**Final Progress Report**

# Improving Patient Safety and Disease Management While on Contact Isolation

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Dates of Project: 7/01/09–6/30/14

This project was supported by the Agency for Healthcare Research and Quality

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AHRQ K08 HS18111

**Structured Abstract**:

Purpose: This K08 proposal was designed to provide the didactic coursework and research mentoring to make Daniel Morgan an independent researcher in hospital epidemiology.

Scope: Contact isolation of patients who are known to be colonized with antibiotic-resistant bacteria is used to prevent transmission to patients and limit hospital-acquired infections. It is used for approximately 25% of inpatients. Patients on contact isolation are less likely to see healthcare workers, have lower quality-of-care, are more likely to become depressed, and have less patient satisfaction.

Methods: A methodologically rigorous approach was used to quantify the impact and relationship between isolation status of patients and adverse outcomes using a validated clinical data repository historical cohort and prospectively enrolling a cohort to address adverse events, management of disease, psychiatric screening, and patient satisfaction. Additional funding was obtained from AHRQ to complete a cluster-randomized trial (the BUGG study) that evaluated the benefits and harms of universal glove and gown use.

Results: We found no increase in adverse events related to patient isolation. Likewise, depression and anxiety, which were associated with isolation, appeared to be primarily due to the confounding effect of patients who were more chronically ill having more depression or anxiety. Patients who were isolated tended to have lower satisfaction. Together, these results imply that isolation may not be as dangerous as previously thought. During the time of this K award, as last author on an AHRQ-funded cluster trial, I found that universal isolation decreased MRSA.

Key Words: Isolation, MRSA, Contact Precautions, Adverse events

**Purpose**: (Objectives of study)

This K08 award was to foster development in a successful, independent investigator in patient-oriented research and a leader in the study of infection control and patient safety. With the support of this award, I plan to gain the psychometric, biostatistical, and epidemiological skills needed for a successful career in outcomes research and to acquire specific expertise in methods to study adverse events and psychiatric outcomes. This knowledge will be essential in the development of infection control interventions that seek to maximize the positive impact on overall patient safety. In the long term, I hope to translate the knowledge gained from this research into future investigations of novel interventions aimed at improving infection control delivery and patient safety.

Contact isolation is the use of gowns and gloves for all healthcare worker-patient contact and private patient rooms. It is used to decrease the rates of the most common hospital adverse event, nosocomial infections.

We aim to definitively identify the ways in which contact isolation adversely impacts patient care (Aim 1), how this is associated with changes in healthcare worker and institutional behavior (Aim 2), and how patients at high risk of adverse events while on contact isolation can be identified prior to the adverse event using a prediction rule (Aim 3). Aims 1 and 2 will be investigated using a large historical cohort as well as a prospective cohort. Aim 3 will draw on data collected from Aims 1 and 2, followed by a validation stage in a new prospective cohort of patients.

**Scope**

<u>Background/Context</u>:

Contact isolation is increasingly used by hospitals nationwide, with over one quarter of inpatients at US hospitals in contact isolation. Being colonized with bacteria requiring contact isolation occurs primarily in the medically complex patient who has multiple preexisting illnesses and recent hospitalizations. In studying patients on contact isolation, this application focuses on the medically complex patient that is the objective of AHRQ K08 funding. Contact isolation is used on patients known to be colonized with antibiotic-resistant bacteria to prevent transmission to noncolonized patients. Isolated patients receive no direct benefit from being isolated. On the contrary, patients who are isolated may, in fact, be harmed in efforts to prevent infections in other patients. A multitude of potential adverse outcomes associated with being on contact isolation are recognized in national guidelines by the CDC and SHEA. However, no specific methods for recognizing and preventing these adverse outcomes has been developed or tested.

Settings/Participants:

The central data repository (CDR) is maintained by the Information Technology Group of the University of Maryland. The relational database has microbiology, pharmacy, ADT (admission discharge transfer), pathology, and radiology data. The pharmacy, microbiology, and medical demographics tables in the relational database have been regularly validated against medical records in more than 1,400 patients admitted between October 1997 and September 2008. For each of the projects in which we have used the relational database, a random 10% sample of cases and 5% of controls have been validated against medical chart reviews. The positive and negative predictive values of the data are greater than 99% when compared to patients' medical charts. The repository has been validated for infection control studies of antibiotic resistance.

This historical cohort consisted of patients admitted to the University of Maryland Medical Center (a 705-bed tertiary-care hospital located in Baltimore, Maryland) between February 2007 and January 2008. Patients were excluded for lack of complete electronic medical record. Four subcohorts of patients defined by diagnosis (acute myocardial infarction, heart failure, pneumonia, and those undergoing surgery) were assembled during the 1-year period to measure disease-specific hospital quality-of-care process of care indicators as a function of a patient having been on contact isolation. The primary outcome within each specific disease subcohort was the ratio of patients who have perfect quality-of-care scores (binomial). Secondary analyses focused on reaching individual quality-of-care measures (binomial).

A prospective matched cohort was utilized to assess adverse events (Aim 1.2), measures of depression and anxiety (Aim 1.3), and patient satisfaction (Aim 1.4). The cohort was formed from general (medical and surgical) inpatients who remained hospitalized on day 3. We identified patients on contact isolation (exposed) and matched them with sequential non-contact isolation (unexposed) patients in a 1:1 fashion. Standard hospital duration was chosen because length of stay has been an important confounding bias in prior studies.

Incidence/prevalence

Contact precautions were used on up to 25% of acute care hospitalized patients.

**Methods**

Aims 1 and 2 were investigated using a large historical cohort as well as a prospective cohort. Aim 3 was fulfilled through a randomized cluster trial.

**Results**

Principal findings: This grant was aimed at understanding the potential harms of patient isolation in the hospital. Through a series of experiments, we significantly advanced this field.

Outcomes: The PI has completed a Masters in Clinical Research and became recognized as an expert in Infection Control and Patient Safety, as demonstrated by recently being elected to the Governing Board of the Society for Healthcare Epidemiology of America (SHEA).

Previous studies of adverse events related to patient isolation were not replicated when more rigorous study designs were used. Likewise, depression and anxiety, which were associated with isolation, appeared to be due primarily to the confounding effect of patients who were more chronically ill having more depression or anxiety and being more likely to be isolated (and not caused by the isolation itself). Patients who were isolated tended to have lower satisfaction.

Discussion: Together, these results imply that isolation may not be as dangerous as previously thought. However, during the time of this K award, as last author on an AHRQ-funded cluster trial, I investigated universal isolation and found it decreased MRSA but not VRE.

Conclusions/Significance: These studies have informed the public debate over patient isolation. I've written pieces for JAMA and Infection Control and Hospital Epidemiology on the trend toward not using patient isolation and recently argued the pro side of a pro-con debate on patient isolation at our national meeting.

Implications: This K award has led me toward my current projects. One is examining the impact of patient isolation in nursing homes on a VA Merit award. I also have an AHRQ R01 under review, looking at patient isolation for the emerging disease *Clostridium difficile*.

**List of publications and products:**


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