The network structure of critical care transfers.

Theodore J. Iwashyna, MD, PhD. Fellow, Division of Pulmonary, Allergy and Critical Care. Senior Fellow, Leonard Davis Institute. Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania.

Abstract

Background: In light of wide variations between hospitals in their quality of critical care, some have proposed moving patients to better quality. A system of critical care transfers already exists, but it is little studied.

Methods: All 1993 Medicare claims were examined for the 576 acute care hospitals in the Mid-Atlantic region.

Results: Critical care transfers are common. There is a single continuous transfer network linking hospitals in the Mid-Atlantic region. There are signs that congestion may be a problem in this network.

Conclusion: The existing transfer network may be a useful policy tool to improve the outcomes of critically ill patients, but more study is needed.

Background

- There are wide variations between hospitals in the quality of critical care they provide.
- Moving patients from low performing hospitals to high performing hospitals is a possible solution to improve patient outcomes.
- An existing network of critical care transfers exists, but we know very little about it.
- The existing network might be useful for moving patients to higher quality care.

Methods

Study Population
- All patients hospitalized in fee-for-service Medicare in 1993
- In Mid-Atlantic Region: Pennsylvania, New York, New Jersey, Delaware, Connecticut
- At least 1 day of critical care services

Definition of a Critical Care Transfer
- If a patient had claims in hospital A until day t, and then claims in hospital B from day t or t+1, we inferred that the patient was transferred from hospital A to hospital B.
- If patient used critical care in both hospitals, then we define this as a critical care transfer.
- Under this definition, transfers to hospitals outside of the region are not observed.

Results

Critical care transfers are common.
- 481,183 hospitalizations involved critical care in 1993 in the Mid-Atlantic Region.
- 550 hospitals had at least 1 critical care patient.
- 542 of those hospitals were involved in critical care transfers.
- 18,598 critical care transfers among 542 hospitals
- 7.7% of all critical care stays of any length involved an interhospital critical care transfer.
- 83 hospitals (15% of 542) sent but did not receive critical care transfers.
- 1 hospital received but did not send transfers.

A network for critical care transfers exists.
- There was a single, integrated network throughout the Mid-Atlantic Region.
- Transfers frequently cross between metropolitan areas, also crossing the borders of so-called “Hospital Referral Regions”.
- A graphical representation is in the Figure.

Acknowledgments

- Supported by NIH grant HL07891-09.

Policy Implications

- Critical care transfers are common and deserve further study.
- If the existing network moves patients towards higher quality care, then we may be able to improve patient outcomes by providing incentives (e.g., Pay-for-Performance) for hospitals who already transfer some patients to transfer more, and for hospitals that already receive some patients to accept more.
- If the contrary is true, then a formal regionalization of critical care is more urgent, and regionalization plans will need to wholly restructure existing transfer habits.

Figure: Critical Care Transfers, 1993

Small circles represent hospitals, placed at their approximate latitude and longitude; arrows indicate the direction of transfers, and an arrow’s thickness is proportional to the number of transfers.

Conclusions

- Critical care transfers are common.
- We do not know where the network sends patients. Are patients systematically funneled towards more effective hospitals? Or does the network disperse patients at random or to second-quality “back-up” sites? These are key questions for further studies.
- The tools of network analysis allow us to visualize and investigate the critical care transfer network as an integrated whole.

Implications

- A network for critical care transfers exists.
- Transfers frequently cross between metropolitan areas, also crossing the borders of so-called “Hospital Referral Regions”.
- A graphical representation is in the Figure.