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Coping with the Unexpected

When Eyjafjallajökull, the Icelandic volcano erupted on March 21st of this year it was surprisingly Europe that was disturbed the most and not Iceland. The spewing cloud of ash caused fewer problems for Iceland in comparison to the havoc it reeked on European air travel. At first thought any effects of volcanic ash on the healthcare sector would be health risks but there was in fact a more pressing problem: nuclear medicine.

The week of the 19th of April saw the use of nuclear medicine screech to a halt in Ireland affecting management and staff and more importantly patients and their families. I spoke to Fionnuala Barker from St. Luke's hospital in Dublin to find out how her department coped with this crisis and what they have learnt from the experience.

So why did nuclear medicine shut down with the airports? Ms. Barker explained that most of the radioactive technetium used for bone scans and day-to-day nuclear medicine is shipped into Ireland from the continent via either France or Holland. Deliveries normally take place over the weekend, having the material ready for patients on Monday. The technetium is usually dispatched from the manufacturers on a Friday evening, arrives in Ireland on the Saturday morning and dispatched to the hospitals over the weekend. As the airports closed on the 17th of April no deliveries could be made.

Airspace Closed

Barker stressed that missing a weekend delivery due to circumstances such as severe fog closing an airport is not a problem; the delivery can be made another day. The real issue was the fact that the airports remained shut during the week, or were reopened and closed again meaning that most nuclear medicine departments did not receive their deliveries for the whole week. This led to the cancelling and rescheduling of appointments with the amount of disruption depending on the workload. The consequences of the ash cloud crisis were different for each hospital, depending on the size of nuclear medicine department.

At St. Luke's, the nuclear medicine department only takes patients from their hospital resulting in a smaller workload than a larger department. They were able to successfully accommodate patients whose appointments were cancelled within two to three weeks. This would have been a problem for larger departments.

Just a few weeks after the ash cloud crisis had been resolved and deliveries returned to their usual schedule another problem arose; this time, disruptions to generator supplies. Hospitals already rescheduling patients due to the closure of the airports were forced to contend with a lack of technetium meaning rescheduling some patients for a second time. In this case, St. Luke's was lucky, having already returned to a normal schedule.

Time Sensitive Material

The delivery and use of radioactive material such as technetium is extremely time sensitive, a strict schedule must be adhered to. For St. Luke's, the material comes from Petten in Holland, close to the Belgian border. The technetium leaves the factory around four pm on Friday and travels by road to Brussels. From there it is forwarded on cargo flights via the East Midlands in the UK. Arriving there at one or two am, it is then shipped by another cargo flight to Dublin arriving at five or six am. So the initial disruption began in Brussels but the complications do not end there. The problem with radioactive materials for nuclear medicine is that they cannot be stockpiled; this week's material is made specifically for this week. Ms Barker explained that, "if you don't use it, it won't be there next week, it will have decayed. The technetium that we prepare to use that day has to be used that day, it loses 10 percent of its radioactivity per hour." To use it the following day means topping it up.

Nuclear medicine deals with time sensitive material that must be ordered in advance. Most departments in Ireland will only receive one delivery per week and this has been ordered specifically according to the schedule. For specific nuclear medicine therapies you would order a specific therapeutic amount for a specific patient on a specific day. To illustrate this key point Barker used the example of radioactive iodine used to treat thyroid cancer patients (patients she was treating during the week of the ash cloud crisis),

"If I order radioactive iodine to treat a patient today, and I can't treat that patient today there will be roughly 10 percent less tomorrow and unless the medical consultant who is looking after the patient agrees to treat with 10 percent less then you have to try and get extra in to top it up". But this must be ordered, made, and delivered from Holland meaning up to a 48-hour wait, again impossible if the airports are closed.

Juggling Patients to Keep to the Schedule

This crisis was not really something hospitals expected or could prepare for. Fog or other disruptions to air travel are unlikely to have the same impact as a complete closure of the European fly zone so already established contingency plans were not adequate. St. Luke's did not have a contingency plan in place but managed to juggle their patients successfully and avoid a scheduling nightmare.

Again using the example of thyroid cancer patients, Ms. Barker explained that the department has two iodine treatment rooms so two patients

can be treated at the same time. This was the plan for the week of the 19th of April. These treatments are scheduled six weeks in advance as patients must stop taking their regular drugs at certain intervals, one drug four weeks before and another two weeks before. This adds a certain urgency to the situation, patients cannot be kept off their drugs for too long and so if they cannot be treated that week, it would need to be the following week.

The two patients were due to start treatment on the Tuesday, with their radioactive iodine arriving on the Monday morning but this was not delivered because of the volcanic ash cloud. Ms. Barker explained that they hoped for a delivery everyday but to no avail. This was upsetting for the patients, one of whom decided to go home until the iodine was delivered while the other waited in hospital. After putting increasing pressure on the suppliers St. Luke's did manage to have the material delivered on the Friday. This was a specific delivery solely for these two patients. Treatment took place on the Friday afternoon, three days late with the patients staying in the hospital over the weekend and being discharged on Sunday afternoon. In order to keep to the prearranged schedule for the following week, one of the rooms was cleaned and decontaminated on the Sunday evening, the second the next morning allowing the next week's patients to be admitted as normal on Monday afternoon.

Ms. Barker explained that the weekend treatment of these two patients was essential, "If we hadn't have been able to treat those patients we would have had a dilemma." Patients were already scheduled until the end of June and pushing each appointment back is simply not feasible. Many patients have particular situations, some have already arranged childcare for the three weeks after their treatment.

Lessons Learnt

A few weeks after the crisis ended Ms. Barker wrote a report for the Chief Executive suggesting the creation of an emergency group to meet if the situation should arise again. This was approved and a group made up of medics, nurses and other staff was created with the remit to meet urgently if a similar crisis occurs. The group will prioritise patients in terms of medical urgency and then allocate someone to contact them and reschedule them all. The group will examine all the parameters as the key facet of this particular crisis is the uncertainty, "We didn't know from one day to the next whether we would get any supply or not and that's the biggest issue."

Part of a Wider Problem

Although St. Luke's may have a contingency plan should a similar situation arise there is still an uncertainty surrounding the supply of material for nuclear medicine. Dervla Gleeson delves further into this topic in our medtech section (pg. 35). There is a shortage of molybdenum, which is the particular isotope used to make technetium generators, the main isotope used for imaging and nuclear medicine. Why is there a shortage? The problem is there are only five generators in the world that make it and most are over 40 years old. The Canadian authorities were forced to shut down their reactor due to safety issues meaning the other four reactors had to re-arrange their schedule to provide enough medical isotopes.

Preventative maintenance like this is important as should all the reactors break down there would be no supply for nuclear medicine. Ms. Barker explained that at one point during the year there were only two reactors in operation, this reducing to one over a short period. There is now a new reactor in Poland but there are still very few generators and most are not commercial businesses but research institutions, the production of molybdenum not being their core business.

Moreover, research and support for nuclear reactors is not high on the political agenda like it was in the 50s and 60s. There is a clear antinuclear stance especially considering the growing concern over greenhouse gases and global warming. Both the European Union and the producers and suppliers of radiopharmaceuticals have set up groups since this crisis began to cooperate and maximise supply. Building a new reactor is not an immediate solution as it could take between five and ten years to be fully operational. At the minute medical isotopes are relatively inexpensive but this is only set to change with bigger, high-tech imaging departments and the dwindling of supplies.

Conclusions

From the Irish experience it is clear that planning is key to the successfully managing a crisis of this kind. At St. Luke's an all-out crisis was avoided by successfully juggling patients to keep to the schedule and by pressuring suppliers into making extra deliveries. This crisis has highlighted the need for communication between management and medical staff and also the wider issue of continuing the supply of radiopharmaceuticals.

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