

Big gains in bone marrow transplant survival since mid-2000s

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A bone marrow transplant can be a lifesaving treatment, but it can come with life-threatening risks.

The encouraging news for patients: Those risks have been plummeting for years.

The overall risk of death after transplant dropped 34% between 2003-2007 and 2013-2017, according to an analysis published in the Jan. 21 issue of the *Annals of Internal Medicine*.

Those gains stem from a sharp decline in transplant-related complications, said corresponding author Dr. George McDonald, an emeritus member at Fred Hutchinson Cancer Research Center. The risk of dying from those complications—mostly due to infections and diseases involving the liver, kidneys and lungs—has fallen from 30% to 11% over the past 25 years.

Other findings weren't all as dramatic, McDonald said. Risk of death from relapse of cancer declined—but nowhere near as steeply as that from complications. Recurrence of cancer remains a

major challenge for the transplant field, he said.

Still, the results should reassure researchers and clinicians at Fred Hutch and elsewhere who have toiled to improve the practice for decades, said McDonald, who also led [an earlier analysis](#) in 2010 showing similar striking improvements for [bone marrow transplant](#) recipients from the 1990s through the early 2000s.

The team's latest analysis shows that trend has continued. McDonald credits the improved outcomes to small, steady advances made at transplant centers by a diverse cast of doctors, nurses and specialists across every major medical discipline.

"Each of us has been working hard, trying to make our little corner of the problem less severe," said McDonald, who saw his first transplant patient in 1972. "Cumulatively, those little improvements sum up to big improvements in outcomes. This paper reflects 25 years' worth of clinical research."

Bone marrow transplants are lifesaving treatments for patients with blood cancers and other diseases. During these procedures, patients first undergo chemotherapy and/or radiation to destroy their diseased bone marrow and to prevent rejection of donor cells. A donor's healthy, blood-forming [stem cells](#) are then given directly into the patient's bloodstream.

For the current study, McDonald and colleagues reviewed the outcomes of 1,148 patients who underwent a transplant at the Hutch's clinical care partner, Seattle Cancer Care Alliance, between 2003-2007. They then compared them to 1,131 patients who had the procedures between 2013-2017. The most recent cohort was older and sicker when they had their transplant, McDonald said. Yet they still fared better than the previous group.

In absolute terms, the frequency of overall mortality during 2013-2017 was 40%, and this proportion will obviously increase with further follow-up, McDonald said.

McDonald noted that the study was a retrospective analysis of previously collected data and therefore cannot say with certainty what caused the improved outcomes. "But we can make really educated guesses as to why we're getting better," he said.

Those educated guesses involve changes to clinical practice driven by ongoing research at Fred Hutch and elsewhere, including:

- Improved methods to prevent, detect and treat the viral, fungal, and bacterial infections that threaten immune-compromised transplant patients
- Before transplant, identification of patients at high-risk for fatal complications.
- The use of less-toxic chemotherapy and radiation regimens to prepare patients for transplant, especially for those at high-risk.
- Advances in the prevention of graft-vs-host [disease](#), where donor [immune cells](#) attack a patient's organs
- Lower doses of prednisone to treat GVHD, which has led to fewer infections

Looking ahead, McDonald thinks further clinical research by infectious disease experts and medical specialists in liver, kidney and pulmonary disease will help drive down the risk of death from transplant-related complications into the single digits.

The tougher challenge will be preventing relapse. But there is cause for optimism, said Fred Hutch's Dr. Brenda Sandmaier, an oncologist and study author.

"Now that we have significantly reduced non-relapse mortality, we have a platform to implement different treatments to prevent relapse or treat early evidence of recurring disease," she said. "In another 10 years, (the relapse rate) should and will go down."

Sandmaier pointed to several areas of clinical

- research underway to reduce the risk of relapse:
- New targeted therapies that inhibit molecules involved in disease are being tested in clinical trials to prevent relapse after transplant
 - Novel pre-transplant preparative regimens such as radioimmunotherapy—which delivers a radioactive punch to cancer cells with little to no damage to surrounding healthy tissue—can reduce disease before transplant
 - New cellular therapies, such as CAR T-cell therapy, could also eliminate disease before [transplant](#)

Provided by Fred Hutchinson Cancer Research Center

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