Radiotherapy during surgery could save millions of travel miles and tons of CO2

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One targeted dose of radiotherapy given during surgery to remove early stage breast cancer could save millions of travel miles, enough CO2 emissions for a 100 hectare forest, and free up thousands of hours of women's time, concludes research published in the online journal *BMJ Open*.

Standard treatment for early stage breast cancer is surgical removal of the cancerous tissue (lumpectomy), followed by a course of (external) radiotherapy beamed onto the affected breast every day for between three and six weeks.

But single dose targeted intraoperative radiotherapy, or TARGIT for short, is delivered by an applicator directly into the breast tissue during surgery. This adds around 20 to 40 minutes to the operating time, but in most cases avoids the subsequent need for daily hospital visits to complete a standard course of radiotherapy.

Previous international research (TARGIT-A trial) indicates that TARGIT is as good as standard external beam radiotherapy (EBRT) in suitable patients with early stage disease, and it is routinely offered as a treatment option in many countries, say the researchers. But TARGIT is not yet widely available in the UK's 62 hospitals with radiotherapy units.

To assess the travel implications, journey times, and environmental impact of TARGIT and EBRT, the researchers compared these factors in 485 patients who had taken part in the TARGIT-A trial, 249 of whom

had been randomly assigned to TARGIT and 236 to EBRT.

They also included a further 22 patients treated with TARGIT in two other semi-rural centres after the trial had finished.

They calculated the shortest driving distance from home to the radiotherapy unit and average travel time, excluding traffic delays, using Google Maps. They then calculated the total distance travelled and time spent to complete the entire course of radiotherapy.

On average, TARGIT-A trial participants in the UK live 13 miles (21 km) from a radiotherapy unit, and accounting for population density, the researchers estimated that two thirds of the UK population lives further away than this.

CO2 emissions were estimated for a standard family car with an average fuel consumption of 40 miles/gallon (7 litres/100 km). This would produce 299 g/mile (186 g/km) of CO2 emissions for a diesel car and 272 g/mile (169 g/km) for a petrol vehicle.

The TARGIT patients travelled significantly fewer miles (21,681) than EBRT patients (92,591) for their treatment, and spent significantly less time in transit: 3 hours compared with 14 hours.

Their journeys also emitted significantly less CO2: 24.7 kg compared with 111 kg for the EBRT patients.

The researchers worked out that the patients treated in the two semi-rural radiotherapy units each saved themselves journeys adding up to 753 miles, 30 hours of travel time, and they spared the planet 215 kg of CO2.

There are around 50,000 cases of breast cancer diagnosed in the UK

every year, of which around three quarters are treated with lumpectomy and EBRT.

Based on these figures, the researchers calculate that if TARGIT became widely available across the UK, it could save 5 million miles (800,000 km) in journeys, 170,000 hours of travel time, and 1200 tonnes of CO2—equivalent to a forest of 100 hectares—every single year.

This is a lot 'greener' than the estimated environmental benefits of introducing mobile breast cancer screening, they say.

"The management of breast cancer has changed over the decades. However, the requirement of patients to travel to receive these specialist services is often forgotten by policy-makers," they write.

And they conclude that "introducing TARGIT as an option for appropriate patients in the UK will contribute significantly to saving patients time, cost, fuel and CO2 emissions."

More information: Environmental and social benefits of the targeted intraoperative radiotherapy for breast cancer: data from the UK TARGIT-A trial centres and to UK NHS hospitals offering TARGIT IORT, DOI: 10.1136/bmjopen-2015-010703

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