The PPE Handbook
For Healthcare Facilities

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Quint-Bouzid has over 30 years of experience as a registered nurse and more than 16 years of progressive experience in hospital administration. She has demonstrated experience in leading and managing successful teams. She has comprehensive knowledge of nursing issues, trends, healthcare regulations, and practice. She has advanced training in hospital emergency operations and has served as the hospital’s emergency operations manager and as the incident commander during disaster situations. She frequently provides education and training on various safety topics such as safe environments, personal safety, and safety in the healthcare setting.

Quint-Bouzid holds a master’s degree in public administration from Troy State University and a bachelor of science degree in nursing from D’Youville College. She has also attended the executive education program for nurse leaders from Wharton School of Business. She has been a sub-principal investigator on two research studies evaluating the effects of oxytocin on maternal fetal outcomes at birth and the effects of intentional caring behaviors on nurse retention. She lectures on topics related to patient and staff engagement and lateral violence in nursing.
Preface

After 30 years of a career in healthcare as a clinician and administrator, I wondered how to impart and share some of the things I’ve learned along the way. I’m at a juncture in my career at which I want to contribute to the greater body of knowledge.

Worker safety is of particular importance to me, as I strongly believe that the workforce must be healthy and protected from harm in order for the healthcare industry to thrive and fulfill its mission to society. For this reason, I find myself driven to assuming other duties as assigned at various levels of responsibility. I started out volunteering to be the unit-based safety coach, serving on a perinatal safety committee at several hospitals as a staff nurse. As a healthcare executive, I found myself leading several organizational safety councils, serving as the safety officer and the emergency preparedness manager. I was serving in this role when the Ebola crisis was in full swing. At the time, my organization had a relatively inexperienced occupational health nurse; similarly, so was the infection prevention practitioner. These would be the natural leaders of our Ebola response plan. Essentially, I looked at the current situation as a disaster and went into my emergency planner mode. The same principles of all-hazard preparedness for emergencies were applied to the situation: planning, mitigation, response, and recovery. All of my advanced training in emergency management for healthcare came to bear.

A multidisciplinary team of key stakeholders was quickly deployed, and within 10 hours the organization had its initial response plan. Of course, the devil is in the details, and the plan had to be tweaked and reworked almost every day for the following two
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weeks. Of course, I partnered with the state’s Office of Preparedness and Response and local health departments to ensure we were using evidence-based practices and guidelines. During this time, I witnessed firsthand the sheer panic of healthcare workers when we discussed putting on and removing personal protective equipment (PPE). Reactions ranged from bravado, to tears, and to acceptance that this is an area of knowledge deficit. These reactions were demonstrated from every level of staff (nurses and doctors to environmental services workers). These are the personnel that we assumed were using these techniques on a daily basis when having to handle other more common forms of communicable diseases, such as H1N1, SARS, TB, and VRE. Conventional wisdom was that we would refresh the staff on which PPE to select and provide a brief update on the less frequently used PPE such as the respirators (N-95), and the training boxes would be checked off. In reality, we ended up having to conduct mass staff training on how to properly put on, take off, and dispose of PPE. Being on both sides, as the worker simply just trying to do my job and the manager wondering “why don’t they just do their job correctly,” I have a unique perspective on why healthcare worker safety and PPE remains a challenging topic.

I’m amazed how little intentional thought has been given to the topic of PPE by healthcare workers, given the nature of the work we do and the knowledge that in this line of work one could actually lose his or her life in the call of duty, at the very worst, or expose oneself or loved ones to contagious diseases. I have personally known several colleagues who have developed hepatitis C and tuberculosis disease due to workplace exposure. Each time I’m told someone I know has
acquired an infectious disease, I momentarily become sad and question why as healthcare workers we are not more careful when it comes to taking seriously those things designed to keep us safer, such as proper hand hygiene practices and wearing appropriate protective equipment.

This idea came full circle for me during the 2014 Ebola virus disease (EVD) scare in the United States. Interestingly enough, when the news of the virus wreaking havoc in Africa started to come to our awareness in the United States, hospital administrators and practitioners intuitively knew they had to review their practices to protect their employees and other patients. However, many of my fellow administrators and staff voiced their belief that in our country we would better identify and contain the EVD because of our advanced knowledge of medicine and available resources. We listened to the news and felt sorry for those people over in Africa, but arguably we took no concerted steps to even bolster our healthcare workers’ knowledge of and compliance with using PPE. I sat in meetings where comments were made to the effect that “after all, it must be the poor hand hygiene practice and lack of resources of those people” and so that was why the disease was spreading out of control. Others made comments such as “with our advanced knowledge of medicine in the U.S., we could keep the disease from spreading like it did in Africa.”

Then it happened: We all saw the streaming images of men in moon suits transporting a person in an ambulance to a Dallas hospital in October 2014. Then we learned of the nurses and doctors stating they were not prepared for this kind of infectious pathogen in our
healthcare system. We all know what happened shortly afterward. Panic and fear gripped the healthcare world, and then a calming realization that the whole notion of PPE and good safety practices will require more thorough and ongoing risk assessment, planning, preparation, and evaluation. The bottom line is that we are not as prepared as we ought to be to handle even basic infection prevention. Approximately four years earlier than the Ebola crisis, the U.S. healthcare system thought it had bolstered up its knowledge and protocols around PPE when we experienced the H1N1, and then the severe acute respiratory syndrome (SARS) scare. How wrong we were.

The Purpose of This Book

This book is meant to serve as a quick guide for busy healthcare professionals when faced with the need to protect themselves from a potentially infectious organism in the throes of doing what they do best: caring for others.

While many resources are available from the Centers for Disease Control (CDC), Occupational Health and Safety Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), Institute of Medicine (IOM), Institute of Health Improvement (IHI), and many other state and local sources, they are lengthy, tend to be vague and open to interpretation, and are not consolidated under one umbrella. There are more occasions than one would think where healthcare workers are not properly fitted for a lifesaving piece of equipment such as a respirator mask. This was painfully evident when a
colleague of mine reported that during the Ebola scare her organization’s protocol called for the physicians to wear a vented hood while the nurses were trained to wear an N-95 respirator mask. Neither of the groups underwent fit testing procedures. Furthermore, they were not monitored for compliance.

When I thought about putting together a pocket guide for the busy healthcare worker who wants to be compliant and do the right thing, I reached out to a longtime nursing instructor and asked her a simple question: “Why do healthcare workers struggle with complying with PPE?” She immediately responded that it’s because the importance of PPE is usually not emphasized during a healthcare worker’s training.

She went on to tell me that for the 11 years she’s been a nursing instructor, she could not remember PPE selection and use as a topic on any course syllabus. It is not included in her orientation to new students.

This pocket guide is intended to bring all the pertinent information to the fingertips of the average healthcare worker in a clear and concise manner. It is meant to serve as a resource for clinical staff, administrators, healthcare educators, and practitioners. It is intended to not only discuss selection of PPE, but to also create a space for healthcare workers to review their beliefs and practices about PPE and address barriers to its effective use.
CHAPTER 1

Introduction: PPE for Healthcare Workers

The concept of personal protective equipment (PPE) for worker safety, like many other inventions, had its roots during wartime, then was applied to other hazardous civilian occupations such as firefighting, construction, and mining. The term often refers to protective clothing, helmets, goggles, and other garments that are worn to protect an individual from injuries.

One of the first large-scale and well-documented uses of PPE was respiratory protection against chemical warfare during World War I. The use of chemical gases shifted the dynamics of the war, and the use of respirators allowed troops to protect themselves from the toxic and harmful effects of the gas.

Leonardo da Vinci is credited not only with being a great painter, but also with inventing the first respirator during the 16th century. His idea was that soldiers could be protected from inhaling harmful dust and other toxic chemicals generated from weapons made of powder. With the advancement of technology and increasing demand, respirators became easier and less expensive to make. Over the years, they became less cumbersome, easier to wear and more durable, and thus more readily available for everyday workers. As with most safety advancements of our century, there were some
regulatory pushes for worker safety that also aided in the proliferation of respirators and other PPE.

Federal agencies such as the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) have developed standards that made respirators safer and more reliable and led to safety standardization and respirator fitting requirements.

As with respirators, other PPE initially developed to protect soldiers during combat evolved into what is now considered common practice for worker safety and protection. For instance, during the 4th century, the Japanese imagined the concept that metal plates strapped to the soldiers’ and horses’ torsos would prevent injuries during combat. With the industrial revolution, evolution of technology, and commercial development, the concept of protective armor is now manifested into disposable protective coveralls worn by healthcare workers to prevent contamination from chemical, biological, and physical hazards.

Another example of a type of PPE that evolved from combat use into an item of everyday personal protection is the helmet. Protecting the head is important because it contains the brain, which controls every aspect of our body and human functioning. The oldest known helmet was made out of leather or bronze and was used as far back as 900 B.C. In the early 1800s, shipbuilding workers would paint their hats in tar and cure them under the sun to solidify. When the hats hardened, they would be strong enough to protect people’s heads from being struck by falling objects. Today, materials used in soldiers’ helmets range from lightweight
plastics to various types of synthetic fibers, once again demonstrating that technologic advancement and commercial research and development will continue to see protective equipment evolve.

Today in the United States, hard hats are mandatory when working on a construction site or in mining, and in any other workplace where strikes to the head from foreign objects, such as falling equipment, debris, and moving mechanical machinery are a hazard. In addition, secondary injuries such as slips, trips, and falls can also cause head injuries if the worker then strikes his or her head on an object. Despite its evolution in function, form, and availability, the main principles of PPE have not changed: to prevent hazards from entering or contacting workers’ bodies, and to prevent hazardous materials attaching to workers’ personal clothing from where it may subsequently enter their homes.

Evolution of PPE in Healthcare

Just like in other industries, modern PPE for healthcare workers evolved out of the need for occupational safety and health (protection of the worker) and as a means of infection prevention (protection of the patient). In short, PPE keeps both healthcare workers and patients safe from each other when exposures can be anticipated or expected.

Gloves for use in healthcare appeared in Germany around the 1760s when physicians used gloves made from sheep intestines for vaginal exams. In the 1840s, Charles Goodyear patented what he referred to as “vulcanized” rubber. This invention allowed development of
gloves that were flexible enough to wear during surgery, and in the late 1890s, nurses at hospitals began wearing gloves on a routine basis when treating patients.

Surgical masks made from cotton gauze were originally worn by surgery staff in the early 1900s to prevent contamination of open surgical wounds. Around the same time, healthcare workers adopted the use of the same respirators used by soldiers to protect themselves from chemicals, firefighters to protect themselves from smoke, and miners to protect themselves from dust and gases. Historically, surgical masks were worn for airborne isolation precautions in hospitals when patients were known or suspected to be infected with pathogens spread by the airborne route of transmission.

Then, in 1990, new PPE guidelines for working with tuberculosis patients changed the game, when the CDC stated that surgical masks alone may not be effective in preventing the inhalation of droplet nuclei, and recommended the use of disposable particulate respirators. Later revisions of the guidelines based on further research led to NIOSH revising testing and certification requirements for all types of air-purifying respirators, as well as standards that require healthcare workers to wear respirators when working with patients with certain illnesses—and the training that employers are required to conduct.

Unlike the history of other forms of PPE, the use of goggles for eye protection is not clear. It’s not a stretch to surmise that as blood sprays occurring during traumas and surgical procedures became a commonplace event, the need to protect the eyes from these body
fluid sprays became important. It is thought that isolation gowns were likely born out of the common use of aprons and smocks in surgery and nursing—as a way to protect the wearer rather than the patient.

**Why Is PPE Needed?**

In the case of soldiers, they face extreme risks and hazards such as violent explosions, exposure to toxic chemicals, and biological hazards on a regular basis. To reduce the levels of danger, standard operating procedures or protocols are used in conjunction with protective equipment. Similarly, healthcare workers must follow safe work procedures, along with equipping themselves with the correct PPE. Although the equipment and procedures may not seem as extreme in comparison to combat protective equipment, the objective of occupational PPE and safe work procedures are the same: optimal safety when working in high-risk or hazardous conditions.

When used properly, PPE acts as a barrier between infectious materials such as viral and bacterial contaminants and your skin, mouth, nose, or eyes (mucous membranes). The barrier has the potential to block transmission of contaminants from blood, body fluids, or respiratory secretions.

Interestingly enough, the most important and least appropriately-used PPE is hand hygiene. We know human hands are one of the biggest culprits in transmitting pathogens to other parts of the body and to inanimate surfaces in the surrounding area and to other individuals. So it stands to reason that effective hand hygiene is the
most basic of PPE. Hand hygiene and gloves are essential, both to protect the healthcare worker and to prevent the transmission to others.

Face cover, protective footwear, gowns or coveralls, and head cover are also considered essential to prevent transmission to healthcare workers. Not only is PPE effective in protecting the healthcare worker, but it also protects patients who are at high risk for contracting infections through a surgical procedure or patients who have compromised immune systems from being exposed to substances or potentially infectious material brought in by visitors and healthcare workers.

It is important to note that PPE alone will not fully protect you from acquiring an infection or transmitting an infection to another individual; however, we do know that when properly used with other infection control measures such as hand washing, use of alcohol-based hand sanitizers, and covering your cough and sneeze, these efforts dramatically reduce the spread of infection from one person to another.
In the tense moments when a healthcare organization first encounters a hazardous situation or patient, proper PPE training is put to use in order to protect the facility’s other occupants and employees while minimizing risk. The only way to ensure your staff is ready for such a situation is through organizationwide awareness and training. *The PPE Handbook for Healthcare Facilities*, sold in packs of five, is the perfect tool to give staff the knowledge and know-how of proper PPE usage. This handbook clarifies confusing PPE situations as well as when and how to properly implement best practices. Don’t wait to train until after a hazardous situation has already occurred—the time for training and best practices is now!

**This handbook offers frontline staff:**

- The proper techniques involved with using PPE
- Detailed diagrams that demonstrate donning and doffing PPE, identify different kinds of PPE, and delineate where each PPE type is used
- Information from multiple government resources, such as the CDC and OSHA, presented in an easy-to-use, one-stop reference tool