotics should also be administered as prescribed by the physician (Rogers, 2010).

Nutrition is an extremely important aspect for any patient battling leukemia. Even for patients in remission, inadequate nutrition can contribute to a relapse (Shipway, 2010). Nurses should attempt to make patients as comfortable as possible and encourage beneficial eating habits. Implementing flexible eating schedules and uninterrupted meal times when possible may contribute to better nutrition (Shipway, 2010). Due to treatments and various medications, some patients lose their appetites, or are unable to complete digestion; therefore, nurses should also be prepared to give feedings through nasogastric tubes. Many pediatric patients perceive nasogastric tubes as a threat or punishment for not eating, so nurses should work as educators in this setting to teach the patient the benefits and need for the feeding as well as address any questions or concerns the patient may have (Shipway, 2010).

Healthy People 2020 Clinical Recommendations

As leukemia deaths increase, Healthy People 2020 set the goal of “reducing the number of new cancer cases, as well as the illness, disability, and death caused by cancer” (United States Department of Health and Human Services, 2011). In order to accomplish this goal, the public needs to be aware of signs and symptoms of leukemia, and those with leukemia need to stay healthy and eat nutritiously to improve their immune strength. In order to achieve this goal, Americans need to have health evaluations and physicals. Annual physicals are extremely

important and are recommended because most people find out they have leukemia through simple blood tests done during their physical.

Americans need to be aware of the signs and symptoms of the types of leukemia, previously described, in order to get care quickly and to begin to take control of their treatment. Public education can be achieved through mass media or small media like commercials, brochures, billboards, newspapers, television news, or flyers. Using media to educate the public about signs and symptoms of cancer will also remind people to get a physical annually, achieving another goal set by Healthy People 2020 (U.S. Department of Health and Human Services, 2011).

Improving the number of healthy Americans is another goal indicated by Healthy People 2020. In order to fulfill this goal, Americans should exercise, stay active, lose weight if overweight, and maintain proper nutrition. Furthermore, Americans need to eat a balanced diet of grains, fruits and vegetables, dairy, and protein. It is recommended for the individuals to participate in mild physical exercise for at least 150 minutes/week or more (U.S. Department of Health and Human Services, 2011). Eating nutritiously and staying active can only increase the well-being and immune system of someone who has leukemia and is being treated for it.

Other Practice Guidelines and Recommendations

There are many ways to improve cancer patients' health and process of being cared for and treated. A patient learning that they have cancer is usually a traumatic and life-changing event; the health care staff does not want to worsen the circumstances of the patient. The health care team can manage this stressful time by demonstrating patient-centered care. The Institute of Medicine (IOM) has made a goal to practice patient-centered care which includes the healthcare

team collaborating with the patient and their family to create a factual treatment strategy that is accurate and designed specifically for the cancer patient, thus respecting the patient and family's "medical, social and cultural" wishes (Committee on Establishing a National Cord Blood Stem Cell Bank Program, 2005). The IOM suggests accomplishing this goal by focusing on: educating patients about their disease and treatment, patient empowerment over their treatment choices, shared decision-making between doctors and patients, communication and coordination between the patient and health care team, and addressing mental health issues of the patient (Committee on Establishing a National Cord Blood Stem Cell Bank Program, 2005).

The Institute of Medicine recommends the use of cord blood retrieval and storage for future allogeneic or autologous transplantations to treat leukemia patients. IOM suggests that a National Cord Blood Policy Board should be established to start researching, funding, and collecting cord blood in order to treat people who have developed with cancerous cell. Leukemia is a cancer that is often treated by cord blood transplantations (Committee on Establishing a National Cord Blood Stem Cell Bank Program, 2005). The allogeneic transplantation includes transferring healthy cells from one person into a person who has a medical need for new noncancerous cells. This transplantation has been proven "effective" to treat leukemia if neutrophil recuperation is seen in the cancer patient's blood. Autologous transplantation has also been proven "effective" for treating leukemia, but only for acute myelogenous leukemia. Autologous transplantation is the collecting of blood or bone marrow from a person which is then saved and infused into the same person in the event that the person presents cancer (Committee on Establishing a National Cord Blood Stem Cell Bank Program, 2005).

Conclusion

In order to be diagnosed and obtain treatment for leukemia, individuals need to be aware of the signs and symptoms presented by the disease and seek medical attention as soon as symptoms occur. To facilitate early discovery of the blood disorder, individuals should not avoid annual physicals. Different types of treatment are available for the individual disorders and are still being explored. Cord blood transplantation is continuing to be researched and may become more widely used as it is proved effective (Committee on Establishing a National Cord Blood Stem Cell Bank Program, 2005). Americans and health care teams should strive to meet the goals set by Healthy People 2020, thus reducing the number of cancer related deaths (U.S. Department of Health and Human Services, 2011).

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