PERCEPTION OF PATIENTS AND HEALTHCARE WORKERS (HCW) OF CONTACT PRECAUTIONS (CP) FOR MULTIDRUG RESISTANT ORGANISMS (MDRO)

by

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ABSTRACT

Background:

Contact precautions (CP) for multi-drug resistant organisms (MDRO) have and continue to be a controversial topic in the health-care setting. To control the spread of such organisms within hospitals, interventions involving patient isolation or patient quarantine are utilized. The aim of this study was to evaluate the quality of care for patients under CP isolation as well as healthcare worker perception of modified CP control to ultimately decrease the risks that are encountered from CP and to provide a more effective CP policy that serves patients and healthcare workers better.

Methods:

A mixed method study within an academic University-affiliated medical system was conducted. Patient care perception and healthcare worker perception were evaluated qualitatively via surveys for eight weeks (June2015-August 2015) with all ICUs assigned to the same strategy. Data was collected using anonymous, self-administered surveys. Four different surveys were distributed between the two groups: 100 patients under CP as well as 100 non-CP patients. A total of 100 health care workers were divided into two sub-categories based on expertise: physicians and nurses and then individuals who specialize in infection control.

Results:

A total of 200 patients and 100 healthcare workers were interviewed for this study. Using qualitative contact analyses, the interview transcripts showed no significant difference in the quality of care for patients under CP compared to non-CP patients. The average rate for healthcare worker compliance with PPE was 40-70%. Healthcare worker perception of modified CP protocol was evaluated and showed that PPE does not inhibit or limit the quality of care they provide to patients under CP. If contact isolation were to be removed, majority would feel comfortable caring for patients with only the utilization of hand hygiene (HH).

Conclusion:

Patient care and satisfaction for those under CP was not limited compared to that of non-CP patients. Proposed changes in CP protocol coupled with the comprehensive data collection detected no significant changes in MRDO acquisition and infection. This is important to public health because modifying CP protocol could facilitate and make the work of health care workers more efficient. Further research needs to be done to determine the cost effectiveness as well as waste management (gloves/gowns) of CP to determine its overall usefulness that may inhibit or enhance these findings. (Sponsored by Infection Control Department and Quality Departments UPMC Hospital System)

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PREFACE

I would like to thank my thesis director, Dr. Yassin from UPMC Mercy, Department of Infection Control, for his support and guidance for the past year. Dr. Yassin made working on this study not only enjoyable but helped solidify my future goals in clinical medicine. I appreciate you trusting me to work with you and your team.

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1.0 INTRODUCTION

Contact precautions (CP) for multi-drug resistant organisms (MDRO) have been a fundamental part of infection prevention. However, the extent and the details of CP continue to be a controversial topic in the health-care setting for several reasons. The use of these CP can be associated with adverse effects on patients such as psychological or physical problems[1]. This leads many to believe that CP may negatively impact several levels of patient care. However, to control the spread of organisms such as MDRO within hospitals, interventions involving patient isolation or patient quarantine are utilized. It is important to note that quarantine and isolation are not one in the same. Modern uses of isolation and quarantine have often but not always varied by the location of a disease outbreak. These measures are driven by the nature of the disease as well as the degree of risk of transmission as was evidenced by the response to tuberculosis and later HIV[2]. Both protect others by preventing the exposure to individuals who may have contracted a contagious disease. However, both require a different set of standards and care in regards to the patient.

Isolation is utilized for individuals who are ill with a contagious disease. While in isolation, they receive care for the disease with the placement of CP from healthcare workers. These include barrier precautions (gloves, masks, and gowns) as well as proper hand hygiene. Patient isolation can also be broken down based on the type of precaution necessary. Standard precautions are followed for all patients and require the use of any personal protective equipment (PPE) required for patient care. Transmission-based precautions require extra steps that must be

followed along with the standard precautions for illnesses caused by certain bacteria. Airborne precautions are needed for bacteria that can remain and travel in the air. The use of negative pressure rooms and respirators (N 95 mask) must be utilized by all who enter the patients' room must utilize the use of respirators. Finally, droplet precautions are used to prevent contact with mucus and other secretions from the nose and sinuses (throat, airways, and lungs). All who enter the patients' room should wear surgical masks.

Quarantine is defined as the restriction of activities of healthy persons who have been exposed to a communicable disease to prevent transmission during the incubation for the period of communicability[2]. In contrast to isolation, quarantine methods vary greatly due to the specific quarantine methods that are the most appropriate response to prevent transmission. The quarantine of definitive cases (persons known to be in close physical proximity and who have no protection from possible exposure to a probable case) is referred to as home quarantine where individuals are required to remain at home for 10 days with a follow up[2].

Nomenclature does not always fit the established definitions for these measures. In some areas, such as China, isolation and quarantine are used interchangeably.

1.1 CONTACT PRECAUTIONS

Intensive care units (ICUs) are high-risk settings for the transmission of MDRO such as methicillin- resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococcus (VRE), MDRO gram-negative rods as Carbapenem resistant (CRE), extended spectrum beta-lactamase (ESBL) producing, as well as Clostridium difficile[3]. This has led to increasing numbers of healthcare-associated infections (HAIs), which have a tremendous impact on patient

morbidity and mortality[4]. Contact isolation precautions are an infection control intervention utilized to reduce patient-to-patient or HCW to patient transmission of MDRO. The CDC recommends these additional measures "for all patients infected with target (MDROs) and for patients that have been previously identified as being colonized with tar-get MDROs[9]."

Antimicrobial resistance is endemic in many US hospitals with multiple outbreaks particularly in ICUs[1]. The prevalence of MDROs varies temporally, geographically, and by healthcare setting[10]. For example, VRE emerged in the eastern United States in the early 1990s[10]. The type and level of care also influence the prevalence of MDROs. There is plenty of evidence to support the use of CP in outbreak settings (Lin, W.R., et al. 2011). There is also epidemiologic evidence that suggests that a majority of MDROs are carried from one person to another via the hands of HCWs[17]. Hands of HCWs can be contaminated during the process of care-giving or from contact with environmental surfaces in close proximity to the patient[18,19]. Without adherence for hand hygiene and glove use, HCWs are more likely to transmit MDROs to patients. Therefore, strategies to increase and monitor adherence are important components of MDRO control and prevention programs[17]. The control of MDRO spread within hospitals requires more than one intervention. This type of bundle approach makes it difficult to estimate the true effect of each applied intervention. The exact benefit of CP has to be weighted against other costs and adverse events. Multiple studies have tried to address these questions with no clear answer as of yet.

1.1.1 Initiation of Contact Precautions

Successfully preventing infections will reduce the burden of MDROs in healthcare settings. Prevention of antimicrobial resistance depends on appropriate clinical practices that

should be utilized for all patient care. Successful control of MDROs has been documented in the United States and abroad using a variety of combined interventions. These include improvements in hand hygiene, use of CP until patients are culture-negative for a target MDRO, active surveillance cultures (ASC), education, enhanced environmental disinfection, and improvements in communication about patients with MDROs within and between healthcare facilities. This is known as the bundle approach, and these interventions can be applied in various combinations and degrees of intensity, with differences in outcome. Nearly all studies reporting successful MDRO control employed a median of 7 to 8 different interventions concurrently or sequentially[10].

Preceding literature indicates that no single approach to the control of MDROs is appropriate for all healthcare facilities. Many factors influence the choice of interventions to apply within an institution, these include, the type and significance of problem MDROs within the institution, as well as the population within the healthcare setting. The presence of high-risk patients (e.g., transplant, hematopoietic stem-cell transplant) and special-care units (e.g. adult, pediatric, and neonatal ICUs; burn; hemodialysis) influence surveillance needs and could potentially limit the areas of a facility targeted for MDRO control interventions[10]. Once interventions are implemented, ongoing surveillance should be used to determine whether selected control measures are effective and if additional measures are necessary. The result of this process should be to ultimately decrease MDRO rates to minimum levels.

1.1.2 Effect of Contact Precautions

The effect of CP on patient perception satisfaction continues to be debated. A case-control study used the Hospital Consumer Assessment of Healthcare Professionals and Systems

(HCAHPS) questionnaire to measure CP patient satisfaction. Patient's overall evaluation of the hospitalization was not affected by contact precautions; however, some HCAHPS measures were lower in patients under contact precautions[4,8]. Another study of inpatients found an association between CP protocol and lower HCAHPS scores for physician communication and staff responsiveness[4]. Fewer visits, delay in care and responsiveness may be associated with lower patient satisfaction, depression, anxiety, or preventable adverse events including falls, pressure ulcers, or hypoglycemia[5]. The data on harms of contact precautions are observational and should be interpreted as such. The Centers for Disease Control and Prevention (CDC) recommends that, while caring for patients on CP, hospitals should ''counteract possible adverse effects on patient anxiety, depression, and other mood disturbances; perceptions of stigma; reduced contact with clinical staff; and increases in preventable adverse events[9].

Contact isolation precautions likely play an important role in reducing transmission of multidrug resistant organisms and controlling outbreaks of pathogens. Many organisms including MRSA and VRE are spread primarily via patient-to-patient transmission, often from the hands and/or clothing of HCWs[8]. Thus, the use of isolation precautions is more often than not an accepted intervention in acute non-outbreak settings. However, the modification of CP is long overdue. The status of CP at many hospital systems is overwhelming for HCWs. The effects and perceptions of CP on patients as well as HCWs are necessary in order to take those steps toward establishing significant changes in MRDO acquisition and infection. This was the basis of our study, to see if contact precautions for MDRO are in fact truly beneficial and to what extent.

2.0 METHODS

2.1 STUDY DESIGN AND POPULATION

A prospective cross-sectional study within an academic University-affiliated center was conducted. Patient care perception and healthcare worker perception were evaluated quantitatively via surveys for eight weeks (June2015-August 2015) with all ICUs assigned to the same strategy. Data was collected using anonymous, self-administered surveys. Four different surveys were distributed between the two groups: 100 patients under CP as well as 100 non-CP patients. A total of 100 health care workers were divided into two sub-categories based on expertise: physicians and nurses and then individuals who specialize in infection control. Access to patient files was not utilized in order to conduct this study.

2.2 QUESTIONAIRE DESIGN

The questions for the surveys were formulated based on the current available literature. For healthcare workers, the survey included questions with pre-set categories based on demographics and beliefs on commonly used infection prevention practices and compliance rates. Healthcare workers were asked questions such as “Do you think PPE affects the time or frequency you have contact with your patient?” Open-ended questions were also utilized

regarding the potential benefits and harmful effects of contact isolation. For CP patients, surveys included questions based on perceptions of quality of care, knowledge as to why they were in isolation and potential delays that they may or may not have been experiencing. They were asked questions such as “Do you feel that your care has been worse under isolation?” Also “Do you know why you were placed in isolation?” Non-CP patients were asked similar questions based on age, gender, and quality of care during their stay.

2.3 STATISTICAL ANALYSIS

Excel was used for descriptive analysis and to measure the percentage of answers for each question from the survey. For this study, our results are simple descriptive data and were analyzed for hypothesis generating as opposed to hypothesis confirming.

3.0 RESULTS

3.1 CP PATIENTS

A total of 200 patients and 100 HCWs were included in the primary analysis. Characteristics of patients surveyed both under and not under contact precautions are outlined in Table 1. Of the 100 isolation patients who received the survey, 88% responded yes when asked if they knew why they have been placed under CP isolation. When asked if they had experienced reductions in the quality of care received while in isolation, 76% responded no and 75% of these patients responded no when asked if they had experienced delays in their care. Table 2 highlights these findings.

3.2 HEALTHCARE WORKERS

Of the 100 healthcare workers who received the survey, when asked how much they believed contact precautions reduce the transmission of MDRO, 43% of infection control specialists answered 20% (10/23) and 57% (44/77) of physicians and nurses responded with 40%. However, there's no evidence to support this. It is believed that the true impact is around only 1-2%. When asked if they believe PPE for isolation delayed their work, 74% (17/23) of infection control specialists responded yes and 51%(39/77) of physicians and nurses responded

yes. Regarding the time spent with patients who are under CP, 74% (17/23) and 46% (35/77) agreed that PPE does affect the amount of time and frequency spent with their patients. Regarding their compliance to the use of gloves and gowns when caring for patients under CP, 65% (15/23) of infection control specialists responded with 40-70% compliance while 74% of physicians and nurses responded with >70% compliance.

Table 1: Distribution of age and gender between CP and non-CP patients

Variable		n=100 CP patients	n=100 Non-CP Patients
Gender	Male	55	54
	Female	45	46
Age	>50	20	18
	50-70	71	58
	>70	9	24

Table 2: CP patients' responses to benefits and/or harms to isolation

Variable		n=100 CP Patients
Days in isolation	<2 days	8
	2-7 days	80
	>7 days	12
Assistance with feeding/restroom	Yes	28
	No	72
Knowledge to why in isolation	Yes	88
	No	12
Reduction in quality of care	Yes	24
	No	76
Experienced delays	Yes	25
	No	75
Spread MDRO after discharged	Yes	7
	No	93
Hand hygiene	Yes	95
	No	5

Table 3: Healthcare worker responses to perceptions of contact precautions and compliance

		n=23	n=77
		Infection control specialists	Healthcare workers
CP reduction of MDRO	5%	1 (4.35%)	1 (1.29%)
	10%	3 (13.0%)	10 (12.9%)
	20%	10 (43.5%)	22 (28.6%)
	40%	9 (39.1%)	44 (57.1%)
Does PPE delay care to patient	Yes	17 (73.9%)	39 (50.6%)
	No	6 (26.1%)	38 (49.3%)
Does PPE affect frequency with patient	Yes	17 (73.9%)	35 (45.4%)
	No	6 (26.1%)	42 (54.5%)
PPE compliance	<40%	4 (17.4%)	10 (12.9%)
	40-70%	15 (65.2%)	9 (11.7%)
	>70%	4 (17.4%)	58 (75.3%)
Patient evaluation discrepancies	Yes	16 (69.6%)	28 (36.4%)
	No	7 (30.4%)	47 (61.0%)

4.0 DISCUSSION

Surveys are a great tool to probe into the perceptions of both HCWs and patients under CP. It is not adequate to only report major side effects difference. The patients' satisfaction, delay of care and minor medication errors may not be life threatening but enough to make patients unsatisfied. The HCWs may be going to patient rooms tens of times per shift. CP puts significant pressure on their time and work flow. When isolation becomes a significant proportion of the patients, this could be easily translated to reduce compliance or major delays. Certainly waste management and the effect of medical waste on the environment can't be denied. Many institutions recently abandoned CP for many MDRO partly due to lack of established benefit and also due to the wide spread use of chlorhexidine bathing (decolonization) that is perceived to reduce colonization and potential to contaminate environment and other individuals.

The purpose of this study was to evaluate the quality of care for patients under CP isolation as well as healthcare worker perception of modified CP control to see if these protocols, in fact, decrease the risks of MRDO infections. Patient care and satisfaction for those under CP was not limited compared to that of non-CP patients. The quality of care for CP patients was not hindered as a result of CP protocol and a majority of the isolation patients believed that CP protocol is a necessary measure. Proposed changes in CP protocol coupled with the comprehensive data collection detected no significant changes in MRDO acquisition and

infection. However, modifying CP protocol could facilitate and make the work of health care workers more efficient.

Although many HCWs thought that CP isolation precautions prevented transmission, many were also concerned about several potential adverse outcomes. We found that although patient isolation is an important aspect of infection control, it may also negatively influence direct patient care. It was found that time spent by healthcare professionals in patient care is less frequent or shorter with patients in isolation, compared to that of non-isolation patients. Some healthcare workers and patients stated that the requirement to don a gown and gloves has created a barrier for healthcare workers, because it provides additional steps that need to be performed prior to entering the patients' room. Whether the less frequent contact or shorter time spent with patients is associated with adverse clinical outcomes is currently unclear, but deserves further study. Future studies to assess the adverse impact of isolation precautions should examine a broader array of safety indicators, as well as the psychological aspects and cost effectiveness.

There are limitations to this study. The surveys were self-administered and can therefore be response bias, specifically social desirability bias. This form of bias occurs when survey responders answer questions in a manner that would be considered to be favorable to the administrator. This can lead to under-reporting or over-reporting of the results. Also there was no data to thoroughly explore explanations for why individuals responded the way they did to certain answers. For example, why infection control specialists believed that CP reduces the spread of MDRO by 20 percent, while physicians and nurses believed that contact precautions reduce MDRO by 40 percent. The reported literature suggests that CP reduced MRSA infection by less than 1% in an endemic non-outbreak setting[4]. Given the controversial nature of this topic and the lack of data thus far that looks into healthcare worker and patient perception, we believe that our data has value. Our data provide themes for the potential for a more comprehensive

study that utilizes both qualitative and quantitative methods involving different groups that includes nurses, aides, administrators, attending physicians, residents, and patients.

5.0 CONCLUSION

Contact precautions are employed to isolate a patient who is colonized or infected with any number of MDROs. Patient's overall evaluation of the hospitalization was not affected by contact precautions; however, some CP measures were found to be lower in patients under contact precautions.

As the problem of antibiotic-resistant bacteria in healthcare institutions continues to increase, isolation procedures will remain and increase as a critical infection control intervention to reduce nosocomial transmission of MDROs. Healthcare facilities must not accept ongoing MDRO outbreaks or high endemic rates as the norm. With the selection of the appropriate infection control measures, all healthcare facilities can reduce the MDRO burden substantially. However, attention must also be paid to the potential adverse effects.

APPENDIX A: SAMPLE SURVEY QUESTIONNAIRE FOR PATIENTS AND HCWS

Non-CP patient questionnaire example

Question	Answer 1	2	3	4
What kind of health care worker are you	Attending phyician	Nurse	Physician fellow or resident	Nurse assitant or student
What kind of protective personal equipment (PPE) is required for contact isolation ?	gloves	gowns	gowns and gloves	
How much you think isolation reduces transmission of infection?	40%	20%	10%	5%
Do you think PPE for isolation delay your work?	Yes	No		
Do you think PPE affects the time or frequency you have contact with your patient ?	Yes	No		
What is NOT included in Standard universal precautions ?	hand hygiene before and after patient contact	glove use	gowns and gloves if blood fluid exposure is anticipated	
if Contact isolation is removed (Q 7-9)				
if Contact isolation is removed; Would you feel comfortable caring for your patient ?	Yes	No		
if Contact isolation is removed ; Would you feel comfortable if you have good hand hygiene (HH) ?	Yes	No		
if Contact isolation is removed; Would you feel comfortable if you wear gloves for every patient contact and perform HH ?	Yes	No		
Rate your compliance with wearing gownswhen caring for patients in contact isolation	>70%	40- 70%	< 40%	
Do you think you evlauate your patient in isolation for a shorter time or less frequently	Yes	No		

APPENDIX B: SURVEY QUESTIONNAIRE DATA FOR PATIENTS AND HCWS

DATA SPREAD SHEET OF ANALYZED NON-CP PATIENTS (FIRST 20 PATIENTS)

Patient	Is the patient in contact isolation ?	Are you male or female?	How old are you?	Do you need help going to the bathroom or feeding?	Have you ever been in isolation before?	If you were did you feel any difference in the care under isolation?	What would worry you the most if you were in isolation?	Do you think you face delay in your care in case of emergency or urgent need ?	As a patient do you wash your hands or use hand sanitizer frequently?
23	no	female	<50	yes	yes	was not in isolation	delay in admission and procedures	no	no
46	no	female	<50	yes	yes	was not in isolation	delay in admission and procedures	no	no
89	no	female	<50	yes	yes	was not in isolation	delay in admission and procedures	no	no
77	no	female	<50	yes	yes	was not in isolation	delay in diet or room cleanliness	no	no
17	no	female	<50	yes	yes	was not in isolation	delay in nursing care	no	no
26	no	female	<50	yes	yes	was not in isolation	delay in physician care	no	no
58	no	female	<50	yes	yes	was not in isolation	delay in physician care	no	no
15	no	female	<50	yes	no	was not in isolation	delay in nursing care	yes	no
4	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
5	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
11	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
12	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
14	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
21	no	female	<50	yes	no	no	delay in admission and procedures	no	yes
30	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
31	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
32	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
35	no	female	<50	yes	no	was not in isolation	delay in admission and procedures	no	yes
36	no	female	>70	yes	no	was not in isolation	delay in admission and procedures	no	yes

APPENDIX C: DISTRIBUTION OF MDRO CASES FROM OCTOBER 2014 – JANUARY 2015

Organism			Oct/14	Nov/14	Dec/14	Jan/15	
LT	CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)	CR	658	850	780	724	CP
	EXTENDED-SPECTRUM -LACTAMASE (ESBL)	ES	1613	1635	1892	1818	CP
	MDRO ACINETOBACTER BAUMANNII (AB)	AB	599	669	646	781	CP
	MDRO GRAM NEGATIVE RODS (GNR)	GN	3875	3781	3558	4070	CP
	METHICILLIN RESISTANT STAPH AUREUS (MRSA)	MR	10645	10139	10419	11705	CP
	VANCOMYCIN INTERMEDIATE STAPH AUREUS (VISA)	VI		1	17	10	CP
	VANCOMYCIN RESISTANT ENTEROCOCCUS (VRE)	VR	9884	9283	10127	11123	CP
	VANCOMYCIN RESISTANT STAPH AUREUS (VRSA)	VS				4	CP
ST	BACTERIAL MENINGITIS	MN				2	DROPLET
	CLOSTRIDIUM DIFFICILE (CD)	CD	1531	1439	1457	1842	CP
	GASTROINTESTINAL ISSUES	GI		1	14	33	DROPLET
	H1N1	HN				2	DROPLET
	INFLUENZA	FL	4	68	1274	2303	DROPLET
	NOROVIRUS	NV	2	13		2	DROPLET
	NOT SPECIFIED	NS	33	41	24	30	DROPLET
	RESPIRATORY ISSUES	RI	1162	1288	2174	2660	DROPLET
	roll out TB	RT	34	15	12	21	DROPLET
	TUBERCULOSIS (TB)	TB	4	3	2	32	AB
	VARICELLA	VZ	13	27	28	14	AB

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