MENINGITIS

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BY

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Dedication

This book is dedicated to all the Emergency Medical Personnel
Who take care of the sick and injured
Twenty four hours a day, seven days a week, 365 days a year

Chapter 1

The scream of sirens broke the silence of a quiet pre-dawn. The squeal of tires caused several nurses to turn their heads and security officers to move toward the ambulance bay. Double glass doors swished open as paramedics raced through the alcove pushing a stretcher.

"Sixteen-year-old male found unconscious this morning in his bathroom. Mom states there was coffee-ground vomit in his bed when she attempted waking him for school. Upon arrival, the patient was supine on the bathroom floor, unconscious, but breathing." The paramedic rattled out the history while squeezing the ambu-bag that delivered oxygen to the comatose patient.

"Trauma room one," shouted the charge nurse. The ER staff poured into the room behind the stretcher carrying a well-built young man. As nurses and EMTs transferred the patient onto the hospital gurney, the paramedic continued to relay the details.

"BP 120/72, pulse 130, respirations 24, and temperature 102. Upon arrival, the patient began seizing and we administered IV valium. Two more seizures occurred en route to the hospital. Mom states he complained of a headache before going to bed."

The patient began seizing again, causing his flailing arms to pull out the IV catheter placed by EMS. "Dr. Brittmore! Room one!" screamed the charge nurse. The patient continued the jerking movements of his arms and legs while foaming at the mouth. His head was contorted backwards with the force of a grand mal seizure.

"Let's get this patient intubated," Dr. Brittmore ordered while moving to the head of the bed. "Valium ten milligrams IM, intubation set, and get another IV started." Calmly, Dr. Allyson Brittmore began a detailed assessment of the critical patient: a young male, no signs of trauma or chronic illness. "Where is that valium?" she called to the room full of nurses.

"Coming, Doc."

Still, the patient seized. Looking at the monitor to her left, Allyson noticed the oxygen saturation falling. "People, we are running out of time," she yelled. Gripping the laryngoscope that would open the patient's mouth and move aside his tongue, Allyson attempted to pry open the man's clenched jaws. The EMT student reached over to help and almost stuck his fingers into the patient's mouth, causing Dr. Brittmore to grab his hand.

"Never ever, stick your fingers into a patient's mouth unless you are willing to lose those fingers."

"I was just trying to help. Sorry, I didn't know," he replied.

Finally, the rhythmic jerking stopped and the patient went limp. Allyson slipped the blade into the patient's mouth, lifted the jaw, and looked down the open airway until she could visualize the vocal cords. Smoothly slipping a round plastic tube into the open trachea, she pulled out the laryngoscope. "We're in! Somebody listen." She held the lifesaving tube in place while an ambu-bag was fitted onto the end. A nurse placed her stethoscope on the chest and listened.

"Bilateral breath sounds are present."

"IV in."

"Oxygen saturation is back up to 98 percent."

Allyson took a deep breath. The crisis had been temporarily averted. Now she had to figure out what was causing this patient's illness. As she made her way from head to toe examining the patient, the rash on his legs caught her attention.

Then came the words that even battle-tested ER personnel dread hearing, "Masks and gowns on everyone. Hang Rocephin two grams IVPB. Somebody call Dr. Simmons; we have a case of meningitis."

Allyson wrote orders on the ICU order form and began documenting her findings. She briefly met with the distraught mother and explained the seriousness of the situation. Everyone who had come in contact with this young man would need to take antibiotics. The rash she had noticed was typical of Neisseria meningitidis, a highly contagious illness with a 90 percent mortality rate. This young patient was not going to be one of the survivors.

By the time an infectious disease specialist, Dr. Terry Simmons, arrived, Allyson had sent blood cultures to the lab, performed a lumbar puncture to obtain spinal fluid, and started the appropriate medications.

"Nice work, Dr. Brittmore, and thanks for calling. The more patients I can enroll in my study, the faster I can develop a better vaccine. Where's the mom? I'll try and get permission to use her son's blood." Dr. Terry Simmons was a well-liked and respected member of the faculty. He had been involved with the medical school since it had opened twenty years ago and was a frequently published researcher. His latest study involved developing a safer and more effective vaccine against this deadly type of meningitis. Any case of bacterial meningitis was dangerous, but the form caused by a bacterium named Neisseria Meningiococcus was the most fatal. Because it is relatively rare, research using human blood was time consuming and slow. Dr. Simmons had diligently pursued this project for three years and wasn't much closer to an answer. Most patients died rather quickly and obtaining enough blood samples before their death was difficult.

Within an hour, all of the necessary paperwork was completed, samples obtained, and the patient had been moved to the ICU. Dr. Simmons's nurse arrived with several doses of ciprofloxin, one pill for everyone that was exposed to the young man. If taken within the first few hours after exposure, it prevented about 90 percent of additional cases. Detailed paperwork tracking exposed employees was a routine part of the hospital's infection control. Within a teaching institution, someone was exposed to something nearly every day. Due to rigid precautions, the incidences of diseases spreading among the healthcare providers were rare.

Allyson moved quickly through the remaining patients already placed in the general medicine rooms. As she finished discharge instructions for a young lady with bilateral ear infections, the code blue alarm sounded.

"Code blue, ICU; code blue, ICU." Allyson ran down the back corridor and up the stairs to the intensive care unit. Several nurses and the medical resident were already at the bedside administering CPR and giving medications to stimulate the patient's heart. Not surprised, Allyson recognized the young man with meningitis. His condition had worsened over the past two hours and the lethal infection was claiming another life. After forty-five minutes, the attempted resuscitation was stopped. It was apparent that nothing was going to restart his heart.

Dr. Brittmore had the unwanted task of telling the parents that their son had died. No matter how many times she sat in the family room and relayed the devastating news, it never got easier. The mother was distraught and the father sat quietly sobbing into his hands. Soon other members of the young man's family poured into the room, and Allyson quietly slipped out. Making her way back to the emergency department, she suddenly felt exhausted. What a horrendous night. Her replacement had already arrived for the day and was busy seeing patients. Allyson finished her last chart and slowly walked out of the ambulance bay doors with no idea of what would soon become a major medical disaster.

Chapter 2

Two days had passed, but the image of a sixteen-year-old boy lying in a hospital bed covered with a rash still haunted her dreams. Eyes that were open but glazed over by death and hospital tubing inserted into every body orifice. Despite receiving everything medicine had to offer, the doctors at a major medical hospital couldn't save him. Where was the justice of that? Sitting in the hospital cafeteria Allyson was eating breakfast before the start of her shift.

"Sorry to hear about your patient. May I join you?" Dr. Simmons sat his tray across from Allyson and took a seat. "I heard from the ICU nurses that he didn't last long. Thanks again for calling me. I harvested enough blood to supply my research for three more months."

"No problem," Allyson absently replied. *Harvested* seemed a funny choice of words since the patient was still alive when Dr.

Simmons had seen him. She had always suspected researchers were a different breed of doctor. "How's the research coming? Any closer to that new vaccine?"

"Every day brings me closer, but no major breakthroughs. I've had trouble completing the final steps because of a shortage of blood samples from infected patients. Maybe this year's flu season will bring in more patients."

"I certainly hope not, Dr. Simmons. I certainly hope not," Allyson replied. *What a morbid guy,* she thought while stirring her coffee.

"Sorry, that didn't sound right, and please call me Terry." He smiled, but it seemed forced. "Did you know my son died from meningitis when he was eighteen?"

Surprised, Allyson shook her head. "He was a senior in high school, played football, and was crowned Homecoming King the week before he died. I was giving a lecture in Boston when my wife called from this very hospital. By the time she reached me, he was already dead."

"I'm so sorry. When did it happen?"

"Almost ten years ago. Our marriage didn't survive. Most don't, you know, after the death of a child. I blamed her for not taking him to the hospital in time, and she blamed me for being out of town. In the end it's nobody's fault, just a terrible tragedy."

"Is that why you began your research on a better vaccine?"

"Partly. It also helps when your research program gets big money. I had been playing around in the lab with a new method of creating vaccines when a company approached me with the grant money. The CEO had also lost a family member to meningitis."

"Doctor Brittmore, ER STAT! Doctor Brittmore, ER STAT!"

"That's my cue, gotta go." Allyson grabbed her coat and began sprinting towards the ER. "Nice talking," she yelled back to Dr. Simmons. Rounding the last corner before entering the department, she could hear the yelling from trauma room one.

"Call a code!"

"Get a doctor in here now!"

"Open the crash cart; I'll intubate her."

Allyson ran the last few steps into the trauma room. All the employees from the ER were crammed into the one room. Several were yelling orders at the same time. Calmly Allyson walked to the head of the bed, "Everybody, STOP TALKING!" When there was silence, she asked the charge nurse to tell the patient's story. Listening intently, she assessed the patient's airway and respirations. Since the only breath sounds were shallow, Allyson began to intubate the patient. By inserting a hollow plastic tube into the patient's airway, she would be able to breathe for the young woman. The heartbeat was good although a little rapid, but the blood pressure was too low. After ordering the appropriate ventilation rate, medications, and IV fluids, Allyson continued her assessment. On the patient's legs was a rash that Allyson had seen two days before on the patient with meningitis.

"Who is this? Where did she come from?" Allyson whispered to Phil, the charge nurse.

"Brittany Moore, an ICU nurse on the night shift."

"Brittany? Wasn't she at work the morning we admitted that meningitis case? When did she get sick?"

Phil looked around to see who else was listening, but everyone was busy with the patient. "She worked last night in the ICU, but came over this morning complaining of a headache. We were drinking coffee and talking about signing her in when she seized. By the time I got her on a stretcher and moved into the trauma room, she was incoherent."

"What were her vital signs? Does she have a fever?" Dr. Brittmore whispered.

"I never got to finish taking them. Things went downhill too fast," Phil explained.

Allyson turned back to the patient and completed the physical exam: rigid neck, clear lungs, rapid heart rate, diffuse rash, and a large area of redness on her left forearm. "What's this on her forearm?" she asked Phil.

"She came by the ER a couple of days ago for her TB test. I guess she turned positive."

Allyson carefully examined the area of redness. Although the spot was large, she couldn't feel any raised area called induration that was typical of a positive skin test. Perhaps the meningitis rash had made the area turn red. Making a notation in the chart about a positive TB skin test, Allyson began writing orders to admit Brittany Moore to the ICU. She had a strange sense of déjà vu as she wrote orders almost identical to those for the young man two days ago. "Phil, please call Dr. Simmons and let him know we have another case of meningitis."

As per protocol, the infection control nurse came to the ER again to dispense antibiotics to all the exposed employees. This time, no one joked around about free treatment and the chance to treat a sexually transmitted disease without doing a culture. This time, there was a solemn attitude amongst the staff because Brittany Moore had swallowed that same preventive antibiotic two days ago and it had not helped her.

The rest of the day in the emergency room was routine. Two soap dispensers ran out because everyone was washing his hands religiously. Dr. Simmons came by in the afternoon to talk with the employees about symptoms to watch for over the next two or three days. He wasn't convinced that Brittany had contracted the disease from the patient in the ICU. He explained that most people acquire the disease out in the community. He wouldn't know for certain if the two patients had the same bacteria until the cultures were back from the lab. In the meantime, he asked that everyone be discrete when discussing anything about these two patients. "No need to cause alarm until we know there is a connection. If word gets out that meningitis is spreading within the hospital, both patients and employees will panic. Please contact me personally if you develop any symptoms."

After everyone dispersed, Dr. Simmons walked with Dr. Brittmore back into the doctors' call room. "So what's the real risk?" she asked while pouring two cups of coffee.

"Actually very small. We don't really know if Ms. Moore took the dose of antibiotics. It's not our policy to watch the employee actually swallow the pill, just to make certain they

received it. Many patients don't take the medications we give them, and healthcare workers are worse than patients."

"I hope you're right. An epidemic of meningitis is a scary thought. I've got more patients in the ER so I better go. Nice talking again." Allyson tossed her cup into the trash as she reached for the next chart. Only one more hour before the night-shift doctor arrived. What a day! While finishing up her charts and discharging patients, Allyson thought about the seriousness of a meningitis outbreak within the hospital. After making a note to herself to research the risk of transmission between hospital employees, she turned the ER over to the care of Dr. Smith and headed home, exhausted.

Chapter 3

Two days later, Allyson reported early for her night shift. Despite several hours on the Internet, she had been unable to find any reports of meningitis spreading within a hospital. Even before preventive antibiotics there had never been an epidemic of meningococcal disease. Dr. Simmons was apparently correct. Brittany Moore must have been exposed to it outside of the hospital. Stopping in the physicians' lounge before going to the ER, Allyson overheard several surgeons talking about an ICU death. Curious, she approached the group.

"Who died?"

"That ICU nurse with meningitis died. The entire ICU staff is panicked. Dr. Simmons is having a meeting today with the nursing supervisors."

"Several nurses are demanding a full ten-day course of ciprofloxin, and two have refused to return to work unless the ICU is completely decontaminated."

"When did she die?" Allyson asked.

"Yesterday morning, after coding off and on all day long. It was an ugly scene."

"Her husband has already hired an attorney—that one with the hammer ads."

"Where is Dr. Simmons having that meeting?" Allyson interjected into the conversation. She had a compelling need to know exactly what was happening. The ER nurses were probably just as panicked as the ICU nurses were.

"In the ICU conference room, I think."

"There was a notice on the door about a 5 p.m. meeting."

Looking at her watch, it read 5:05 p.m. "Thanks, I'm going to try and make that meeting. See you later." She hurried up the stairs to the third-floor conference room. People were standing outside the doorway while more chairs were brought in and tables were taken out. Evidently, a large number of the hospital staff wanted to hear what was going on and what steps were being taken to prevent any further cases.

Once everyone was crammed into the conference room, Dr. Simmons raised his arms to get everyone's attention and to obtain silence in the room. Within a few minutes, all eyes were on him, the Chief of Infectious Diseases, a recognized authority on meningitis.

"First, I would like to thank everyone for your interest in this situation. It is vitality important that we control any rumors about these two cases of meningitis. Preliminary cultures reveal that both patients died from a meningitis infection, but not from the same type. This is the typical season to have multiple cases and these two appear to be coincidental."

An audible sigh of relief came from several parts of the room. As people began to talk amongst themselves, Dr. Simmons tried to quiet the room again. "Every possible precaution is being taken to prevent the spread of all contagious illnesses within this hospital. The head nurse on each floor and medical unit will be conducting an in-service to refresh our staff about universal precautions. We are saddened by the loss of one of our nurses and our thoughts are with her family. I cannot over

state the importance of rumor control. Hysteria will ensue if we, the medical staff, do not keep a lid on this story. Are there any questions?"

Allyson slipped out of the room as the questions were being addressed by Dr. Simmons and the Director of Nursing. Very little information had been relayed when she thought about it. She could have finished a decent meal before her shift; now it was grab and go. The ER was packed when she arrived with her cold sandwich and chips.

"Thank God you're early," Frank Burns voiced as she came into the call room. "I have been hammered all day. What kind of sandwich is that?"

"It's my sandwich and no, I'm not sharing. Why are you back here if the ER is full?" Frank Burns was a likeable fellow and generally a good physician, but slow. He always seemed to be running behind no matter how many patients had presented that day. And, he was always hungry.

"I just stepped back here to get a bite to eat. I ordered a bunch of labs on the patients so they would be ready for you."

"Thanks. Did you actually see any of them?"

"No, not really; just for a minute."

"Did you write down anyone's history or physical exam?"

"No, I'll let you do that."

"Frank, you know it's hard to write up the patient when everything has been done. I have no idea what they looked like before they got treatment."

"Sorry. Hey, there was a lawyer looking for you today. Something about the meningitis cases," he mumbled while eating some of her chips.

"Well, that's just super. What did you tell him?"

"That you would be in to work at 7 p.m."

"Thanks a lot, Frank!"

"No problem. I don't have any patients to check out, so I'll see you later." With that Dr. Frank Burns headed for the cafeteria and left Allyson just shaking her head. Someday she was literally going to box his ears.

Surveying the chart rack, the damage wasn't as bad as it seemed. Four patients were waiting to be seen and all the others were being discharged. Taking the first chart from the rack, she thought about her sandwich. After reading the nurse's note about the patient's chief complaint, she realized that her sandwich would have to wait. In room four was a young woman complaining of a headache, fever, and stiff neck. *Could this be another case of meningitis or just the flu?* After an initial exam, Allyson determined that the patient might indeed have meningitis and wrote the order for a lumbar puncture. Only by testing the spinal fluid for white blood cells and bacteria could the diagnosis of meningitis—or its absence—be confirmed.

Picking up the chart from the order rack, Susan, an ER nurse, looked up at Dr. Brittmore. "Here we go again, huh?"

"Let's hope the test is negative. I'm sure getting tired of taking antibiotics." Allyson moved on to the next patient while the nurses got the patient ready for a spinal tap. Her next patient had strep throat, and the third one had a sprained ankle. Quick and easy.

Before she could see the fourth patient, Susan informed her that the spinal tray and the patient were ready. While prepping the patient for her procedure, Allyson noticed a large red area on her forearm.

"What happened to you arm?" she asked while opening the kit and drawing up the numbing medication into a syringe.

"I had my routine TB skin test yesterday. I've never had a reaction before, but this time it turned red within a few hours. I think I'm supposed to start some medicines next week, but this headache couldn't wait until my appointment."

As Allyson performed the test without any difficulty, she kept thinking about that positive TB test. Why was that redness so familiar? A positive skin test wasn't unusual, but something about this one looked familiar. As she saw cloudy fluid come out of the spinal needle and into the clear plastic collection tube confirming her suspicion of meningitis, the image of another red arm surfaced in her mind. Brittany Moore had also had an unusual redness on her forearm from a skin test.

"Mrs. Cooper, where did you get your skin test?"

"Here in the ER. I work in the kitchen. Is something wrong?"

"No, I was asking so we could make sure your paperwork was completed. I'm all done with the puncture and will be sending the fluid to the lab. In the meantime I'm going to start you on some medications and see about getting you admitted. Be back in a little while." She motioned the nurse to follow her outside of the room. "This spinal fluid looks positive, so I need you to put the patient in isolation and call infection control, again. This is definitely getting scary."