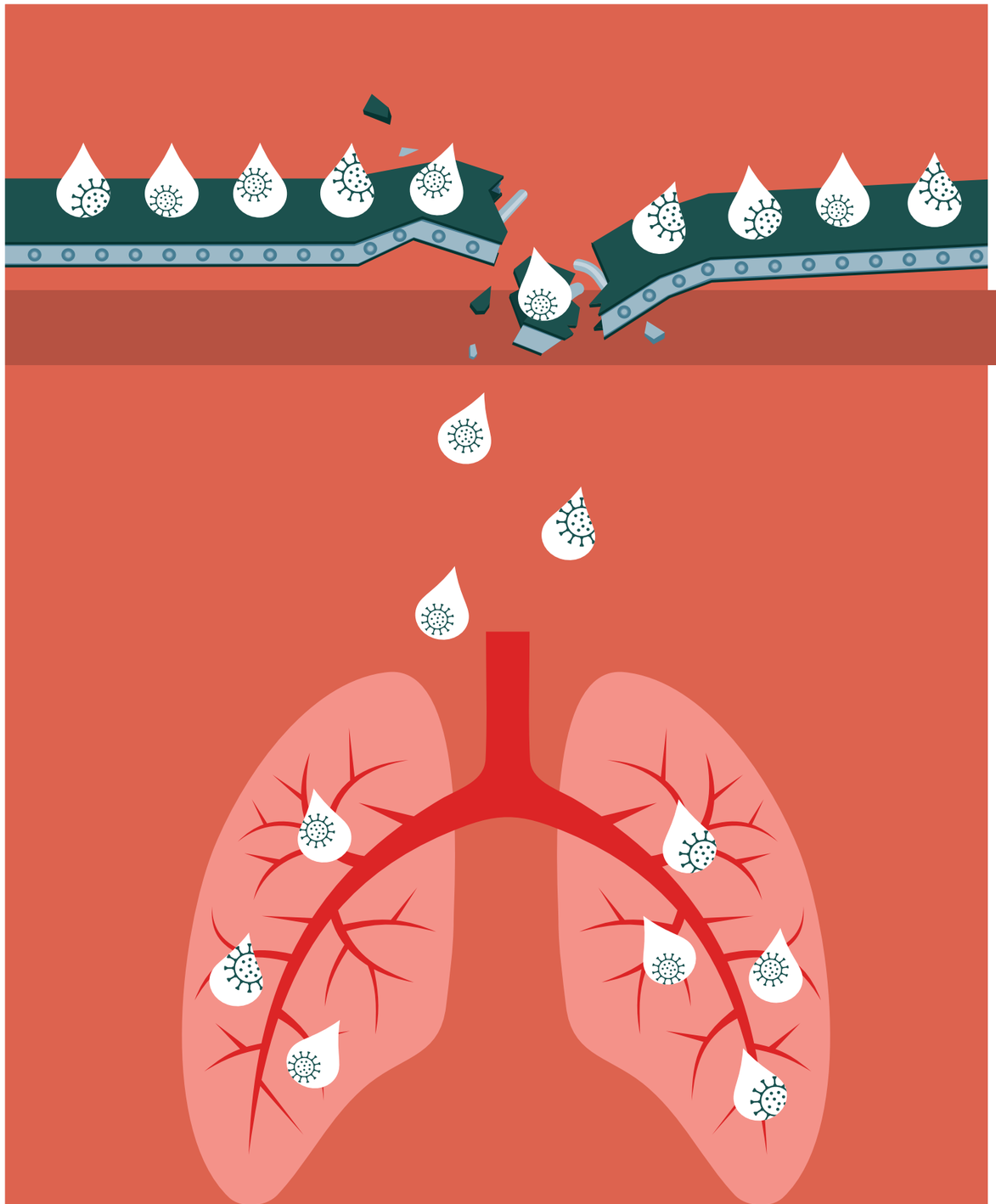

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Process Failures That Increase the Risk of Infection Through Respiratory Droplets:

A Study of Patient Safety Events Reported by Hospitals Across Pennsylvania

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Respiratory pathogens can lead to pneumonia, bronchiolitis, and death. Rapid identification, along with appropriate standard and isolation precautions, are necessary to prevent the spread of infectious agents causing respiratory infections. We analyzed patient safety events reported to the Pennsylvania Patient Safety Reporting System that were related to viruses and bacteria spread through respiratory droplets. An analysis of events that occurred from January 1, 2019, through December 31, 2019, led to the identification of 338 events involving process failures related to recognizing infectious agents that are spread through respiratory droplets, implementing measures to prevent their spread, or providing timely treatment. Detailed analysis of the process failures showed that 54.9% were associated with processes in testing or processing of laboratory specimens; 29.7% were associated with isolation-related procedures; and 15.4% were associated with medications, triage/assessment, documentation/verbal communication, or not providing the standard of care for patients in missed/delayed orders, procedures, or referrals. Implementation of risk-reduction strategies can help to further reduce the spread of pathogens through respiratory droplets in the hospital setting and further enhance patient safety. These strategies include evaluating collection processes for testing/laboratory specimens, consistently using empiric isolation precautions based on initial triage and patient presentation, and evaluating processes for admissions and transfers.

Keywords: *respiratory, pneumonia, isolation, droplet precautions, influenza, syncytial*

Introduction

In the United States, an estimated 21 million patients seek medical treatment for respiratory infections each year.[1] Severe respiratory infections such as croup, bronchiolitis, and pneumonia are caused by bacterial and viral agents spread through respiratory droplets.[2-5] Most viral pneumonias in the United States are caused by influenza and

Most viral pneumonias in the United States are caused by influenza and respiratory syncytial virus (RSV), but other causes of viral pneumonia include human metapneumovirus, human parainfluenza virus, rhinovirus, coronavirus, adenovirus, and measles.[6-9]

respiratory syncytial virus (RSV), but other causes of viral pneumonia include human metapneumovirus, human parainfluenza virus, rhinovirus, coronavirus, adenovirus, and measles.[6-9] Other infectious illnesses, such as mumps, rubella, meningitis, and pertussis, are also spread through respiratory droplets.[10]

Numerous outbreaks of infectious agents (e.g., influenza, rhinovirus, RSV, measles, and pertussis) have been described in hospital settings.[11-20] Thus, streamlined processes to quickly identify patients and staff that may be contagious, effectively isolate or exclude those individuals, and efficiently treat the suspected infection have the potential to significantly reduce the spread of nosocomial (i.e., hospital-associated) infectious agents through respiratory droplets.[21]

In order to determine the types of process failures that may place patients and staff at the greatest risk for exposure to infectious agents that cause respiratory infections or are spread through respiratory droplets, we examined patient safety events submitted to the Pennsylvania Patient Safety Reporting System (PA-PSRS)* that were related to failures in the processes of early identification and prevention of the spread of infectious agents through respiratory droplets. Based on our analysis and a review of the medical literature, we developed risk-reduction strategies to help guide facilities to improve staff and patient safety.

Methods

We queried the PA-PSRS acute care database for events that occurred from January 1, 2019, through December 31, 2019. We searched free-text fields (i.e., Event Details, Event Recommendations, and Event Comments) for keywords relating to viral or bacterial agents that are spread through respiratory droplets: "RSV," "syncytial," "influenza," "adenovirus," "coronavirus," "rhinovirus," "enterovirus," pertussis," "metapneumo," "meningitis," "mumps," "measles," "rubella," and "rubeola." These keywords were selected based on common viral agents detected in a typical laboratory respiratory panel and other highly infectious diseases that can be spread through droplets, such as pertussis, meningitis, mumps, and rubella.[10,21,23-26] The keyword "rubeola" was included because measles is also highly infectious; causes symptoms similar to that of rubella (e.g., cough, runny nose, sore throat, and rash); and is spread through small respiratory droplets.[26,27]

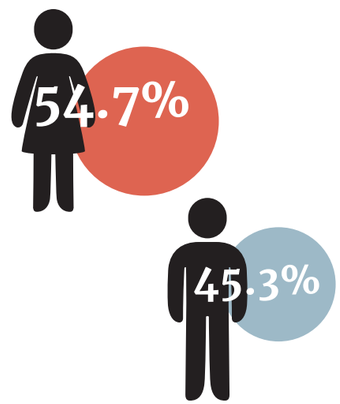
An analyst manually reviewed each report to identify events that included process failures related to early identification and prevention of the spread of infectious agents through respiratory droplets. Specifically, we included events with process failures related to identification of an infectious agent through testing and processing of specimens; prevention of the spread of the potential infectious agent through isolation and precautions; medications/treatment; initial triage or assessment; documentation or verbal communication; or missed/delayed orders, procedures, or referrals. Several events included multiple process failures, which were analyzed individually. We excluded events that did not directly relate to identification, isolation, containment, or treatment to eliminate an infectious agent, such as transfers to higher levels of care, canceled procedures, vaccination errors, additional complications, or delayed delivery of oxygen.

Results

The initial query of the PA-PSRS acute care database produced 602 events that occurred in 2019. An analyst manually reviewed the details for each event and identified 338 events that met inclusion criteria. All 338 events were reported by hospitals.

Patient age/gender

For the 338 event reports, 54.7% occurred in females and 45.3% occurred in males. In **Figure 1**, we present the number of events by the following age groups: 0 through 5 years (young children), 6 through 18 years (school-aged children), 19 through 35 years (young adults), 36 through 64 years (middle-aged adults), and 65 years and older (older adults). Patients 5 years and younger (32.2%) or 65 years and older (25.4%) were most frequently associated with the included events.



Harm Scores

Facilities assigned harm scores to each event at the time of reporting. **Figure 2** summarizes the frequency of harm scores, which ranged from A–E. No events were assigned harm scores F–I, meaning that no events led to a temporary harm that resulted in initial or prolonged hospitalization, permanent harm, near-death, or death. Harm score C was most frequently associated with the events analyzed (50.9%, **Figure 2**).

Figure 1: Percentage of Events by Age Group, N=338

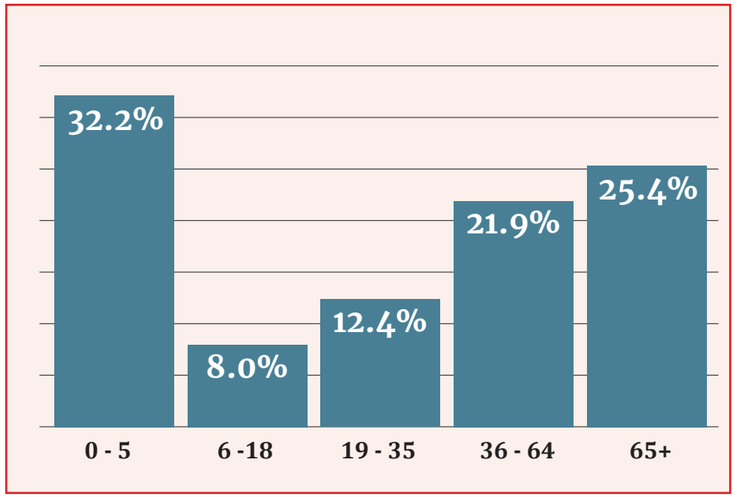
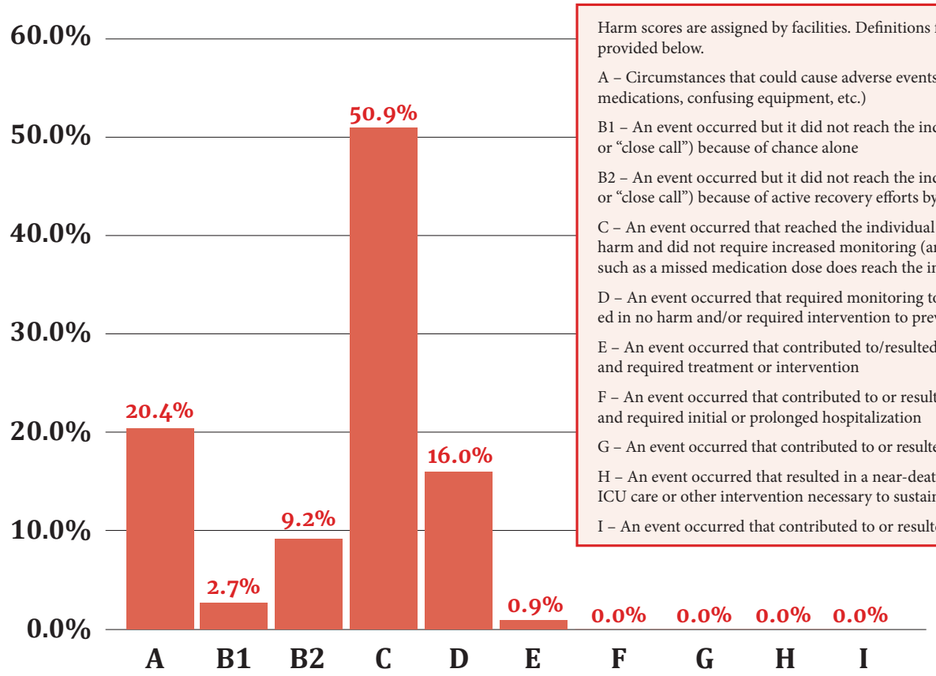


Figure 2: Percentage of Events by Harm Score, N=338



Harm scores are assigned by facilities. Definitions for each score are provided below.

A – Circumstances that could cause adverse events (e.g., look-alike medications, confusing equipment, etc.)

B1 – An event occurred but it did not reach the individual ("near miss" or "close call") because of chance alone

B2 – An event occurred but it did not reach the individual ("near miss" or "close call") because of active recovery efforts by caregivers

C – An event occurred that reached the individual but did not cause harm and did not require increased monitoring (an error of omission such as a missed medication dose does reach the individual)

D – An event occurred that required monitoring to confirm that it resulted in no harm and/or required intervention to prevent harm

E – An event occurred that contributed to/resulted in temporary harm and required treatment or intervention

F – An event occurred that contributed to or resulted in temporary harm and required initial or prolonged hospitalization

G – An event occurred that contributed to or resulted in permanent harm

H – An event occurred that resulted in a near-death event (e.g., required ICU care or other intervention necessary to sustain life)

I – An event occurred that contributed to or resulted in death

*PA-PSRS is a secure, web-based system through which Pennsylvania hospitals, ambulatory surgical facilities, abortion facilities, and birthing centers submit reports of patient safety–related incidents and serious events in accordance with mandatory reporting laws outlined in the Medical Care Availability and Reduction of Error (MCARE) Act (Act 13 of 2002).[22] All reports submitted through PA-PSRS are confidential and no information about individual facilities or providers is made public.

Process Failure Analysis

To gain a better understanding of steps needed to prevent the spread of infectious agents through respiratory droplets and to enhance staff and patient safety, we further analyzed the types of process failures identified in the event reports. Eighteen events involved two or more process failures. Thus, a total of 357 process failures were further analyzed. The process failures were categorized into three main categories: process failures in testing or processing of specimens (54.9%); process failures in isolation procedures (29.7%); and other process failures (15.4%), such as those related to medications; triage or initial assessment; documentation or verbal communication; or missed or delayed orders, procedures, or referrals (see **Figure 3**).

Specimens/Testing

We further subcategorized the types of process failures related to testing or specimens. A total of 38.8% (76 of 196) of process failures for testing or specimens were related to errors involving the specimen container, such as selection of the wrong tube, swab, or media for specimen collection, or labeling errors, such as no label, wrong patient identification, or a missing label for specimen source. Another 24.5% (48 of 196) of process failures were related to specimen collection and processing. These types of process failures involved delays in specimen collection, delays in processing of specimens in the laboratory, or the quality or quantity of the specimen received.

A total of 15.3% (30 of 196) of the process failures involved errors in entering orders by the bedside team (i.e., physicians and nurses) or by laboratory staff when selecting laboratory tests based on paper requisitions or electronic orders. Specifically, events involved duplicate or missing orders; errors in entry from paper requisitions; confusion between similar types of respiratory panel tests (e.g. influenza/RSV, rapid influenza, and respiratory panels) or confusion among two tests for measles caused by different viruses (e.g. rubella versus rubeola). Another 12.8% (25 of 196) of these process failures were related to communication of incorrect laboratory results to the bedside team, missed alerts for critical results, or communication of incorrect lab results during verbal report.

An additional 8.2% (16 of 196) of the process failures were related to delays in transport of specimens to the laboratory, packaging of the specimens from several different patients into a single transport bag or container, or not attaching a printed order with the specimen.

Isolation/Precautions

We further subcategorized the process failures related to isolation or precautions. A total of 34.0% (36 of 106) of these process failures related to transfer of a patient with potentially contagious illness without placing a mask on the patient. Another 28.3% (30 of 106) of the events related to failures in isolating the patient while ruling out the diagnosis of an infectious agent spread through respiratory droplets. These types of errors related to not implementing isolation precautions while the patient was being tested for a potentially infectious agent, admission or transfer of a patient into a double occupancy room prior to completion of testing, or errors in following the protocols for isolation precautions while ruling out a diagnosis for a potential infectious agent.

A total of 18.9% (20 of 106) of these process failures were related to errors in following the isolation procedures after a patient already tested positive for an infectious agent spread through respiratory droplets. These types of process failures involved delays in isolating the patient; attempts to admit the patient into a double occupancy room; confusion in differences between contact, droplet, or airborne isolation protocols; or lack of signage for isolation or precautions.

Another 16.0% (17 of 106) related to process failures that resulted in exposure or development of a hospital-acquired infection (HAI) from an infectious agent spread through respiratory droplets. For many of these, the specific process failure that occurred was difficult to determine from the event report description. These failures were identified as exposures to or development of an HAI when a patient and/or their roommate developed symptoms and tested positive for an infectious agent spread through respiratory droplets several days after admission, when the patient was later identified to have an infectious agent and had not been placed in isolation precautions, or when a patient who tested positive for an infectious agent was placed in a room with another patient because no other rooms were available to appropriately isolate the patient.

A total of 2.8% (3 of 106) of isolation process failures related to miscellaneous factors, including a visitor seeing multiple patients, a patient diagnosed with an infectious agent leaving the hospital, and lack of appropriate personal protective equipment (PPE) or supplies outside an isolation room for providers.

Other Process Failures

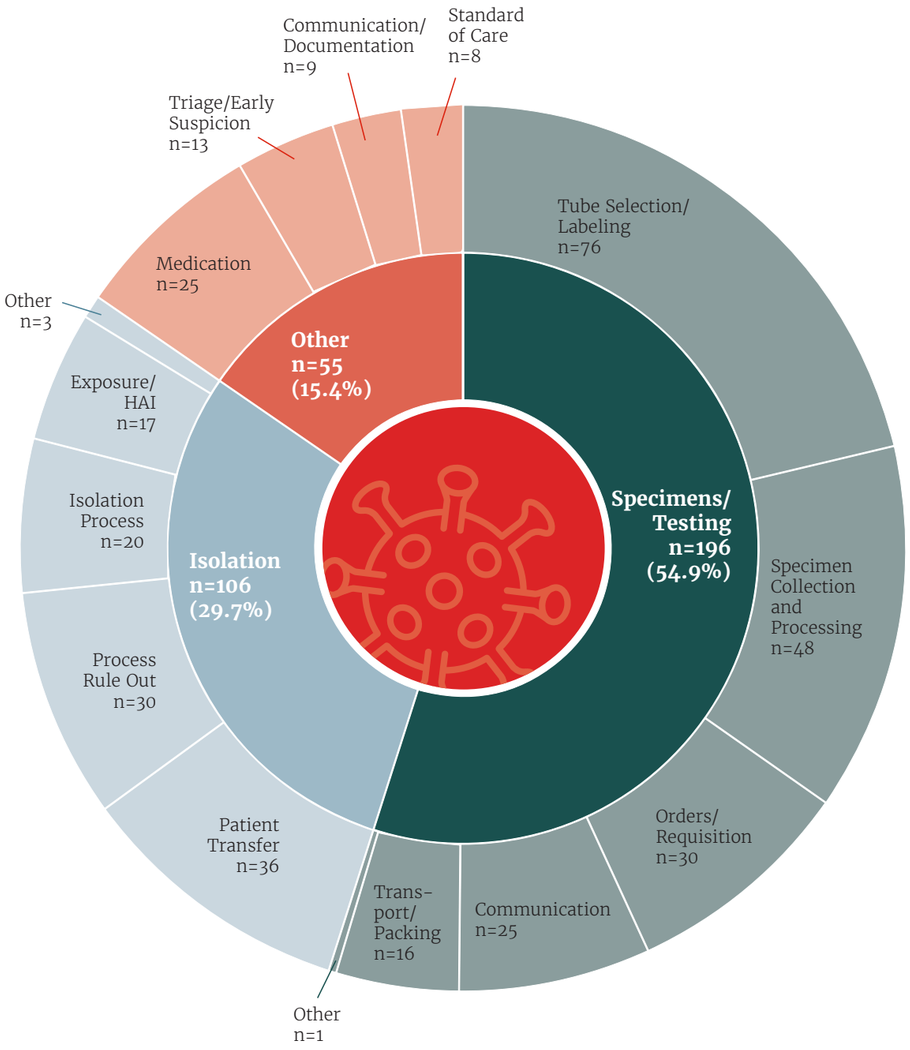
We further categorized the other types of process failures. A total of 45.5% (25 of 55) of these process failures were related to medications. These process failures were related to errors in dosing or timing, delays, or missed doses of antibiotics or antivirals. One medication process failure was related to the weight of the patient not being provided to the pharmacy. A total of 23.6% (13 of 55) of other process failures were related to not recognizing signs or symptoms of a potential infectious agent spread through respiratory droplets during triage or during initial assessment. They were categorized separately from isolation failures because they relate to process failures in associating the signs and symptoms with those caused by an infectious agent versus process failures in the specific isolation steps. These types of process failures included patients that were later realized to have presented with signs or symptoms of a highly contagious infectious agent yet remained in the waiting room area or without appropriate isolation precautions following triage, were not recognized as potentially contagious upon assessment by the initial providers, or were admitted to inpatient areas before a provider recognized the symptoms and ordered appropriate testing and isolation.

Another 16.4% (9 of 55) of other process failures were related to errors in communication or documentation. These process failures included entry of incorrect test results or patient information into the chart, or errors in verbal reports at admission, transfer, or shift change. A total of 14.5% (8 of 55) of other process failures were related to errors in maintaining the standard of care, such as missed orders from the standard hospital protocols for the diagnosis, providers not completing tests (e.g., lumbar puncture) prior to transfer to another unit, or missed or delayed referrals.

Admission/Transfer

Of the 357 process failures, we also noted that a combined 22.7% of the process failures were related to admission or transfer of the patient. These process failures were related to admission and transfer occurred across all three process failure categories, including testing/specimens (n=9), isolation (n=60), and other (n=12).

Figure 3: Process Failures in Preventing the Spread of Infectious Agents, N=357



Children ages 5 and younger and patients ages 65 and older are most at risk for complications or death from respiratory pathogens.[1,42]

Process Failures by Care Area and Age Group

The 357 process failures were further analyzed based on the care area where the events occurred (**Figure 4**). The process failures occurred over 20 care area groups. Process failures were most frequently associated with the emergency department (31.9%; 114 of 357), medical/surgical unit (21.3%; 76 of 357), laboratory (13.7%; 49 of 357), intensive care unit (ICU; 6.4%; 23 of 357), pediatric unit (5.3%; 19 of 357), and pediatric intensive care unit (PICU; 5.3%; 19 of 357). Testing or specimen-related errors most frequently occurred in the emergency department, which represents 36.2% (71 of 196) of the testing or specimen process failures. However, process failures also occurred in the laboratory, ICU, medical/surgical unit, pediatric unit, and PICU. A combined 69.8% (74 of 106) of process failures in establishing proper isolation or precautions occurred in the medical/surgical and emergency care area groups. Similarly, a combined 54.5% (30 of 55) of other process failures occurred in the medical/surgical and emergency care area groups.

Figure 5 shows the 357 process failures cross tabulated with the patient age groups. Testing or specimen process failures were most frequent among patients who were age 0 through 5 years (43.3%; 85 of 196), while isolation process failures were most frequent among patients who were age 65 and over (48.1%; 51 of 106).

Figure 4: Cross Tabulation of Care Area Group with Process Failure Categories, N=357

	Process Failure Category			
Care Area Group	Testing/ Specimens	Isolation	Other	Grand Total
Administration		1	1	2
Emergency	71	26	17	114
ICU	12	7	4	23
Imaging/Diagnostic	2		1	3
Intermediate Unit	5	4	1	10
Labor and Delivery	3	2	2	7
Laboratory	48	1		49
Med/Surg	15	48	13	76
NICU	3	2		5
OB–GYN Unit	1		4	5
Other	2	3	4	9
Outpatient/Clinic	2	1		3
Pediatric	13	4	2	19
Pharmacy			1	1
PICU	14	2	3	19
Psychiatric Unit		1		1
Rehab Unit	1			1
Respiratory	1			1
Specialty Unit	3	3		6
Surgical Services		1	2	3
Grand Total	196	106	55	357

Discussion

Infection prevention requires efficient coordination of many hospital processes during a patient's stay. Rapid diagnosis of a contagious illness is essential not only to ensure timely treatment of patients but also to prevent the spread of disease. In fact, processes that lead to timely identification of the signs and symptoms of a contagious illness (e.g., fever, cough, and rash) as well as recent travel history are ever more critical in preventing the spread of novel infectious diseases (e.g., COVID-19 or other emerging infectious diseases), which can quickly spread through communities, may have increased risk of morbidity, and for which initial testing may not be immediately available.[28,29] Thus, accurate and timely assessment of signs and symptoms along with effective screening and surveillance programs are crucial for infection prevention.[30,31] The laboratory plays a key role, especially when rapid testing and accurate results are essential to infection prevention.[30,32-36] Furthermore, cohorting and isolation of patients with initial symptoms, along with appropriate use of standard, droplet, and contact precautions, may also significantly reduce the risk for spread of infections.[37-39] Finally, efficient delivery of treatments, such as antivirals and antibiotics, may improve outcomes, and theoretically reduce infectiousness of the infectious agent.[40,41]

Figure 5: Cross Tabulation of Age Group with Process Failure Categories, N=357

	Process Failure Category			
Age Group	Testing/ Specimens	Isolation	Other	Grand Total
0 – 5	85	12	15	112
6 – 18	21	2	4	27
19 – 35	25	9	9	43
36 – 64	34	32	14	80
65+	31	51	13	95
Grand Total	196	106	55	357

Review of the literature shows that children ages 5 and younger and patients ages 65 and older to be most at risk for complications or death from respiratory pathogens.[1, 42] Given the increased risk of severity of respiratory illnesses in these age groups, it is concerning that we also found these same groups associated with more frequent event reports related to infectious agents spread through respiratory droplets (**Figure 1**). However, it is difficult to draw conclusions regarding this observation as the increased events related to respiratory pathogens also could have simply resulted because more patients in these age groups sought care, which would in turn increase the likelihood of a reportable event.

Our analysis of PA-PSRS-reported events identified process failures that were similar to those described in the literature as contributing factors to nosocomial outbreaks of infectious agents, such as influenza, rhinovirus, RSV, measles, and pertussis.[11-20] These same process failures related to delayed suspicion, delayed identification, and delayed treatment of infectious agents.[11-20] Thus, opportunities to reduce these types of process failures have the potential to reduce the spread of infectious agents in the hospital setting and to improve staff and patient safety.

Risk-Reduction Strategies

Our analysis has shown that the types of process failures identified in our study often involve systems problems, human factors, or knowledge deficits. Specific areas for implementation of process improvements or monitoring are outlined below and are summarized in **Table 1**.

Laboratory Samples

In our analysis of events related to agents spread through respiratory droplets, 54.9% of the 357 events involved testing or specimen process failures. Of these, 47.0% were related to selection of the incorrect tube/swab/media, not ensuring the lid was secure, not properly packaging for transport to the laboratory, not labeling samples, or labeling of tubes with the wrong patient name. These are relatively basic processes, but errors resulted in recollection of samples, delays in patient care, potential delays in isolation, and potential delays in admissions or discharges from the emergency department. Furthermore, 15.3% of these errors were related to difficulties in entering orders by physicians, nurses, or laboratory staff; many of these difficulties specifically related to confusion between similar types of tests, such as combination influenza/RSV tests, rapid influenza, and reflex orders for respiratory panel testing.

Risk-reduction strategies include automation for specific specimen collection instructions to be provided to the staff who will collect the specimen when laboratory tests are ordered. These instructions would include the specific type of tube/media/swab to be used and instructions for how to collect the sample. Other risk-reduction strategies include providing additional staff development/training with physicians and staff about available laboratory testing for infectious agents spread through respiratory droplets, how to properly enter orders for these tests, how to properly collect samples, which types of tubes/swabs/media are needed, and packaging/transport requirements for specimen delivery. Tables/charts of available tests and types of recommended swabs/media for collection could offer a way to stratify this information into easy-to-use references for staff to access.[43]

Reinforcing policies and procedures through staff and physician champions as well as through orientation and staff training programs are also important steps in quality improvement and error reduction methods.[44-46] A hospital collaborative also specifically addressed labeling errors of blood samples and noted that changes in workflow for printing labels, changes in staffing workloads, use of a patient-specific binder system, monthly laboratory/nursing staff meetings, mandatory competencies for specimen labeling processes, information technology system improvements in label printing, and increased leadership involvement through dashboards

Rapid diagnosis of a contagious illness is essential not only to ensure timely treatment of patients but also to prevent the spread of disease.

were all important interventions in changing the culture and improving specimen labeling processes.[47-49]

Isolation/Precautions

Nearly one-third (29.7%) of the 357 analyzed process failures were related to isolation procedures and use of PPE and resulted in HAIs or potential exposure of patients and staff to infectious agents spread through respiratory droplets. Moreover, 28.3% of the isolation-related process failures involved not initiating isolation precautions while waiting on test results. Although standard precautions include many effective infection prevention processes, such as handwashing and use of gloves, masks, or gowns when there is potential for contact with body fluids or splashes, these precautions alone may not be effective in preventing the spread of infectious agents through respiratory droplets. The use of eye protection in addition to masks and handwashing have been found to be key measures to prevent the spread of infectious agents through respiratory droplets to other healthcare workers or patients.[21,39,50] Furthermore, standard precautions require that each provider uses assessment and critical thinking skills for each patient encounter to determine what PPE may be needed. Thus, other staff, such as laboratory, respiratory, radiology, nurse aides, or housekeepers, may be placed at additional risk for exposure when entering these patient rooms if isolation protocols are delayed until after testing is completed.

Thus, risk-reduction strategies include establishment of empiric processes to initiate isolation precautions based on triage and/or initial nursing or physician assessment.[51] Bundling specific isolation orders with laboratory testing orders until the test results are returned can help ensure that the orders are not missed or delayed and that the appropriate type of precautions (such as airborne or droplet) are implemented.[52,53] These types of processes, especially when implemented in all areas of the hospital (including the emergency department, physician offices, urgent care, and inpatient units) can ensure that other patients and staff are not exposed while the testing is performed to rule out the potentially infectious agent.

Moreover, 52.9% of the isolation process failures were related to either errors in following isolation procedures or transferring patients who tested positive for an infectious agent without a mask. Again, bundling these isolation order sets together can help ensure that all steps for setting up isolation are implemented.[52,53] Examples include bundling droplet precaution orders to include instructions for a mask for the patient during transfer; a private isolation room for admission; orders for droplet/contact precautions; specific PPE, such as mask, eye protection, gown, and gloves, to be worn during patient care; and signs or PPE to be placed outside the patient room. Similarly, bundled airborne precaution orders should also include orders to place a surgical mask on the patient during transfer,

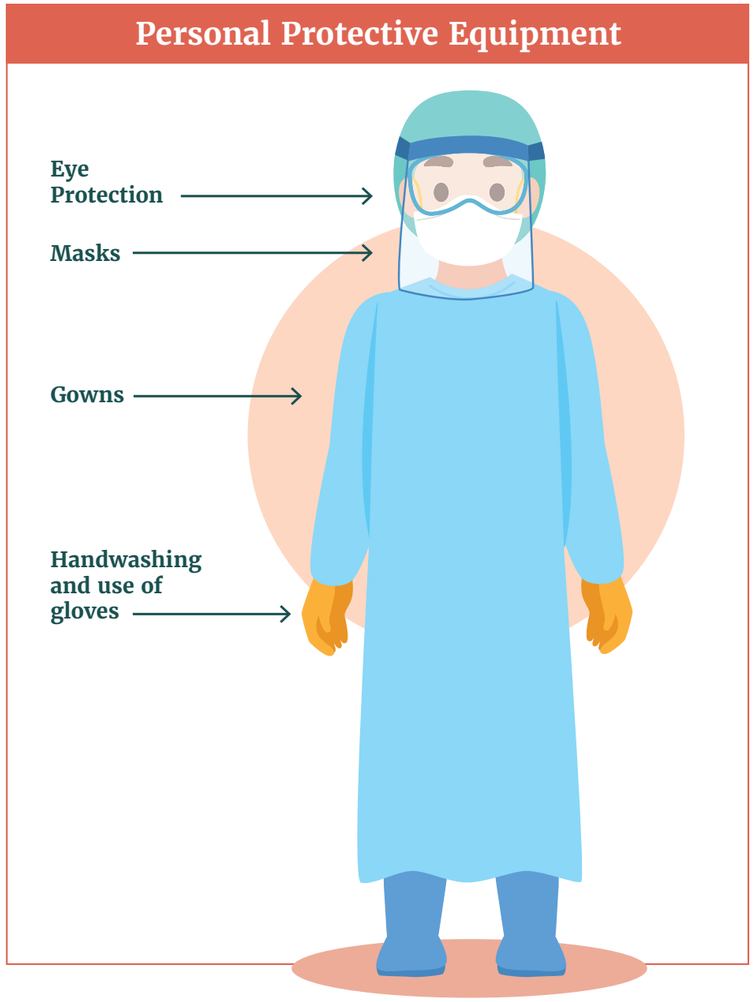


Table 1: Risk-Reduction Strategies to Reduce Process Failures that Contribute to Spread of Infectious Agents

Risk-Reduction Strategies	
Laboratory Samples	Automate inclusion of instructions for specimen collection when laboratory orders are entered Implement continuous quality improvement programs to monitor/improve 1. Workflow processes 2. Staffing 3. IT system processes 4. Leadership involvement 5. Specific processes, such as patient/binders for labels[48] Staff development training to include 1. Available laboratory testing 2. How to order specific laboratory tests 3. How to collect samples/specimens 4. Types of tubes/swabs/media that are needed for each type of specimen 5. Packaging/transport requirements to specimens 6. Reference tables and charts of available tests[43] a. Recommended tubes/swabs/media b. Collection method c. Specific order names to select in electronic medical record (EMR) Reinforce policies and procedures 1. Identify staff and physician champions 2. Orientation/residency programs 3. Monthly meeting of laboratory and nursing staff 4. Mandatory competencies on specimen labeling
Isolation/ Precautions	Establish empirical policies and procedures based on initial triage, assessment, and symptoms Bundle specific laboratory testing with isolation orders[52,53] Bundle isolation orders into sets[52,53] 1. Type of precautions (e.g. contact, droplet, airborne) 2. Type of personal protective equipment (PPE) a. Gloves b. Type of mask c. Gown d. Eye protection 3. Transport a. Place mask on patient b. Communicate to receiving unit c. Verify if oxygen is needed 4. Private isolation room a. Signs placed outside of room b. Negative-pressure room (if needed) c. Area to don and doff PPE
Admission and Transfer	Review system processes 1. Standard of care – protocols/order sets for each diagnosis 2. Handoff/communication a. Standardize handoff reports between nurses b. Standardize handoff reports between physicians c. Standardize handoff for transport team 3. Admission room assignment protocols

a private patient room with negative air pressure, and PPE orders to include use of N95 respirators or positive-pressure purifying respirators (aka powered air-purifying respirators, or PAPRs) for staff caring for patients. Ultimately, these types of bundled orders may reduce the risk for additional exposures or HAIs.

Admission and Transfer

Events involving the admission or transfer of a patient were identified in 22.7% of all process failures analyzed. Admissions and transfers of care from one department or facility to another represent vulnerable points in the coordination of care for patients.[54,55] At times, these processes could potentially be hurried by pressures to reduce the patient's time in the emergency room. Process failures include missed collection of specimens prior to admission and admission of patients into a double occupancy room while tests were pending or even after positive results were found. Furthermore, other process failures included nurse-to-nurse handoff/report errors, missed communication of isolation orders or test results during patient transfers to other units, and medications that were delayed or not given prior to admission.

Thus, recommended risk-reduction strategies include closer examination of the processes to maintain the standard of care for each diagnosis, such as developing written or electronic protocols or order sets for specific diagnoses, identifying communication requirements during provider or shift changes, and strengthening protocols for assigning patients to specific rooms based on their suspected diagnosis. Additional education and communication requirements with transport teams may help to ensure placement of a surgical mask on a patient during transport and to verify if other equipment, such as oxygen, is needed.

Limitations

It is important to note that many other processes in the hospital are also key to the prevention of the spread of infectious agents, and despite mandatory event-reporting laws in Pennsylvania, our data are subject to the limitations of self-reporting. This may be more likely for process failures that occur when a specific patient was not identified. It is also important to note that harm and the significance related to process failures in the steps to isolate and contain potentially infectious agents may not be immediately realized, and therefore, not reported. Thus, the number of events and severity of the outcomes may be more substantial than those captured through event reporting.

Conclusion

Preventing the spread of infectious agents in the hospital involves coordination of many processes. Our study has identified process failures related to identification, isolation and treatment for infectious agents spread through respiratory droplets in hospital settings. Based on our findings, patients ages 0 through 5 years and 65 years and older were most frequently associated with events involving infectious agents spread through respiratory droplets. Furthermore, analysis of the process failures provided insight to various risk-reduction strategies that can be implemented to further reduce the risk for spread of infectious agents. Monitoring of these processes in continuous improvement programs, along with implementation of risk-reduction strategies, may help reduce the risk for the spread of infectious agents as well as support a culture of safety for both patients and staff.

Notes

This analysis was exempted from review by the Advarra Institutional Review Board.

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