

When I told people that I was going to the Arctic for my elective everyone asked why I wanted to go to the cold when I could go to the beach? When I arrived in Hammerfest I was asked the same question. I wanted to do something different so I flew north while my friends flew south. I hope that this report will explain my choice.

My ten weeks in Hammerfest were jam-packed and I have far surpassed my learning objectives. Although my main placement was in the Orthopaedics Department at Hammerfest Hospital, I was able to take advantage of being the only medical student in Hammerfest and find further opportunities to learn. A detailed report of everything I have done would take up pages (I filled an entire journal with my experiences!) so I will give a general account of my time in Hammerfest and focus on a few topics.



Photo 1: Hammerfest Hospital.

Hammerfest & Finnmark

At 70° N and 600 miles above the Arctic Circle, Hammerfest is the world's northernmost town. The town has a population of 10,000 and is located on an island just off the coast in Finnmark, Norway's northernmost region. The Gulf Stream means that temperatures in Finnmark are higher than in other regions at the same latitude. As such, Hammerfest boasts an ice-free harbour and was traditionally a thriving arctic hunting port. During World War II Hammerfest and the rest of Finnmark were burnt down by the Nazis and later rebuilt. Hammerfest is now the centre of liquid natural gas (LNG) production in the Barent Sea.

The weather defines Hammerfest. When the weather is bad it is impossible to get in or out of the town by road, sea or air. The conditions are constantly changing and it is fascinating to watch the weather moving across the bay in front of you. From 14th May this year the sun won't set until July 31st. In contrast from

November to January the town is plunged into 24 hour darkness with only the Northern Lights to penetrate the nights. The winters are long and cold with deep snow from the New Year well into spring. When I left in early June there was still snow on the mountains and further inland. Despite being short, Arctic summer is warm with blue skies.

It is hard to appreciate just how sparsely populated Finnmark is until you visit. Norway has a population of only 5 million, less than London. 75,000 people live in Finnmark, which at 49,000 km² is approximately the same size as Denmark and two-thirds the size of Scotland. This equates to a population density of less than 2 people per km².

Health Care in Norway and Finnmark

Health care in Norway is tax-funded. Patients pay a minimal fee for hospital consultations and prescriptions, but other care is free of charge. Four regional health authorities are responsible for health care across Norway. Helse Nord, the northern regional health authority covers the counties Nordland, Troms and Finnmark as well as Svalbard. Each county has a local health trust which for the northernmost county, Finnmark, is Finnmarkssykehuset. Finnmarkssykehuset consists of two regional hospitals in Hammerfest and Kirkenes. Hammerfest Hospital covers West Finnmark whilst Kirkenes is responsible for East Finnmark. In addition, at least one local health clinic is located in each of the municipalities, providing a varying range of services from simple primary care to radiology facilities and a small operating theatre in Alta, the largest town in Finnmark.

Hammerfest Hospital is the equivalent size of a small UK District General Hospital with 95 beds. Its services are tailored to the needs of the community and the staff that it can employ, including General Surgery, Orthopaedics, General Medicine, Obstetrics and Gynaecology, Paediatrics, Intensive Care, Radiology and an Emergency Department. Elective care that cannot be provided in the community and emergency cases are brought to Hammerfest. If Hammerfest does not offer specialist services necessary for a case, the patient is referred to the University Hospital of Northern Norway (UNN), 449 km away in Tromsø. After specialist surgery or treatment in Tromsø, patients return to Hammerfest for rehabilitation and post-operative care before being discharged to local health services in the patient's municipality.

The geography of Finnmark has huge implications for health care. Patients can travel up to 4 hours by car, bus, plane or boat to reach Hammerfest hospital. The distances people must travel, confounded by the weather and road conditions, mean that providing health care in the Arctic is a real struggle. Primary Care and other community services are relied on heavily to avoid admitting patients to hospital. Extra funding is put towards elective and emergency patient transport, but in a critical situation the distance can be life threatening.

Finnmark is not an easy place to live and it is difficult to recruit staff to work in Hammerfest Hospital, as well as in Primary Care. The few permanent staff in Hammerfest are supported by agency staff and doctors from other parts of

Norway and Europe, especially Sweden, Denmark and Germany. In Hammerfest Orthopaedics Department, not one permanent consultant or specialist trainee is Norwegian. Instability in staffing causes difficulties in building up a consistent quality of care when team dynamics are likely to change and when staff satisfaction in the work place may vary. Many different strategies have been implemented to encourage health care professionals to work in Finnmark, including training and financial benefits.

Orthopaedics

My main attachment was to the Orthopaedic Department at Hammerfest Hospital. The day begins at 7.30am with a meeting of the General Surgery and Orthopaedic teams to discuss new admissions followed by an X-ray meeting. The teams then separate for ward rounds, polyclinic and theatre. Elective work is scheduled until 3.30pm when the working day ends in Norway.

I was able to join in with all activities in the department. I assisted in operations, put on casts in polyclinic and joined the doctors on call some evenings, weekends and over Easter.

Fractures are the bread and butter of the Orthopaedics Department in Hammerfest. Distal radius and ankle fractures are especially common due to the environment in which people live. It is all too easy to slip on the ice and snow covering Finnmark for three-quarters of the year, especially during the 3 months of 24-hour darkness. Many patients presented with injuries associated with an active lifestyle or physical occupations.

Snowmobiles are an integral part of both work and leisure in Finnmark. Across Scandinavia there are strict rules governing their use, including limitations on when and where they can be driven and compulsory use of helmets. Drivers must be over the age of 16 and hold a licence. However in Finnmark, maybe because of the vastness of the county and the importance of the snowmobile in some occupations, the restrictions are lifted and those that remain are often ignored. Snowmobiles are a cause of significant trauma in Finnmark. Modern vehicles are incredibly powerful and heavy, reaching speeds over 100mph. Environmental dangers include avalanches and dangerous terrain obscured by the snow. Alcohol is a factor in many accidents. From personal experience, riding as a passenger at terrific speed over the Arctic terrain is incredibly uncomfortable and jarring, not to mention terrifying.

Snowmobile accidents can result in significant trauma. Dislocated shoulders and fractured collarbones are the least of the department's worries. One 18 year old was flown by helicopter from the Easter snowmobile racing with a possible splenic rupture after the handlebar jammed into his abdomen. A second patient who hit a rock whilst riding under the influence of alcohol dislocated one hip, fractured a finger and had an open tibial fracture. The amount of force required to dislocate a young man's hip is incredible and demonstrates the power of these machines. A third patient and professional snowmobile stunt driver was admitted with bilateral pilon fractures after misjudging a jump in Poland and

landing on concrete. With four fractures in each ankle, poor initial management in Poland and significant skin necrosis requiring plastic surgery in Tromsø, his prognosis is rather bleak.

Other Experiences

Here is a list of other opportunities that I found to explore Medicine and life in Finnmark.

- I spent time in clinic and theatre with other specialties including Anaesthetics, Urology, Plastic Surgery, Obstetrics and Gynaecology and General Surgery.
- I joined teaching sessions in the hospital including seminars broadcast from other Orthopaedics departments in Norway, trauma simulation sessions and a course on surgical airways and chest drain insertion.
- I was invited to spend 1 week in the Plastic Surgery Department at UNN in Tromsø.
- I explored Pre-Hospital Care in Finnmark by going out with the Ambulance in Hammerfest, the Ambulance Plane in Alta and the Sea King Search and Rescue Helicopter and Fast Response car in Lakselv.
- I spoke to an Occupational Health Physician at the Statoil LNG plant in Hammerfest about his role and the health risks of working in such a plant.
- I spoke to a psychiatrist about the effect on mental health of living in a place with such variation in light and the mental health needs of the indigenous Sami population.
- I spoke to a radiologist about his research using digital infrared tomography to assess skin circulation and its application to cold injuries.
- I was invited to stay with a Sami family for a weekend. I helped with the reindeer herding and learnt about their culture and health needs.
- I learnt about the history and culture of Hammerfest and Finnmark through visiting local museums, conversations with hospital staff, joining in with the National Day celebrations and trying the local cuisine.
- I explored the nature when skiing, hiking and on long bus journeys to placements.
- I learnt Norwegian!

Statoil, Melkøye

Norway's economy has boomed since the discovery of oil in Norwegian waters. Statoil is the largest operator on the Norwegian continental shelf. In 2007 the company began processing liquid natural gas (LNG) from the Snøhvit gas field at the Melkøye plant in Hammerfest. Snøhvit is the first offshore development in the Barent Sea and is unusual in having no surface installations, therefore being completely unmanned. Natural gas is extracted from the seabed and piped to Melkøye to be processed. The installations are also monitored and controlled from Melkøye.



Photo 2: Melkøye

Statoil employs a group of Occupational Health Physicians who are responsible for employee health in each of its facilities. Health and safety requirements differ for onshore and offshore facilities. However, Melkøye is in the odd position of being classed as both an onshore and offshore development since workers must sometimes visit the offshore installations. Therefore Melkøye's Occupational Health Physician must not only assess the impact of working in the onshore processing plant, but must also plan for when work is required at Snøhvit.

Natural gas is cooled to -162°C for processing. Working at such temperatures means that cold injuries are a risk and icicles forming on the huge containers can fall onto employees. Gloves and hard hats are used to avoid injury. When work is carried out offshore there are strict rules for the length of time that employees are allowed to work outside depending on temperature and wind chill factor.

Working in the processing plant is a very physical job and requires working in uncomfortable positions or with raised arms to reach controls at eye level. Therefore there is a high incidence of musculoskeletal pain, especially affecting the shoulders, neck and back. In order to avoid such problems, Statoil's Occupational Health Physicians are included in design teams to improve ergonomics in their facilities.

Gas leaks are an obvious and potentially catastrophic hazard at Melkøye. All employees are equipped with gas masks and Melkøye is currently trialling a new monitoring system to detect levels of poisonous by-products in the processing plant more accurately. However, there is the potential for these by-products to

escape into the atmosphere when transferring the LNG from Melkøye to the gas containers on the ships. More modern ships have apparatus to collect the by-products, but older ships sometimes lack this. If the wind is in the wrong direction the free by-products would blow back to Melkøye and Hammerfest so loading of the ships must wait.

The Sami

The Sami are an indigenous northern Scandinavian population, distinct from other Scandinavians in ancestry, culture and language. They are believed to have migrated above the Arctic Circle following the retreating ice at the end of the last Ice Age, taking up reindeer husbandry and fishing as their traditional professions. As a minority population the Sami have long been subject to discrimination. From the 1800s 'Norwegianisation' began in Norway and the Sami were forced to conform to a Norwegian way of life. Not until the 1980s' cultural revival were they able to begin to re-establish their culture through self-determination.

There is little information on the health needs of the Sami compared to Norwegians. They are at higher risk of mental health issues and alcohol abuse due to low socio-economic status, cardiovascular disease due to diet, ligament laxity due to genetic predisposition and potentially stomach cancer due to high intake of smoked reindeer meat. Traditional Sami occupations are very physical so they are also at risk of occupational injury. Common injuries include trapped fingers in trawler nets when fishing and snowmobile injuries in reindeer husbandry.

I was very lucky and privileged to be invited to spend a weekend with a Sami family and their reindeer herd. Staged 'Sami experiences' are sold by tourist companies, but what I got to see and do was the real thing. Reindeer husbandry follows a strict seasonal calendar. During winter the reindeer graze inland where the weather is more stable and food is available. That weekend in April was time to round up the reindeer and herd them to the coast to graze on fresh grass over summer. Rounding up the reindeer ready for the 10 day journey to the coast is a huge task. The Sami use snowmobiles to round up the herd over the vast vidda (mountain plateau) and collect them in a large fence (pen). The reindeer are then brought into the kirdnon (central circular pen), 50 animals at a time, so that each family can identify their animals and move them into the family fence. Reindeer are identified by complex markings on their antlers and hides which can only be read by being amongst the herd. When the Sami men standing in the pen see their reindeer they take them by the antlers and drag the animal into the family fence. The biggest fear in this occupation is an antler to the eye, however eye protection is not used.

Reindeer husbandry is very hard work in tough conditions. My first job was to help fix holes in the fence and put up netting over the fence to stop the reindeer being scared. Unable to tie knots with my gloves on and having to haul around metres of heavy netting, this was easier said than done in the wind and cold. The Sami put their hands inside their jackets every 5 minutes to stop their fingers

developing frostbite. Once the fences were ready and the reindeer were brought into the kirdnon, I stood guard at the door to the fence. When the men caught one of their animals I had to open the door to let them push the reindeer through and close it again quickly to stop the reindeer escaping.



Photo 3: Sami reindeer herders fixing their family's fence.

Photo 4: The reindeer in the main fence before being separated into smaller families' fences.

Conclusion

I hope that this report has explained why I chose to go to the Arctic rather than the beach. For the record, I did go for a barbeque at a beach near Hammerfest with the junior doctors, but we were all in our hats and gloves rather than our swimming costumes! I am really glad that I decided to do something different on my own and I have learnt more than I ever expected to. I not only learnt about Orthopaedics and delivering health care in the Arctic, but I also learnt about reindeer herding, how to prepare the local delicacy Red King Crab, aerodynamics (thanks to the pilots flying the ambulance plane!) and much, much more.

I am very grateful to everyone who made my stay in Hammerfest so enjoyable and special. I have never met such friendly people who were so willing to help.

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