Using operational research to reorganise crucial dialysis services during the COVID-19 outbreak

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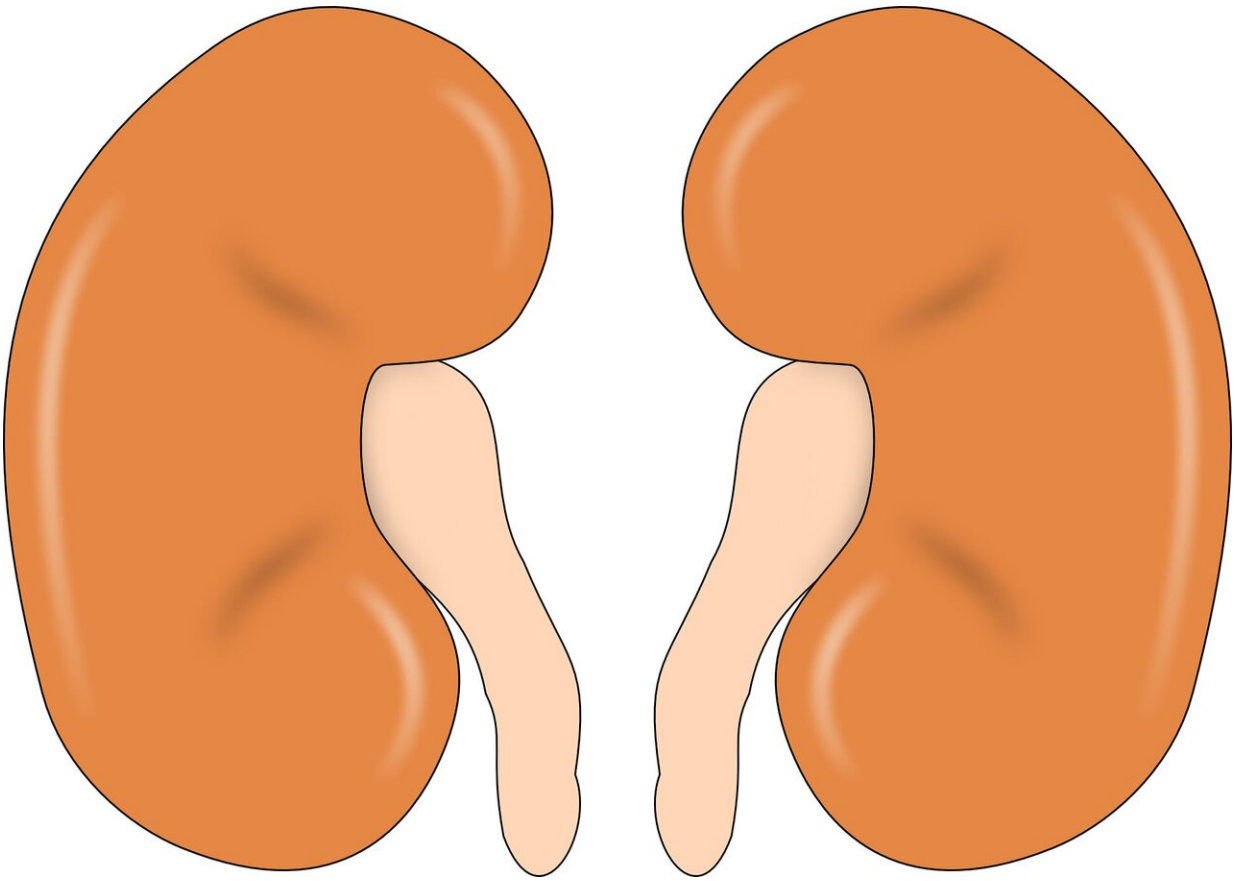

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People requiring renal replacement therapy are particularly vulnerable to

COVID-19 and rely on essential treatment, necessitating travel to treatment centers. This accounts for a significant volume of non-emergency ambulance transport.

NIHR PenARC's operational research team, PenCHORD, in conjunction with researchers from the Institute for Data Science and Artificial Intelligence (IDSAI) at the University of Exeter and the renal department at Portsmouth Hospitals NHS Trust, used computer modeling to identify how to reorganize dialysis services and minimize disruption to 650 patients receiving treatment at The Wessex Kidney Centre. In one key finding, the report grouped patients together for transport, which cut the total time of non-emergency transport by up to 60 percent—freeing up more ambulances to respond to emergencies.

The report's findings, which are applicable to national dialysis services, identify how to protect patients and NHS workers and minimize the impact on ambulance transfer services.

University of Exeter operational researcher Dr. Tom Monks said: "This was collaborative research at its best. Working closely with our NHS colleagues is always rewarding. The work took place in the early stage of the pandemic and the team felt that, if we were quick, we had a real opportunity to contribute to the NHS planning effort to keep a vulnerable group of people safe. It was fantastic to see how rapidly colleagues across the University and NIHR PenARC could mobilize their expertise."

The research team used advanced computer simulation methods, applying a range of infection scenarios, to assess the capacity of services to cope while providing treatment to prevent cross infection between COVID-19 positive and negative patients as in and outpatients. PenCHORD's extensive NHS operational research experience enabled rapid mobilization delivering the evidence within two weeks.

Jonas Willemsen, Renal Information and Systems Manager at Portsmouth Hospitals NHS Trust said: "We're bowled over by how quickly the team turned this around. I think this is going to be, and indeed already is, transformative to our handling of the COVID-19 outbreak."

Using a model that works on the assumption of a high rate of infection over a range of timescales, the report predicts the need and ability of the Trust to reorganize sessions between hospitals to provide separate sessions for patients who have tested positive for COVID-19 and those who have recovered or who have tested negative for the virus. The report takes in to account that, whereas some hospitals might experience an increase in dialysis demand as COVID-19 positive patients are redirected, others might experience a reduction.

The study found that the most resilient approach was to centralize care of infected outpatients usually treated in the Wessex region at the Queen Alexandra Hospital in Portsmouth, with surge capacity at Basingstoke Hospital.

Steve Dudfield, Renal General Manager at Wessex Kidney Centre added: "This is brilliant. It has been extremely helpful enabling us to plan for the demand implications of COVID-19 with a high degree of confidence."

The report predicts an increase in transport times as patients are allocated treatment at different regional centers. It identifies ways to reorganize transport to create a reduction of 40-60%, achieved principally by managing the transport of multiples of patients per journey, and supported by temporary accommodation for infected patients closer to the centralized unit, lessening the impact on ambulance transport services.

A preprint of the study is available on medRvix.

More information: Michael Allen et al. Organising outpatient dialysis services during the COVID-19 pandemic. A simulation and mathematical modelling study., (2020). DOI: 10.1101/2020.04.22.20075457. www.medrxiv.org/content/10.110 … 57v1.article-metrics

Provided by University of Exeter

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