Time Toxicity: Weighing the Benefits of Cancer Therapies Against Time Demands on Patients

A new study surveyed patients with relapsed lymphoma about the time burdens of treatments.

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When talking about treatments for cancer, much of the conversation focuses on whether drugs are safe and effective. But for patients, there's another important factor: Time.

People weighing therapy for advanced cancer face a number of time-related questions: How long will it take them to get to and from a clinic to receive treatment? How long will they be at the clinic for infusions, appointments, scans, and bloodwork? How long will it take to resume normal activities after treatments?

And, especially in cases where a patient has a limited life expectancy, will the treatment's expected benefits outweigh these time demands?

"The amount of time that a patient interacts with the health care system – it all gets accounted for as a 'lost day' you weren't able to be at home," says University of Colorado Anschutz Cancer Center member Ajay Major, MD, MBA.

A 2022 publication introduced a term for the time burdens that cancer therapies impose on patients: time toxicity. "Time toxicity is associated with less time for patients to do things outside of their cancer care, and with inferior quality of life," Major says.

Major is the lead author of a new study that evaluates time toxicity in connection with new therapies for both slow-growing and aggressive lymphomas, based on a patient survey. The study was published online in May by the journal The Oncologist and will appear in its July 2026 issue.

Major, a lymphoma specialist and quality of life researcher, is an assistant professor in the CU Anschutz Department of Medicine's Division of Hematology. He is also co-lead of the imPROve Patient-Reported Outcomes Working Group, a multi-disciplinary cohort of researchers focused on integrating patient-reported outcomes into research and clinical settings, at the CU Anschutz Adult & Child Center for Outcomes Research & Delivery Science (ACCORDS).

He says recent studies have assessed treatment-related time toxicity for patients with solid-tumor cancers, but research has been limited in connection with blood cancers like lymphoma. Also, in this study, information on time burdens is coming directly from patients and not simply from medical records of clinic visits.

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Bispecific antibodies

Lymphoma starts in a type of white blood cell called lymphocytes, part of the body's immune system. There are over 80 different types of lymphomas grouped into two groups: Hodgkin and non-Hodgkin lymphoma, based on the kind of lymphocytes involved.

Major's study included two types of non-Hodgkin lymphoma: Follicular lymphoma (FL), a slower-growing cancer; and diffuse large B-cell lymphoma (DLBCL), which is more aggressive. The focus was on lymphomas that had come back or stopped responding to previous treatments.

Major and his colleagues looked at three drugs used to treat these forms of relapsed lymphoma: mosunetuzumab (for FL), glofitamab (for DLBCL), and epcoritamab (for either). They are in a new class of therapies called bispecific antibodies – engineered immunotherapy proteins that link disease-fighting T cells to cancer cells, helping the T cells identify and kill the cancer cells.

"Unlike CAR T-cell therapies, where we have to collect a patient's T cells and they have to be manufactured for several weeks before we can give them, these are off-the-shelf therapies," Major says of the bispecific antibodies. "I can just get them from the pharmacy and treat the patients immediately, which is very exciting for us, especially for patients with lymphoma who need treatment urgently."

These bispecific antibody drugs have similar efficacy and safety profiles, but they differ in how many trips a patient must make to a clinic or infusion center to get treated, how often, and for how long.

Epcoritamab is administered through weekly subcutaneous (under the skin) injections. It's given once a week at first, then every other week, until the cancer progresses – which could mean indefinitely. But mosunetuzumab and glofitamab are designed to be given once every three weeks, and they are fixed-duration treatment regimens – treatment stops after a set number of cycles, after about 6 to 12 months of treatment. They are both given through intravenous infusions, although mosunetuzumab can also be given via subcutaneous injection.

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Stark time differences

For the study, 120 patients nationwide who were already receiving one of these drugs as their regular cancer treatment were surveyed. Sixty had FL and 60 had DLBCL.

They were asked how many health care visits they had in a 30-day period, and how much time they spent scheduling appointments, at the clinic or infusion center, and getting to and from these visits. There were also asked how much time they needed to recover from treatment – how long they felt unable to return to normal life.

The time differences were stark. Patients with DLBCL taking epcoritamab reported an average of 88 hours of cancer-related time demands across the month, as compared to 43 hours for the DLBCL patients taking glofitamab. For patients with FL, time demands were an average of 62 hours a month for epcoritamab versus 31 hours for mosunetuzumab.

The biggest driver of the time difference between epcoritamab and the fixed-duration drugs was recovery time – patients on epcoritamab said they needed longer to feel back to normal after each visit. Patients on the fixed-duration drugs also reported significantly fewer treatment visits per month.

In the study, patients were also asked a hypothetical question: If two treatments for their cancer worked equally well and were equally safe, but one was a fixed-duration drug that took less of their time and required fewer clinic visits, which would they prefer? At least 92% chose the treatment with the lower time burden.

Recognizing the time toxicity of various treatments "can enable more informed, patient-physician

treatment decision-making that considers clinical outcomes as well as patient convenience and overall time burden," the study concludes.

→ CU Anschutz Lymphoma Researcher's Study Lends Support to Lower Barriers for CAR T-Cell Treatment

Added burden for rural patients

On the question of travel time for treatment, surveyed patients living in rural areas said they traveled far longer for treatments than those in urban and suburban areas — up to 105 minutes each way for DLBCL patients in rural areas, compared to about 31 minutes for urban or suburban patients.

In a previous study, Major and his colleagues cited a rural lymphoma patient who had to be away from home for up to three days for each bispecific antibody treatment at a far-away location. The patient had to find a flexible job that worked with their treatment schedule.

Major says that while the CU Anschutz Cancer Center and other academic medical centers administer bispecific antibodies, "in local communities, the uptake as not been as extensive, partly because these are new medications. We have to make sure that community oncologists, pharmacists, and infusion nurses are more comfortable with providing them so patients don't have as much travel time."

Patient-reported outcomes studies like this will help oncologists have meaningful discussions with patients about the relative time burdens of various therapy options, Major says.

"In some ways, this is a product of our own success in developing new therapies," he says. "Before, we weren't able to have these discussions with patients because we didn't have a choice on treatments. Now that we have choices, we need to be able to better support patients to make choices in their care that are better aligned with what they want out of life."

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