Pregnancy Screening in Patients With Cancer

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Unknowingly treating a pregnant patient is a preventable harm. Screening appropriate patient populations for pregnancy is a preventive measure that can help avoid this “never” event. Yet, pregnancy screening is not consistently integrated into cancer care. The details of screening policies vary, with some organizations lacking a policy altogether. Pregnancy screening should be integrated into treatment pathways, clinical guidelines, and organizational policies, as well as into clinical workflows to avoid the unintentional treatment of a pregnant patient with cancer.

In the United States, half of all pregnancies are unintended, and more women of childbearing potential (WOCBPs) are choosing to delay pregnancy than in previous years.1,2 Due to the later age of onset of most cancers, pregnancy and cancer often are not concurrent (Table 1).3 The incidence of simultaneous cancer and pregnancy is 0.1% to 0.2%.3 WOCBPs are defined as women with the ability to conceive a fetus. This includes all female patients between the onset of menses and menopause (defined by the absence of menses for 12 consecutive months), excluding those who have had prior medical intervention leading to infertility, such as a hysterectomy. Because it is difficult to know with certainty whether a woman is capable of childbearing, a practical solution includes screening of all women aged 10 to 55 years, although this age range is disputable. An audit at an individual NCCN Member Institution showed that over the course of a year and more than 1,000 pregnancy tests, no unsuspected pregnancies were found in women between the ages of 51 and 55 years. A review of the literature revealed a pregnancy rate without artificial reproductive technology of <2% in women aged >50 years. Pregnancy in this age group is most often correlated with grand multiparity (≥5 previous pregnancies). Based on this data review, the institution’s pregnancy testing policy was adjusted to include WOCBPs within the age range of 11 to 50 years, without incidence of unidentified pregnancies in women aged >50 years.

The emotional experience of receiving a cancer diagnosis can make it difficult for a patient to provide an accurate medical history, and symptoms of pregnancy may be attributed to cancer. Providers may also be distracted and overlook the reproductive portion of the review of systems. Although extensive literature has been published about cancer treatment during pregnancy, limited research is available about pregnancy testing before cancer treatment. Guidelines have inconsistent recommendations on pregnancy testing. Consequently, not all cancer care organizations have a pregnancy screening policy, and content varies significantly between policies that do exist. Prevention of adverse outcomes is the shared responsibility of patients, providers, and healthcare organizations.

Background

Cancer treatment modalities include chemotherapy, radiation, hormone therapy, and surgery, all of which can have adverse effects on a fetus. The consequences of unknowingly

Table 1. Common Cancers Diagnosed Among Pregnant Women

<table>
<thead>
<tr>
<th>Type of Cancer</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer</td>
<td>13,000–10,000</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>1.1,000–6,000</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>1–2.2,000–10,000</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>1:10,000</td>
</tr>
<tr>
<td>Thyroid cancer</td>
<td>0.2–1:4,10,000</td>
</tr>
</tbody>
</table>

exposing a fetus to cancer treatment can be devastating and depend on multiple variables, such as dosage, duration and timing of exposure, placental permeability, and gestational age. For example, pregnant patients with cancer who receive multidrug chemotherapy in their first trimester have an increased risk of spontaneous abortion, fetal demise, and fetal malformations. Radiation therapy can result in lowered IQ and fetal malformation, depending on gestational age of the fetus and exposure level. Hormonal treatments such as tamoxifen can result in a high frequency of congenital abnormalities, requiring the use of reliable birth control treatment. Given the risk of harmful exposure to a fetus from cancer treatment, it is necessary to have preventive guidelines, policies, and practices in place.

Prevention

Guidelines and Policy

Guidelines and policies can be used to mitigate the risk of an adverse event. A guideline contains recommendations or suggestions, whereas a policy is a rule or mandate.

Pregnancy testing is needed in many different areas of healthcare. For surgery and anesthesia, the American Society of Anesthesiologists (ASA) recommends informing WOCBPs of the risks, benefits, and alternatives related to preoperative pregnancy testing if the result would alter the patient’s management. This consent/assent process allows for patient autonomy. For radiation, the International Atomic Energy Agency’s Radiation Protection of Patients recommends that WOCBPs are carefully interviewed for the likelihood that they may be pregnant before imaging or treatment. The American College of Radiology (ACR) recommends screening WOCBPs with questions to assess for pregnancy status. Patient answers can be used to indicate the possibility that the patient may be pregnant, and if so, the ACR recommends obtaining consent for a pregnancy test. Patients who are to receive procedures that risk exposing a fetus to high doses of radiation should undergo a pregnancy test within 72 hours before the procedure. For adolescents, who may not be as forthcoming with their pregnancy status, the ACR suggests an alternative method: an institutional policy that requires all minors who have started menses to undergo pregnancy testing before any procedure that could “impair a level of uterine radiation above a specific dose to the uterus.”

Due to the harm cancer treatment can have on a fetus and the high possibility of unplanned pregnancy in WOCBPs, regular pregnancy screening and testing is recommended. ASCO/Oncology Nursing Society (ONS) Chemotherapy Administration Safety Standards inform overall treatment planning, and do not explicitly recommend pregnancy testing for WOCBPs before beginning cancer treatment such as chemotherapy and radiation. Instead, these organizations have general guidelines that recommend a complete medical history and essential workup of each patient to include pregnancy status when appropriate.

The NCCN Clinical Practice Guidelines in Oncology for Adolescent and Young Adult Oncology include recommendations for cancer treatment during pregnancy, pregnancy prevention, and fertility counseling, but do not include pregnancy testing before cancer treatment. NCCN also has disease-specific guidelines (available at NCCN.org), some of which recommend pregnancy testing, and others which address pregnancy during treatment, pregnancy status, and fertility counseling. Overall, there is much more guidance available for cancer treatment during pregnancy and fertility counseling than pregnancy testing before cancer treatment. The absence of a consistent recommendation for pregnancy testing in disease-specific guidelines presents the risk of pregnancy status not being assessed.

Because professional society guidelines currently lack consistency, it makes sense that there is also variation among institutional policies. Policies are created and implemented by individual organizations, yet Hu et al showed that pregnancy screening policy compliance was low, at approximately 20%. The NCCN Best Practices Committee conducted a survey regarding pregnancy screening in which 23 of the 27 NCCN Member Institutions responded (unpublished data, 2016). Detailed review of 6 NCCN Member Institution policies showed significant variation, including the role and responsibilities of healthcare providers.

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providers involved in the pregnancy screening process. The survey showed that 67% of responding NCCN Member Institutions include information regarding pregnancy screening in patient education materials. Regarding policies and guidelines, 30% of responding institutions had no policy or guideline, 22% had a policy, and 48% had a guideline or recommendation (Figure 1). Of the centers that have a policy, 67% perform audits to ensure compliance (N=6; Figure 2).

Figure 1. Results from the 2016 Survey of NCCN Member Institutions' Pregnancy Screening Question, “Does your institution have a guideline (ie, recommendation) or policy (ie, requirement) on screening for pregnancy prior to chemotherapy, therapeutic radiation, or surgery?”

Figure 2. Results from the 2016 Survey of NCCN Member Institutions' Pregnancy Screening Question, “Does your institution perform audits to ensure compliance to its pregnancy screening policy?”

Pregnancy Screening and Testing

Pregnancy screening in WOCBPs can reduce the chances of a fetus being exposed to the harmful effects of cancer treatment. In healthcare, the spectrum of options for pregnancy screening is as follows:

- No policy or screening
- History alone
- History and selected testing
- Universal testing

None of these approaches is perfect. Screening questions in a medical history may alert a provider about a risk for pregnancy, but the questions have low sensitivity and specificity for detection. Blood serum human chorionic gonadotropin (hCG) testing is preferred, because it is the most sensitive pregnancy test available; it allows providers to determine pregnancy status earlier than urine testing. Blood draws are part of treating and monitoring cancer, making blood serum testing cost-effective and convenient in oncology. The optimal timing and frequency of pregnancy testing has not been defined by research studies. The most rigorous schedule is suggested by Patel et al, who recommended that, “A pregnancy test should be administered to rule out pregnancy before each course of chemo- or radiotherapy, and thereafter at each subsequent visit before delivering additional therapy.”

No testing strategy would entirely mitigate the risk of pregnancy concurrent with cancer treatment. Entry into oncologic care is arguably the most important time point for screening. The optimal testing frequency likely varies with patient population and risk.

Fertility and Contraception Counseling

Patient education helps to engage patients and inform them of their health conditions and treatment options. Fertility counseling educates patients about how cancer treatment can affect their reproductive health and presents options to assist in reproduction or address infertility after cancer treatment, if desired by the patient. Discussing the possibility that treatment may result in infertility can be misinterpreted by some patients to mean that treatment prevents pregnancy. Therefore, it is important to convey to patients that cancer treatment is not birth control.

Given its relationship to reproductive health, fertility counseling should include educating WOCBPs and their partners about the importance of contraception, including the use of nonhormonal birth control, regardless of the patient’s hormone receptor

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status.\textsuperscript{19} Pregnancy testing before, during, and after cancer treatment should be discussed. A shared decision-making approach to pregnancy testing and cancer treatment is an effective way to involve patients while maintaining their autonomy.\textsuperscript{20} Using patient education to engage patients can increase the likelihood that they will adhere to treatment.\textsuperscript{21} Education about reproductive and fetal harm from cancer treatment could boost patient adherence to effective contraception and pregnancy testing. These counseling activities should occur around the teachable moments at the start of treatment.

**Clinical Practice**
Screening WOCBPs and offering a pregnancy test is accepted practice before a surgical procedure,\textsuperscript{9} but in cancer treatment it is not as deeply ingrained as a standard part of workflow. Manley et al\textsuperscript{22} examined the safety standard of performing pregnancy testing before elective surgery, which then shared the decision to proceed between the providers and patients. Within this process, patients were informed of the rare occasion of a false-positive pregnancy test as well as the potential risks and fetal harms related to anesthesia. Patients were apprised of the importance of the first trimester of pregnancy and the different treatment options. Finally, the decision was made in alignment with the patients’ values. Clinical trials also require pregnancy testing of all WOCBPs before treatment initiation. The same process should be applied in the cancer care setting.

**System Structure**
Oncology practice must be supported by clinical infrastructure that ensures that best practices are implemented by physicians. Current guidelines and standard system structures use patients’ medical history, physical examination, and laboratory test results to detect their pregnancy status. Serum hCG testing is the preferred pregnancy test, because it can detect pregnancy within 7 to 9 days after conception and results can be obtained with few changes in workflow structure or staff.\textsuperscript{22} Organizational policies must direct healthcare providers on the use of serum hCG pregnancy testing in the appropriate patient population before cancer treatment. Policy compliance must be audited to track adherence.

Technology can be used in system structure to ensure that best practices for testing WOCBPs can be sustained. Electronic health records (EHRs) can prompt providers to order pregnancy testing when prescribing cancer treatment. Hayward et al\textsuperscript{23} found that including a pregnancy test as part of chemotherapy medication order sets in the EHR was the most effective intervention in increasing pregnancy screening rates among adolescent female patients with cancer. Use of an EHR in this manner is effective and upholds the Centers for Medicare & Medicaid Services EHR Incentive Programs’ meaningful use specifications.\textsuperscript{24}

**Recommendations**

- Clinical guidelines and pathways should explicitly emphasize the importance of pregnancy screening for all WOCBPs.
- Organizational policy should reflect national guideline standards and give direction for all healthcare providers involved.
- Pregnancy screening/testing should be bundled with cancer treatment orders in EHRs to prompt healthcare providers to screen the appropriate patient population.
- The importance of pregnancy prevention before, during, and after cancer treatment should be included in patient education and fertility counselling.
- Providers and systems should be audited for pregnancy screening policy adherence.

**Conclusions**
WOCBPs should be screened for pregnancy before and during cancer treatment. Due to poor adherence with this practice, system structure and technology must bolster preg-
Pregnancy screening to decrease the burden of responsibility on individual providers. More research is needed on optimal screening strategies during treatment. Guidelines and policies are necessary in directing cancer care standards and should reflect the specific need for pregnancy screening before cancer treatment. Providers and patients need to be educated and engaged to uphold policy.

References