The Median is the Message for Efficient Wheelchair Service

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Summary

Every year, more than 17 million disabled passengers travel on commercial airlines, some with special needs that the airlines must meet. Meeting these needs can be challenging, because such requests are relatively rare and occur unexpectedly. However, if an airline does not set aside adequate provisions to help the disabled, flights may become delayed as handicapped passengers struggle to reach their destination.

We model the situation and devise a protocol for an airline to use minimal resources to respond efficiently to such requests, balancing the costs of additional personnel against delayed flights.

The model consists of three parts:

- an algorithm for finding the number of escorts that an airport should hire (based on balancing costs);
- establishing that the best ratio of wheelchairs to escorts is one-to-one (even if a wheelchair-bound individual does not request an escort, someone is needed to transport the chair);
- showing that wheelchair service is most efficient when escorts work out of a central “hub” (a hub shortens the time for an escort to travel to the disabled passenger’s gate). The ideal location for a hub is generally the median gate, the gate with an equal number of gates on either side; if there is no gate there, then a nearby lounge would suffice.

To test the efficiency of our model, we simulated wheelchair service in large, medium, and small airports. Our model was successful in reducing
delay times. However, the model is not perfect. It assumes that all escorts are perfectly efficient in their occupation and that all passengers are completely cooperative; the human element is a significant complication that our model does not address. A strength of our model is its flexibility: The algorithm for the number of escorts can adjust to changes in the population and in the airline industry. Thus, as the nation ages and the airline industry grows, our model will still be applicable.

[EDITOR'S NOTE: This Meritorious paper won the Ben Fusaro Award for the Wheelchair Problem. The full text of the paper does not appear in this issue of the Journal, but a Judges' Commentary on the paper is on pp. 413–414.]
