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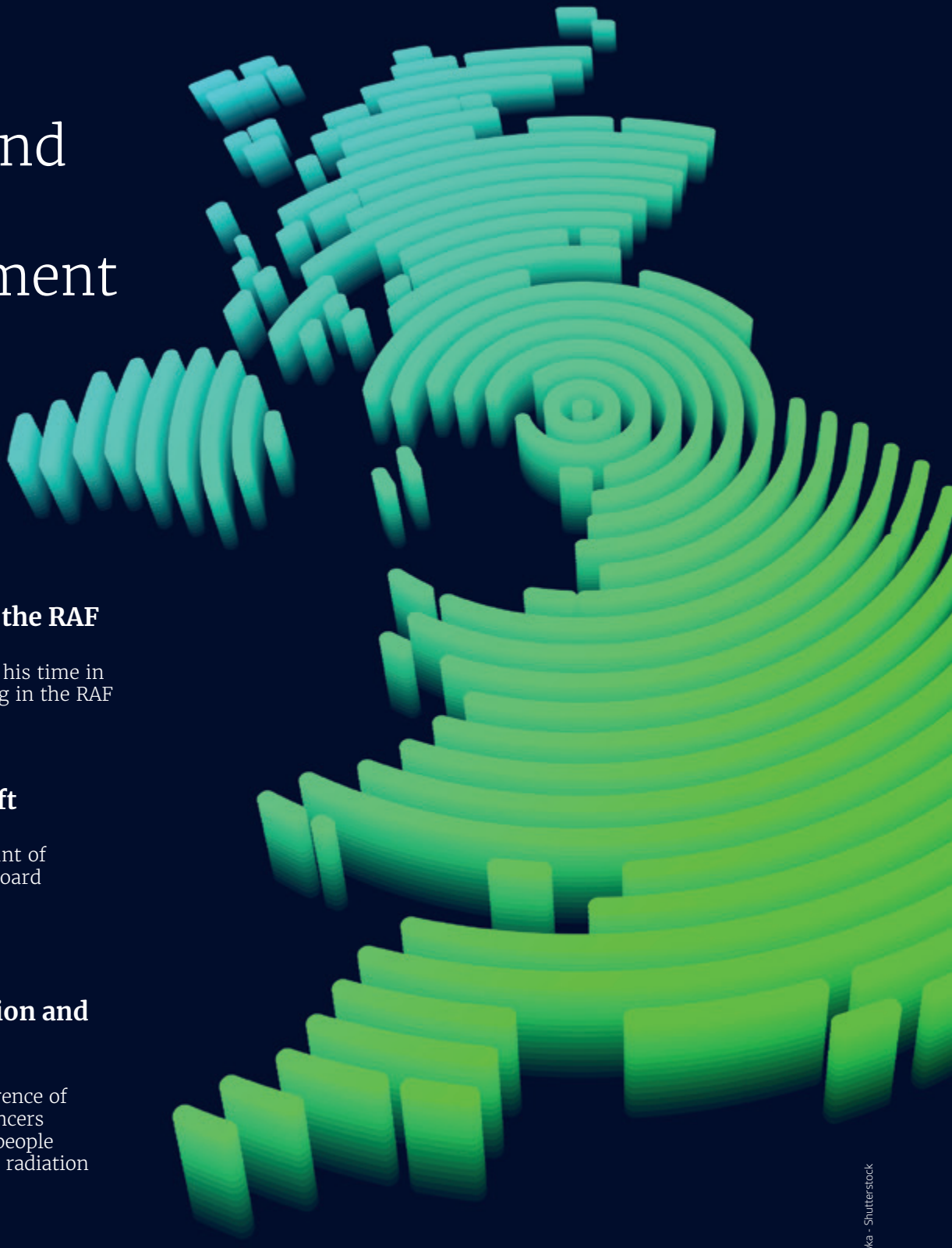
exposure

April 2021

The combined magazine for the nuclear community



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Foreword

We are sure like most people 2020 was a year that most of us are glad is behind us. The situation with lock-downs and shielding has meant that a lot of the things we would normally, and had intended to do just hasn't been possible.

Visiting beneficiaries and attending annual events such as NAVAD (National Atomic Veterans Awareness Day) have either been not allowed or severely restricted.

Thanks to the lockdowns and the arrival of the Pfizer, Astra Zeneca and soon the Moderna vaccine the country is now beginning to gradually get back to some cautious normality, with cases of the virus dropping.

We are pleased to announce that the NCCF will be attending our sister charity, the BNTVA's Annual conference and reunion in August at the Telford Hotel and Golf resort in Ironbridge. This is of course subject to potential future Covid-19 Lockdowns. Attendees will be able to speak to us about what we do and our staff will be able to assist with applications to the Care and Wellbeing Fund.

During the last year the NCCF has been able to take a look at its processes and have implemented streamlining wherever we can to improve services to our beneficiaries. Part of this analysis was authoring the CWI Fund Impact Assessment which you can read on page 16 of this magazine.

We urge you to stay safe and we hope to see some of you this year.

Editor - Exposure

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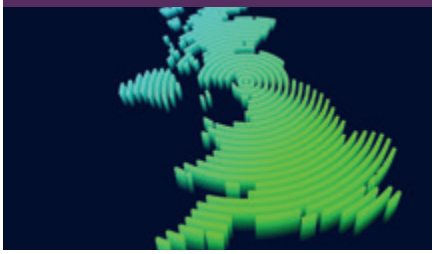
The NCCF



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A report on how the NCCF has helped its beneficiaries

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Making that difference

CHRC

Ionising Radiation and Cancer: Part 2

We discuss the occurrence of radiation-induced cancers in defined groups of people using a science called radiation epidemiology

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CHRC

Centre for Health Effects of Radiological and Chemical Agents

Exposure Online

See the magazine website at: **www.exposure.press**

Life at sea after the RAF

One day in August 1957 there appeared on our S.R.O. a notice asking for volunteers from the Army and RAF personnel to volunteer to join HMS Warrior for return passage home to Portsmouth via South America.

I returned to my tent that evening chewing over in my mind whether or not to volunteer for this trip home with the Royal Navy.

Reminding me at the back of my mind, that old military saying never volunteer for anything in the forces, but purely on a selfish motive I decided on this instance that were more gains then losses, to be had, with the advantages to be had in my favour, was that I would leave Christmas island two months earlier then my repatriation, and secondly I would have a trip around the South America, the Falkland Islands, Pitcairn, Gibraltar, and finally arriving in Portsmouth on 11th October 1957.

I quickly realised that this was once in a life– time chance of me being offered a trip like this. Though I was not fully aware of how I would cope serving in the senior service, I was more than a little apprehensive if 1 would fit into Navy life, and muster up to the grade that they would expect of me. Having no idea of what duties I would be expected to carry out on board her majesties ship.

However the next morning I reported to our orderly room and put in an application to apply for the farewell trip home on HMS Warrior. Returning to my supply duties and wishing that I would be lucky enough to be pick for this South America trip home.

The day I joined the Navy

It was either late August or early September in 1957 (the exact date escapes my memory) that my posting to the Royal Navy HMS Warrior, had arrived. I reported to the MT section and had transport to London Port area and about 100 of us boarded L.C.M., which took us out to the H.M.S. Warrior.

My first impression in seeing this great grey hulk sitting there in the blue sea was what a ugly monster, I suppose I was expecting some welcome signs like "Welcome the R.A.F", but what really upset me that I realised that I had forgotten to bring with me my large jar of Brylcream, but I soon cheered myself up because I realised that any accommodation they found on aboard ship for me was a 100 times better than my old accommodation, the bell tent, that I had lived in for 10 months.

Once on board there was a welcoming committee to show us the ropes and to allocate us to our respective messes. Once again I was lucky because I was billeted in the Royal Marine Band mess, and was handed over to the leading Killick, of the mess, who explained the navy procedures and regulation that I was expected to obey & carry out. At certain times of the day a officer would turn up at our mess and carry out his rounds, it was now that I realised that Navy life was a lot different than R.A.F. life, a lot stricter and more discipline.

The first problem that I had to overcome, was getting to grips with putting up and sleeping in a hammock, this apparatus took us new boys, some time to master, but we did manage to give the matlows something to laugh about when some of the R.A.F lads found themselves on the floor. Once we had mastered the trick in putting the thing up properly and inserting the sticks either end, the problem was solved, and I found it one of the most comfortable forms of sleep that one could get.

After a few days at sea we soon pick up the gest of sea life, and what was expected of us. I just listened and did what I was told to do carrying out my duties to the best of my ability. I didn't wish to get into any trouble and be put on a charge and be punished by loss of any day shore leave. What I could not forget is the reason why I volunteered for this Cruise in the first place, it was to see the world, I had to try and keep a clean sheet.

Life at sea for an RAF Novice

Being at sea on one of her Majesty Ships, for a raw recruit, it is nearly an impossibility to keep out of trouble. I can clearly remember on one occasion when the ship was berthed at Montevideo, I crossed swords with the Master of Arms, a person not to upset on any account. I was detailed to report for duty as an extra navy police patrol. I was put on security duties, on the evening shift, so many bells, which I have forgotten.

Royal Navy/MOD

HMS Warrior, a Colossus class light fleet aircraft carrier, was completed in 1946 and served in the Royal Canadian navy for her first two years. In 1957 she was headquarters ship for Britain's atom bomb tests on Christmas Island. In 1958 she was sold to Argentina and became their Independencia, and was withdrawn from service in 1971. (Wikipedia)

Well late into the night I was put on the returning gangplank duties and instructed, by one of the navy policeman to watch and check the returning crew, to make sure that they did not bring any drink on board, and that they were sober enough to climb the ladder un-aided, return to their mess deck in a fit state, not cause any trouble, and pick up their correct boarding cards. That night two Stoker Ratings cause a disturbance at the top of the gangplank, I left the frame with all the identification cards and proceeded to the gangplank where the two matlows were brawling, while I was trying to sort out the trouble with theses two sailors, another sailor crept up behind me and grabbed a hand full of identification cards and scarpered with them.

We were then in a bit of a panic, as I did not know who was ashore and who was on ship with out a full roll call. So on the appearance on the scene of the Master Of Arms, who took charge of the situation, for some unknown reason the finger of suspicion was pointed towards me.

I remember that not long after the security incident I was relieve of my police duties. Some time later the Master of Arms sent me for. He said that he had found the culprits who had snatch the cards and that he wanted me to go down an identification parade and pick out the stokers that he had lined up.

I walked up and the line, but I couldn't be 100% certain that they were the culprits as the lights on gangway were very dull, I mentioned this to the Master of Arms, and he said I was to have another go and if I didn't pick them out, I'd be up in front the Captain next day. So that is how I found my self in the Captains cabin on theses jumped up charges being read out against corporal Brown R.A.F.

After reading out a number of charges against me, the one I remember was for dereliction of duty! The Captain asked me what I had to say in my defence. I told him that in my opinion could I be expected to carry out the duties, when I was given no written instruction on that night duty that I'd normally be given in the R.A.F. I had been given no instructions or procedures of Navy life at Sea, not even fire drill or life stations. No instructions on the four cards watch system that was used on her Majesty Ships.I was given no details on navy rank and their uniforms, in fact when it came to the Navy I was a complete Novice, and no way with the lack of training could I have expected to carry out the duties that I had been given. The Captain agreed with the evidence that I had submitted and dismissed all charges against me.

The Master of Arms was not happy about the result, after being marched out of the Captains office he said, *Brown I will be keeping a beadyeye on you for the rest of the trip, and if you step out of line, I will come down on you hard*. The four Stokers were admonished from any charges as far as I can remember.

Terry Brown (Evacuee) RAF 1950-1972

Terry at the Weymouth June Parade

Both Images / Terry Brown

Another incident that comes to mind, is of a Airman Sam Musgrove, who when the ship was docked at Montevideo, jumped from the bow of the carrier and swam to some steps leading to the dockside into the arms of an Argentinian girlfriend, that he knew from the last stop at Buenos Aires. Their brief encounter was short lived, because soon on the loving scene were two Navy Police personnel, who kindly escorted him back aboard the ship, where he was confined for the rest of the cruise.

On many occasions us R.A.F. lads gave the sailors a reason to have a laugh at our behaviour and our lack of seamanship, I recall one such occasion when we docked at Port Stanley in the Falkland Island, we had ask a Lieutenant Commander to be issued with protected clothing for the cold weather and also some leather gloves to protect our lilly white hands when handling the hawser when mooring, needless to say he gave us a short and sharp reply.

Sometimes we did find it difficult to understand some of the Navy's terminology. But when I look back over forty-nine years ago now, on my journey home from Christmas Island with the Navy on board H.M.S. Warrior, It brings back very happy memories of life on board one of her Majesty Ships.

I like to think that in a small way that we did contribute to help make the journey successful, as our government did manage to sell the Warrior to the Argentinian Government. So all my painting to cover up the rust seems to have done the trick, and fooled the Argentina Navy that they were getting a bargain, for this nicely turned out ship.

Some of my most proud memories were when we lined the decks on entering foreign ports; it always brought a lump to my throat. And I felt proud to be British. I also got the same feeling when joining the ships company in the marching through various cities during our South America tour, We march through their cities with the marine band playing, to their Cenotaph to lay a wreath on the unnamed fallen comrades, and then on to the Saluting Dais with all the local dignities.

I was very lucky because last March I revisited Rio-De-Janeiro. Stayed a couple of days in Rio, then caught a cruise liner back to blighty, we covered some of the same sea ways that we had crossed some 49 years before, needless to say a lot of old memories came flooding back of my first cruise on H.M.S. Warrior, However there was one big difference between the two sea journeys the first one they paid me for my sea adventure, and the second sea trip I had to pay them. However I must thank the Navy for giving me my sea legs, and for giving me my first taste and the love of the sea, which to this day I have not lost, and was responsible for so many other sea adventitious that I have had in my life time since.

Terry Seymour Brown

EX RAF Sergeant Brown
EX-Warrior

The BNTVA Living Histories' Project

People have a very different understanding of the term Oral History which vary from a very formal rehearsed account of the past to informal conversations about the halcyon days amongst family, friends and co-workers also recorded interviews with people deemed to have an important story to tell.

My understanding of the term is that every single person has THEIR story to tell – we are actually all important which may sound trite but it is true! How many times I wish I had spoken to my father about his experiences and then it was suddenly too late - his story vanished into the mists of time.

We learn from written stories but an oral history can actually represent the person giving their memory of their experiences. When that person is no longer around, it is our memory of them that keeps them alive in our minds.

This is partly the reason why I am passionate about capturing as many oral histories or to be more accurate have chats with people about their memories. My father only talked about the tests in the last two years of his life and it is the only time I have ever seen him cry.

Our Nuclear Test Veterans, widows and descendants have very important memories or experiences that should not fade away – they deserve to be shared with the next generation and beyond. School students should be aware of these stories.

The BNTVA has recently joined the Oral History Society, which is the flagship organisation providing training so that we may treasure these important events in your lives.

The BNTVA is working to record the lasting impact created by the participation of British service personnel, AWRE scientists and civilians, in the British and American nuclear tests and clean-ups from 1952-1967. The BNTVA Living Histories' Project is wide reaching, and a major part of the BNTVA's strategy over the next three years. Not only do we want to hear from those situated at the tests, but their wives, widows and descendants too. The sort of stories we are interested in include life and duties at the tests, experiences of witnessing a bomb blast and the effects of fallout, and how these experiences have impacted your life to date, if at all.

We would be grateful if wives, widows and descendants want to talk to us about the first time your loved one talked about participating in the tests, how they described events, and, in what ways, if any, that these experiences affected your life and experiences as a family. Did these experiences bond you as a unit, cause strain or have any other impact that you may wish to share?

On a charity basis, we would also like to make use of our chats as part of our virtual archive and this can obviously be done anonymously if that is your wish.

Please if you are a veteran, widow or descendant and are even vaguely interested, don't hesitate to contact me either via **m.harding@bntva.com**, via our social media pages or by telephoning me, **Michelle Harding** on **07591 833 856**.

BRITISH · NUCLEAR · TEST · VETERANS · ASSOCIATION · COMBINED SERVICES ™

ORAL HISTORY SOCIETY

An Unusual Draft

Moving from job to job every couple of years, you always hoped to be given something different which would provide a new and interesting experience. Having recently completed two years as an Instructor at the Portsmouth Command Seamanship School, I was due to return to a seagoing job. As an experienced Seaman Petty Officer I was open to a wide range of possibilities: in the event my new posting exceeded my most optimistic expectations.

My usual August Summer leave was augmented by two weeks of Overseas leave. I was both pleased and surprised to receive a "Draft Chit" to join the Tank Landing Ship HMS Messina. Apparently she had been on station at Christmas Island in mid Pacific since December 1956 and many of her ship's company were due for relief. Not surprisingly, one's first question was what was this former wartime landing ship doing in that location and what was her role.

It transpired that, under a blanket of tight security, the planning of the British nuclear trials under the name of "Operation Grapple" had been underway since 1955. Messina was part of a comprehensive Naval Task Group whose composition and size would vary with the implementation of individual planning stages. Obviously a Landing Ship such as Messina would be absolutely essential for transferring stores and equipment onto the open beaches of the two islands selected for the Grapple series of tests, Malden and Christmas. The presence of extensive coral reefs frequently made it impractical for the landing ship itself to run ashore to discharge laden vehicles as designed via the bow doors and ramp.

To provide greater flexibility, Messina's extensive modifications for Grapple included the provision of six LCMs (so called for landing Mechanised vehicles) and two amphibious DUKWs.

The end of September, 1957, saw a collection of enthusiastic sailors bused up to Heathrow to fly out to Christmas Island, situated some 1200 miles South of Hawaii. I was surprised to see that our conveyance was to be a venerable Douglas DC4 - one jump up from the ubiquitous DC3, aka Dakota, but at least it had 4 engines. This aircraft was on charter from the American company Overseas National Airlines and had a capacity for 46 passengers.

Once we were embarked a stewardess came down the aisle and asked "Any of you guys weigh over 200 pounds" - not exactly confidence boosting when about to fly halfway round the World. A pamphlet informed us that the aircraft's max speed was 280mph at 14,000ft - how times have changed! Our first stop was to be Keflavik in Iceland, a journey of about 5 hours where we would have a meal. I recall about an hour into the flight a loud report issued from the galley. A distraught looking stewardess then emerged to announce that there would be no more coffee on that leg.

American airlines, Douglas C-54B, Skymaster

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HMS Messina- The Royal Navy tank landing ship (Photo 1945)

At that time we followed the standard Trans-Atlantic route for prop driven aircraft. Owing to their limited range it was necessary for them to make several refuelling stops; Keflavik was the first. Our DC4 had an advertised range of 3,300 miles but obviously that was very much qualified by headwinds. Our other scheduled stops were Goose Bay, Labrador, a journey of some 1,500 miles which would have taken us about 6 hours. Next was Winnipeg, Canada, at a similar distance. Approaching in daylight, I remember well the magnificent scenery of forests and countless lakes. There we had the usual hour or so break for a meal - I seem to remember a succession of breakfasts. The most notable event at Winnipeg was the problem that the captain had in starting the Port Outer engine. After it made a succession of ineffective wheezes, we were all invited to disembark.

With the other 3 engines running at full chat, the captain rushed up and down the runway hoping that the slipstream would induce a favourable response from the reluctant starter.

As the next 1,500 mile leg to Oakland, California, was to take us over the Rockies, it seemed like a good idea to have the benefit of 4 happy engines. After 3 or 4 runs, the recalcitrant engine suddenly burst into life to the appreciative applause of we apprehensive passengers.

We were invited to reboard at the rush. We were relieved to arrive at Oakland without incident after another sector of about 5 hours. Fortunately Oakland was the base for Overseas National. We had a crew change and the defective starting system received what attention it required. The next leg of our journey to Hawaii was the longest at about 2,400 miles. We arrived in Honolulu Hickam Airforce Base in time for yet another breakfast after a long, tedious overnight ocean flight. Here at Hickam we were pleased to find a rather more commodious RAF Hastings of Transport Command from Christmas Island awaiting our arrival. Although it heralded another long flight of about 6 hours, we were all looking forward to the end of our protracted journey. Indeed our first view on arrival over the island was a revelation.

The British Cabinet had made a decision to proceed with the development of thermonuclear weapons in June 1954. Christmas Island, situated some 1,200 miles South of Hawaii, the largest coral atoll in the pacific, was selected to be the operational base.

The Grapple advance party arrived on the island in June 1956. Since that date, spurred on by the progress of an international anti-nuclear lobby, development work continued apace. Thousands of tons of stores and equipment had already been delivered by both Royal Fleet Auxiliary and charter ships. The airfield was improved by RAF and Army Royal Engineers so that it could operate large and heavy aircraft. The lagoon port landing facilities were extended, base sites and adjoining roadways were all set up to accommodate living quarters, stores and workshops. Thousands of specialist military personnel arrived by both troop ship and charter aircraft. At the peak of the build up the Island base supported a workforce of some 4,000. The Main Camp consisted of over 700 tents, marquees and hutments.

It included a butchery, a bakery and a laundry, The target date for achieving full base operational status was 1st December 1956. It was into this well practiced cauldron of activity that I arrived on 26th September 1957.

Messina had first appeared on the Christmas Island scene back in August 1956. With her complement of 6 LCMs and 2 DUKWs complete with their Marine crews, the rate of unloading increased significantly. While at Christmas, she would be anchored off the lagoon entrance; supply ships would be assigned an adjacent anchorage. My role, with a party of our seamen and army stevedores, was to supervise the off loading of the chartered ships' cargo. In commercial ports this would be done by the port stevedores. The ships' crew would not be involved; such was the case at Christmas.

The range of consigned equipment was - shall we say challenging. With the exception of the specialist Heavy Lift ships, we had to supply all lifting equipment and slings for off loading by a supply ship's derrick. Only occasionally did I get an advance copy of the Bill of Lading. Military vehicles and most of their heavy equipment had fitted lifting points.

Generally large civil engineering equipment such as bulldozers, graders and tractors did not; some interesting improvisation was required. Normal cargo ships were incapable of handling the heaviest items such as lighters, and LCMs, so it was necessary to secure the charter of a Heavy Lift Ship. In the first instance this was Ben Wyvis whose derricks were capable of a single lift of 120 tons. I recall getting her captain to turn into the swell while we off loaded a 30 ton water lighter; fortunately the bosun controlled the heavy lift derrick. Even regular military vehicles could prove tricky to sailors.

Allen Collection

SS Benwyvis, Heavy Lift Ship

We were able to offload heavy and bulky items directly onto self propelled Mexe pontoons for transfer into the lagoon's Port London. It was essential to utilise all available space, therefore it was necessary to start up a vehicle and gingerly park it as near as feasible to the open sided edge. This could pose a problem as some of these large vehicles had gearboxes like railway signal boxes. Discretion was the order of the day. The LCMs and DUKWs also ran a virtual ship/shore shuttle service for more regular loads.

By the time that I joined Messina in September, 3 individual tests of the Grapple series had already taken place during May and June. These were air burst detonations from bombs dropped by a Valiant bomber over Malden Island, some 400 miles SSE of Christmas. Unfortunately the results were unsatisfactory. The fact was not publicised, but it was necessary to reinstitute a further series of tests. The first of these was known as Grapple X. To save time and money, and due to the unavailability of elements of the Naval Task Group, it was decided to drop the bomb off the Southern tip of Christmas Island instead of off Malden. The new site was only 20 nautical miles from the airfield where 3,000 men were based. This relocation required further additional major construction on the island base.

It included the duplication of installations that had been set up on Malden, and the provision of 26 blast-proof shelters.

The news of this extension was not well received by the troops who interpreted this as an extension of their time away from home. It was recognised that they all had been having a pretty arduous time despite efforts made to improve living conditions. Assurances had to be given that no personnel would spend more than 12 months on the Island. Doubtless this proviso explained my own presence.

As part of the preparations for the new test series, Messina was tasked to recover redundant equipment from Malden. The island was featureless, low lying and guano covered. There was limited access through a narrow gap in the coral reef surrounding the island. Deep water moorings had been laid outside the reef from where the LCMs or DUKWs could be launched.

Our trips to Malden required both improvisation and skill to cope with the usual heavy swell on the open beach. A system was devised of attaching hawsers from beached bulldozers to the quarters of the LCMs to prevent them from broaching in the surf. Previously we did lose one which was broached, rolled and swamped.

Wikimedia Commons

Vickers Valiant B1 XD818 - RAF Museum Cosford

Wikimedia Commons

Avro Shackleton

Given the right conditions, landing and recovery of stores and equipment would be made normally via the bow doors and ramp as designed. Air transport was also available for the island as required. A small runway had been constructed at Malden to provide an air link to Hawaii before one was available from Christmas. Earlier on 7 March 1956, Messina made a beach landing to discharge a full load without using restraining bow lines from LCMs. She developed a shear in the narrow gap, damaging several of her plates on a coral head and causing a leak into her fuel tanks. This later necessitated a 4,000 mile journey to New Zealand for repair. As this occurred over the Xmas period, it provided the ship's company with a welcome break.

Securing the bow doors for ocean passage incurs considerable physical effort. Once the ramp is up there is only a small space between it and the bow doors. The only access is via a hatchway on the main deck through which 4 heavy H section steel girders have to be lowered by hand purchase. These then have to be lowered and bolted horizontally to raised brackets on the hinge sides of the doors. Several large turnbuckles completed the job. Of course the reverse is necessary for preparing to open.

Early in the New Year problems developed with the fastenings of these bow doors. This necessitated a ten day visit to Pearl Harbour for repairs. It also provided a most welcome break for our ship's company and a group of embarked military, all of whom enjoyed the Lavish facilities and hospitality of the United States Navy. Adverse comparisons made by some of our lads generated an article in the local newspaper under the invidious title "Sad Sacks of the South Seas"; here our well worn Messina was awarded the pseudonym of Rust Bucket!

It was necessary for us to make periodic visits to several other islands in support of Decca, Met and monitoring stations. Penrhyn, 600 miles from Christmas, was the largest and most attractive. Fanning and Jarvis were regarded as being even less attractive than Christmas geographically, but at least Fanning had a pleasant Cable & Wireless staff. It was not possible to beach Messina at these places so all stores had to be landed by LCM. Onboard Messina the LCMs were traversed on pairs of fixed fore and aft rails to a position where they could be plumbed by one of the 2 derricks. We normally only carried a couple, leaving the others to work at the Christmas anchorage.

The DUKWs were very versatile and easy to handle. There was ramp access from the main LCM deck down to the Tank Deck. They could be launched either by derrick or drive themselves off the open bow door ramp.

My first few hectic weeks onboard led up to the crescendo of the detonation of the Grapple X weapon. The bomb was dropped from a Valiant at 0847 on the 8th of November 1957. As was the practice, she was accompanied by a second observation Valiant. A certain amount of heartburn had been caused on that occasion when at 0100 in the morning a patrolling Shackleton reported sighting a Liberian registered ship, the SS Effie, in the exclusion zone. Despite its best efforts, the Shackleton was unable to get any response from Effie until 0615. The destroyer Cossack was sent to intercept her and she was finally escorted out of the area.

The anticipated yield of this trial had been 1 megaton of TNT. In the event it exceeded expectations producing a yield 1.8 megatonnes but that was still below the safety limit of 2 megatonnes. Nevertheless, due to the size of the explosion, some damage was caused to buildings, fuel storage tanks and helicopters on the island.

Wikimedia Commons

Grapple Y Test

Although this was technically a true Hydrogen bomb its composition did not satisfy the Director, Dr. William Penny, so it was back to the drawing board. Apparently the physicists at Aldermaston had no shortage of ideas for improvements. A revised configuration, under the code name Grapple Y, was adopted in October 1957. Plans for the test were restricted to the PM and a small group of officials because of the continuing possibility of a moratorium on testing. It was calculated that the new device could reach 3 megatonnes of TNT although the safety limit remained at 2 megatonnes.

Meanwhile work to maintain the base and all its test supporting requirements continued. There were personnel changes in the RAF command structure and appropriate adjustments made to the overall base construction requirements. Otherwise routine life continued.

The Grapple Y bomb was dropped by a Valiant off Christmas Island at 1005 on 28th April 1958. It produced a yield equivalent to 3 megatons of TNT, largely as expected. This was the true thermonuclear weapon that Britain sought and remains the largest nuclear bomb that Britain ever tested.

At the time of this test, as with the previous one, Messina lay in the anchorage off the entrance to the Christmas lagoon. This was some 20 miles from the airburst detonation site. The ship was at immediate notice for sea. We had invited some 40 Gilbertese native labourers and stevedores onboard to watch Disney cartoons down on the tank deck as a distraction. These were eminently more popular than watching the bomb test judging by the volume of the applause.

Once the Valiant and its partner took off, we had a broadcast running commentary of their progress. Their con trails were easily visible in a crystal clear sky. At that stage we spectators were squatted on the open deck with our backs towards ground zero, clad in our standard Action Working Dress (No. 8s). This was augmented by our regular service anti-flash hoods and long sleeve gloves. In due course we were given the count down to bomb release.

3 – 2 -1 and then we were subjected to the initial unimaginable flash of indescribable intensity. Despite dark glasses, gloved hands clasped over one's eyes and head crouched down between your knees, every bone in the normal field of vision was brilliantly x rayed. The silent flash was accompanied by instantaneous heat of an alarming degree on your back. Seconds later, the noise equivalent to that of a violent thunderstorm crashed, rumbled and echoed across the sky. Shortly afterwards we were invited to turn and face the blazing tumbling cauldron as it gathered, forming into the familiar mushroom column and producing a succession of skirts as it rose. Transfixed by this awesome spectacle, we were aware of what appeared to be an accelerating pall of mist. This heralded the arrival of the powerful blast of the shockwave, almost knocking some of us off our feet.

Even Dr. Penny, the project director, later admitted that the force of the detonation was greater than he had anticipated.

Here I will end my narrative. A final British test series known as Grapple Z commenced on 22 August. By this time HMS Messina had returned home to Chatham via the Panama canal.

These were relatively small nuclear bombs suspended from clusters of Hydrogen filled balloons. Their purpose was to test a series of new technologies.

Much has been subsequently written about the possible radiation effects on personnel exposed to this and various other theatre nuclear trials. Despite a significant series of health abnormalities reported by the British participants, the UK Government has refused to accept the association of the various complaints, including cancer, to Ionising Radiation. It is significant to note that the United States, Australia and New Zealand have all accepted a causal link. Despite many reported cases having a less severe degree of exposure, all received compensation.

For my part, I subsequently developed skin cancer, a pituitary brain tumour and chronic Fibromyalgia. Two of my children also contracted multiple cancer conditions. Not surprisingly, this prompted me to make several representations to Brunel in the hope of being included in the advertised DNA testing programme, but all to no avail – Amen.

David L Deakin
Cdr. LVO OBE RN.

BNTVA Conference Reunion 2021

9-12th August, Telford Hotel & Golf Resort, lronbridge

The BNTVA have announced the dates of their conference and reunion and have provided us with the following information regarding the event.

After much debate about whether to proceed with the BNTVA Conference Reunion 2021, we have finally booked the Conference Reunion for 9-12 August at the Telford Hotel & Golf Resort, lronbridge, Shropshire. However, please be aware that these dates may be subject to change, due to potential future Covid-19 lockdowns.

The reason we have chosen this beautiful hotel is due to its location and proximity to the RAF Museum, at Cosford. The RAF Museum contains an excellent Cold War Hangar, which houses the actual Vickers Valiant XD818, flown by Wing Commander Hubbard OBE DFC.

This Valiant dropped Britain"s first live H-bomb (thermo-nuclear fusion device) on 15 May 1957 off Malden Island, with an air burst yielding between 150-200kt; this was codenamed Short Granite.

On 10 August, the BNTVA will hold a reunion in the RAF Cosford Museum Cold War Hangar. We anticipate a good show of our veterans and their families, and a day of sharing, befriending, and listening to stories of the tests. This event will be attended by MPs, sponsors, representatives from the armed forces community and the press.

The conference will take place for a full day on 11 August, and feature an array of speakers including a Canberra cloud flyer, who flew through Fallout at both Maralinga and at Christmas Island. We will welcome speakers from academia, indigenous communities from nuclear tests locations, veterans, descendants, veterans, champions, international nuclear tests associations and other interested parties (yet to be confirmed). We will hold a gala dinner in the evening.

We are working hard on subsidising this conference reunion as much as possible, and hope you are able to keep these dates clear. More information and a booking form will be sent out within the next few weeks.

Kev Gregory / Shutterstock.com

Vickers Valiant B1 XD818, Bomber Command's first V class aircraft, establishing Britain's airborne nuclear deterrent, on display at the RAF Museum Cosford

HRH The Prince Philip, Duke of Edinburgh 1921 – 2021

It is with deep sorrow that Her Majesty The Queen has announced the death of her beloved husband, His Royal Highness The Prince Philip, Duke of Edinburgh on the 9th of April 2021.

His Royal Highness passed away peacefully in the morning at Windsor Castle. The Nuclear Community Charity Fund wish to extend our sincere condolences to Her Majesty The Queen and members of the royal family.

Prince Phillip shares part of our nuclear test heritage aside from his military service. The Duke of Edinburgh arrived on Christmas Island in April 1959 where he was met by members of the Operation Grapple Task Force, staff from the Atomic Weapons Research Establishment at Aldermaston, and Gilbertese residents.

The Duke inspected members of the local police force, and met a group of schoolchildren with their teacher.

The Duke visited the Grapple Headquarters and Joint Operations Centre and then inspected the crews of several Hastings transport aircraft. He was flown by helicopter over the test area. On returning to the headquarters, the Duke visited the local church built out of pieces of coral and toured a mess area before departing by helicopter.

Phil Emmerson - Shutterstock

The Nuclear Community Charity Fund

CWI Impact Assessment

A report on how the NCCF has helped its beneficiaries

P16

Don't get scammed

A report on how scammers are now stealing from the unsuspecting public

P25

The Nuclear Community Charity Fund

Making that difference

Care Wellbeing & Inclusion Fund
Impact Assessment

The Nuclear Community Charity Fund operates a Care Wellbeing and Inclusion Fund which serves to reduce suffering and increase wellbeing within the community of British Nuclear Test Veterans, their spouses and offspring. The fund is supported by grants made from the Armed Forces Covenant Fund Trust under the Aged Veterans Fund.

The AVF funding was made as two distinct grants which have been termed Phase I and Phase II. Phase I completed and the fund entered Phase II. Improvements have been developed and deployed throughout the life of both phases.

The NCCF contracts BH Associates to design, develop and operate the processes necessary to deliver the funding successfully within the community.

As part of that delivery BH Associates conduct Impact Assessments relating to the activity and performance of the CWI Fund to ensure the charities aim of continual development is fully realised.

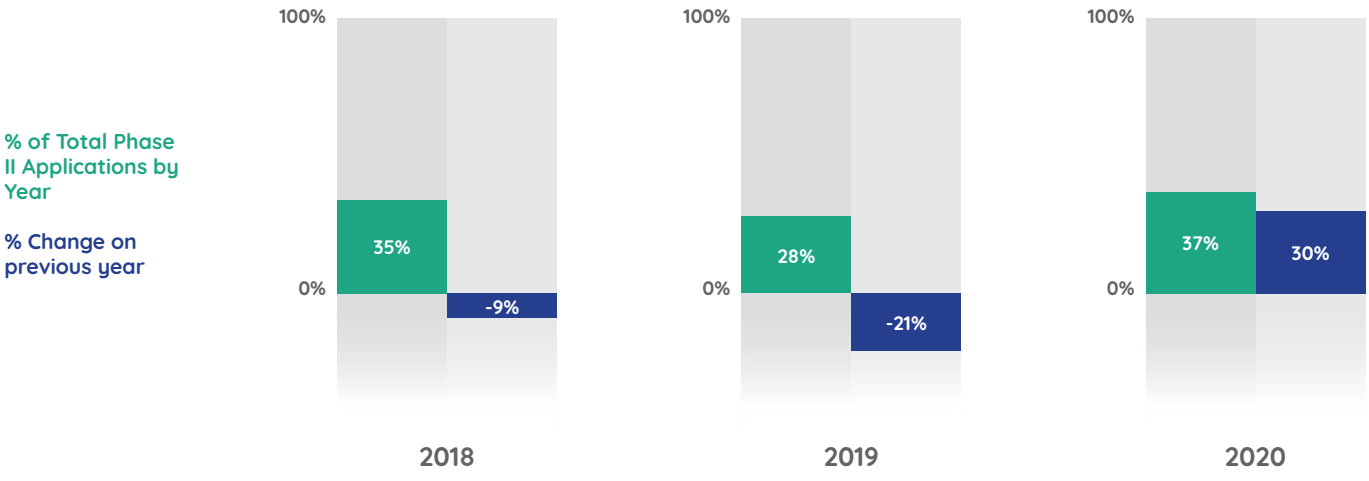
Between 2016 and 2020 the Care Wellbeing and Inclusion Fund has approved around 70% of applications submitted.

In 2020 the approval rate was 10% higher than the success rate for the first year of the fund, this and many other improvements in the ability to deliver targeted grant support to the vulnerable members of the British Nuclear Community highlights how the NCCF continues to make that difference year by year.

Applications Processed Annually

The application rate fell in 2019 but increased significantly in 2020. Following from the Phase I support we believe that the majority of the 'known' community, with Care Wellbeing and Inclusion issues (CWI), had received assistance from the fund. This led to a natural decline in applications. The 2020 increase appears to have been driven by a number of factors; Covid impact on CWI and increased interaction with the British Nuclear Test Veterans Association. This increase in applications also brought new challenges to manage them within the Covid restrictions.

Phase II Applications by Year



Breakdown of Application Results & Average Spend

This is one of the key statistics that influences the future planning of the fund. “How many cases are we likely to need to fund in the coming year and what is the likely cost?” Knowing this informs budget setting and the variation of any application restrictions.

We can see that the fund has maintained a success rate of around 70% for applications. This means that 7 out of every 10 applications are supported.

The balance of ‘Rejections’ to ‘Withdrawls’ is important as it informs the manner in which unsuccessful applications have been managed. Rejections are applications that have been presented to a Grant Panel which the panel have identified reasons as to why the application can not be supported.

The reduction of rejections within the statistics shows that the preparation of applications is refining to fully explore individual situations. This enables presentation of all impacting factors to the Grant Panel informing their decision process.

There has been a 51% decrease in the current rejection rate over the rate achieved during Phase I.

The figure for withdrawn applications was artificially increased during 2018/19 as we had adopted the practise of including form requests that did not result in applications.

The Phase I average and the 2020 figure record only those applications that have been withdrawn by the applicant following interaction with the Grant Team.

This can be a result of applications falling outside the scope of the full provision which when explained by the team result in acceptance by the applicant.

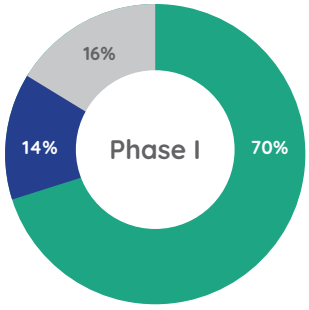
On occasion the Team are also able to obtain necessary support for applicants from other sources such as charities or local authorities. This means that not all the withdrawn applications leave applicants wanting.

On the financial side there has been a significant spend increase per grant in 2020. This can be attributed to a number of high cost grants and the impact of introducing Independent Living Assessments (ILA’s).

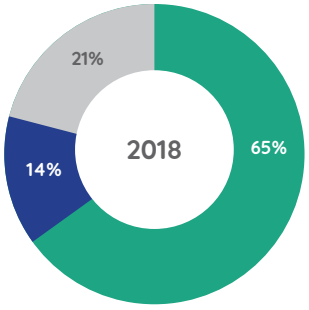
These ILA’s identify a broader range of measures addressing issues faced by applicants and generally provide more support to the beneficiary, of course, this comes at an increased cost, but one which better fulfills the charitable remit to reduce suffering.

Breakdown of Application Results & Average Spend

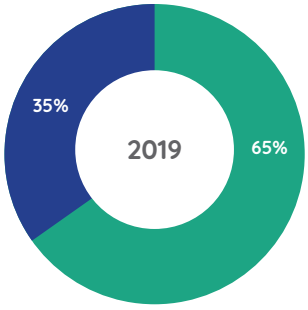
Supported Applications as a % of in period applications
Rejections as % of in period applications
Withdrawn and Abandoned Applications as a % of in period applications



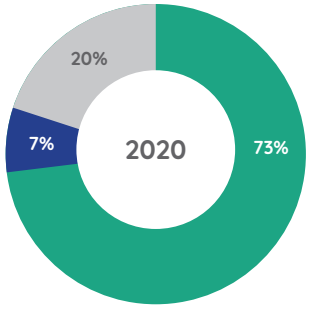
Average Spend per Grant
Not collated



Average Spend per Grant
£2,991



Average Spend per Grant
£2,464

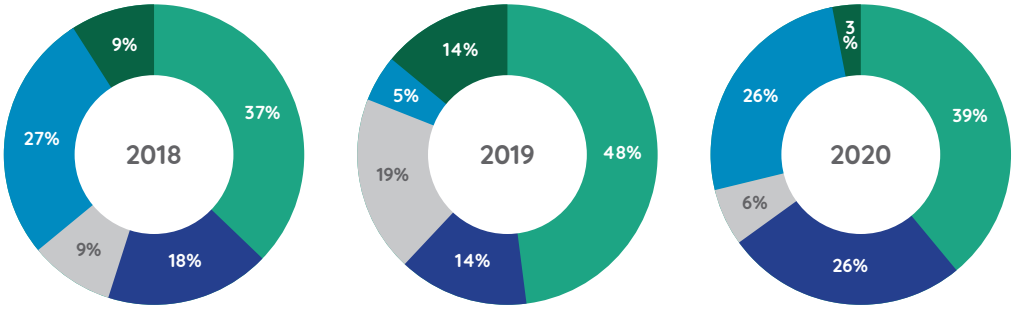


Average Spend per Grant
£3,465

Breakdown of Grants to Provision Area

Categorising grants in respect of the key areas they address provides an indication of the general support trends identified within the community. This informs the charity of the areas needing focus to support future development.

Daily Living Adaptations
General Provisions
Inclusion
Mobility
Medical



From the above we can see that there has been an increase in General Provisions. Further analysis indicates that the majority of this increase has been in relation to genuine cases of hardship resulting in applicants unable to fund the repair or replacement of household items essential to their basic health and hygiene.

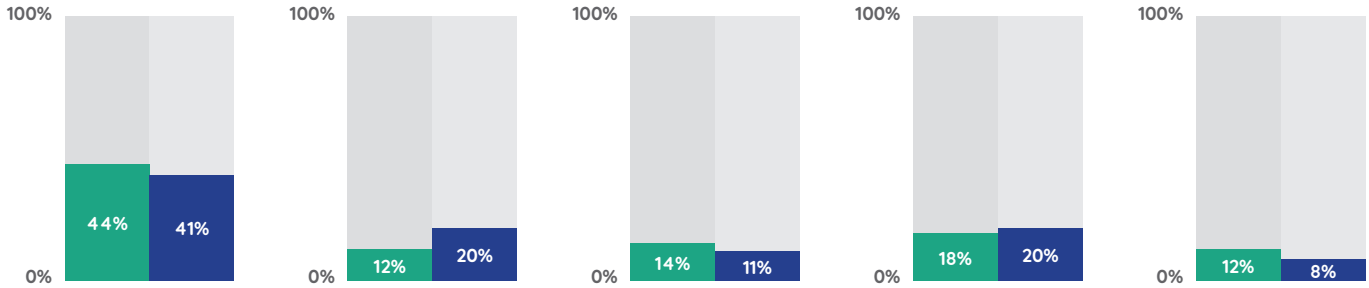
The NCCF are now looking toward identifying common issues within this category so that investigation of the measures provided can be made to develop best practices and best value through contractual negotiations.

This kind of activity has resulted in the development of supply relationships with a number of organisations offering nationwide special services. The relationships not only ensure cost effectiveness but that the standard of work and support is maximised for beneficiaries.

As a longer term view on trends across support categories we have examined requirements between Phase I and Phase II. Again this confirms a sustained increase in General Provisions and also identifies an uplift in mobility support requirements. As a consideration for the future we suggest a review of the General Provision category with the aim of subdividing to garner meaningful figures across specific support measures.

Phase I and Phase II Breakdown of Grants

Phase I Phase II



Daily Living Adaptations
Wetroom, Stairlift, Rise/ Recline chair, Profiling Bed.

General Provisions
Post Operative Care, Hardship.

Inclusion
Respite Breaks, Communication Technology.

Mobility
Electric Wheelchair, Mobility Scooter, Rollator.

Medical
Orthodontic Work, Specialist Consultation.

Breakdown of Grants to Beneficiaries

This statistic is one we monitor to project the change in the nature of the beneficiary pool needs. As the veteran generation declines we see an increase in age related issues amongst the next generation and also an increase in widowed spouses.

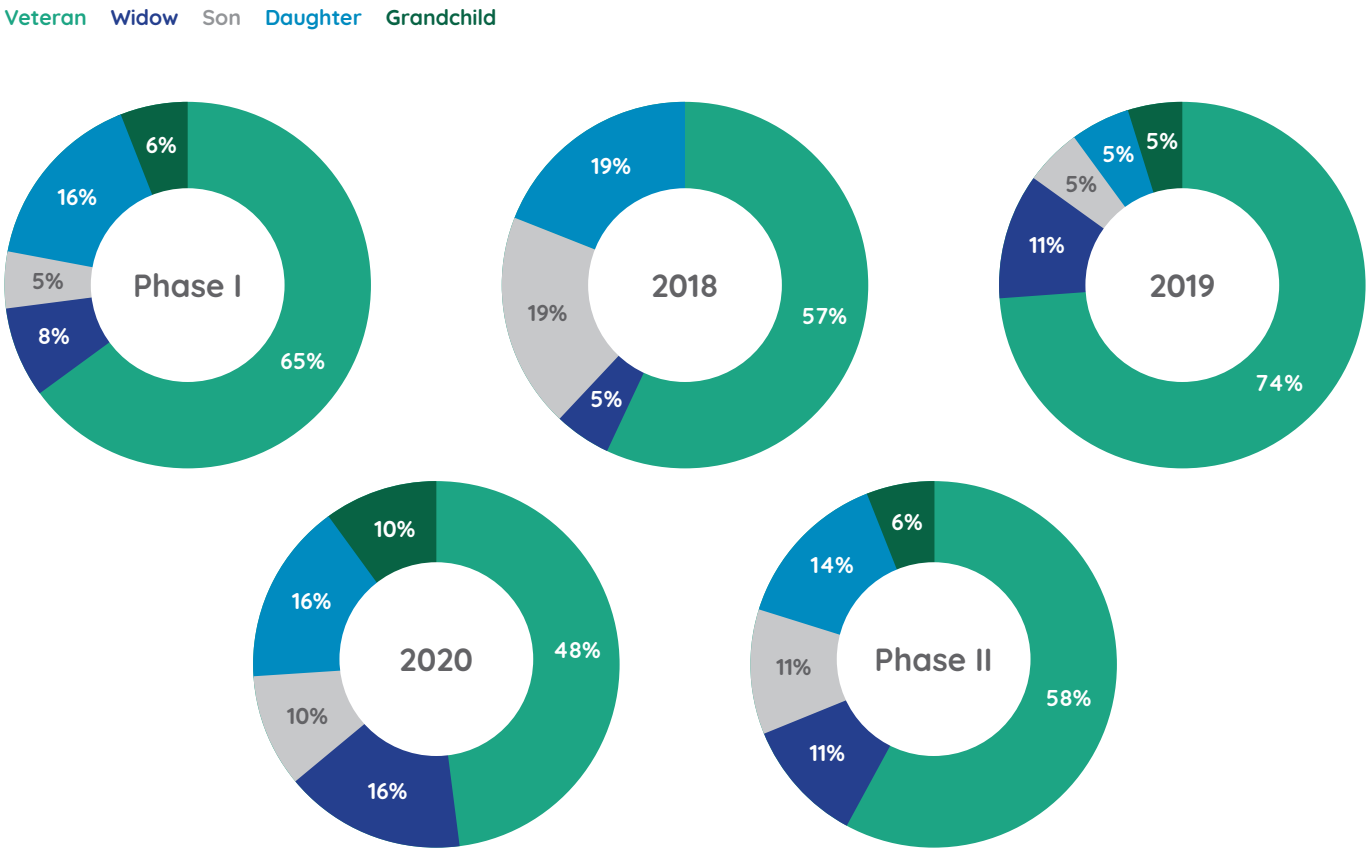
Veterans continue to make the bulk of applicants but as the charity moves to providing more to the non-veteran element of the beneficiary pool it becomes less Ex-Service organisation with an increased general social responsibility.

One of the figures of interest is the ratio of male to female offspring requiring assistance. Other research made available to the NCCF indicates that there are considerably more congenital defects and serious health issues amongst the female offspring than the male.

This has not always been reflected in the numbers which have been assisted but looking to the longer term figures we can see this trend emerging. Similarly we see a clear increase in the assistance needed by the following generation. The 2020 figure for Grandchildren represents an increase of 158% over the fund average at the end of 2019.

The net result of these figures is to raise questions relating to the future provision of the fund and the statistics we gather to inform this. We suggest that breakdowns of the Grandchild applicants into gender and inclusion of Great-Grandchildren will assist. A breakdown of Measures Category to Beneficiary Group will also assist targeting resources for the future.

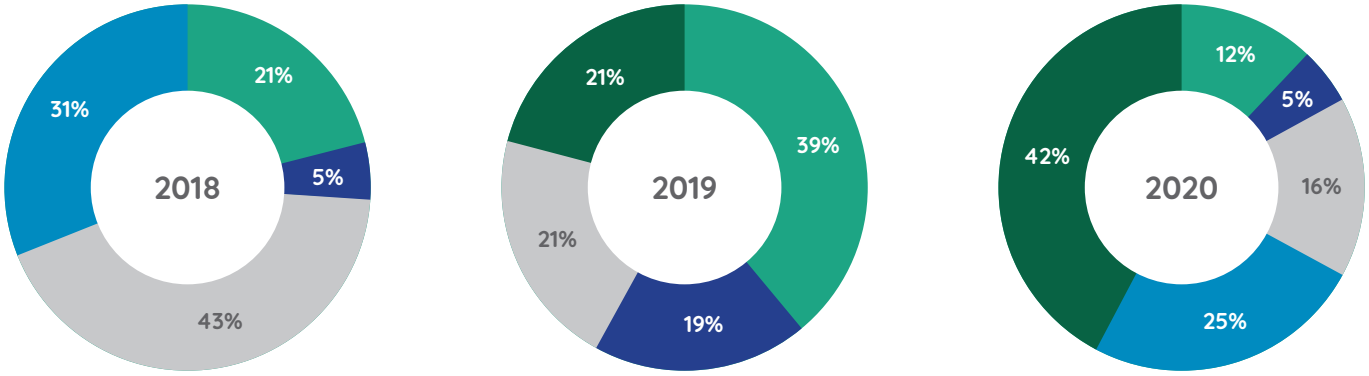
Breakdown of Grants to Beneficiaries



Beneficiary Group Spend Distribution

This set of data was not collated under Phase I however the Phase II results assist in quantifying the severity of issues amongst the beneficiary pool and the cost trends.

Veteran Widow Son Daughter Grandchild



Comparison of 2020 Share of Grants to Share of Expenditure

By considering the share of grants to the share of costs amongst the beneficiary groups we see an interesting trend developing whereby the value of grants made to veterans offspring is higher than to the veterans. This indicates that the measures identified by the offspring are more complex and costly than those identified for the elder generation.

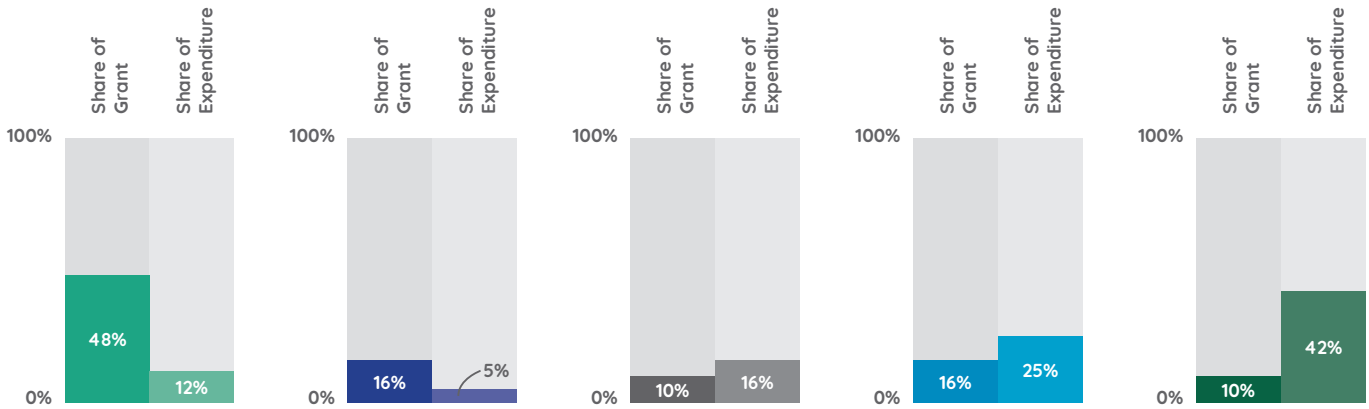
The veterans certainly made a significant portion of the applications however the cost of addressing their needs is a huge difference to those of the younger generations. This is clearly illustrated in the Percent Error Factor figures.

In consideration of these figures it is helpful to examine some of the applications received from Grandchildren. These have been for very high cost provisions like Dental work and Care Support whilst provision for veterans and widows are often a mobility scooter or a rise recline chair reflecting lower expenditure.

Combine this data with the increase in General Provision expenditure and it would seem that there is a clear difference in need between the generations within the community.

Further research may need to be conducted to define aspects and inform future planning.

Comparison of 2020 Share of Grants to Share of Expenditure



Veteran

Variance Error Factor as % Error to the mean

-85%

Widow

Variance Error Factor as % Error to the mean

-82%

Son

Variance Error Factor as % Error to the mean

5%

Daughter

Variance Error Factor as % Error to the mean

3%

Grandchild

Variance Error Factor as % Error to the mean

165%

Breakdown of Applications from UK Regions

Examination of this set of data reveals considerable variations across some of the regions which would not be expected when contrasting to the general UK population densities.

There is a marked difference between the East and West Midlands, we suspect this may date back to historic fragmentation of the nuclear community in the 1990's which has resulted in a lasting disconnect of the West Midlands population from the central nuclear community charities.

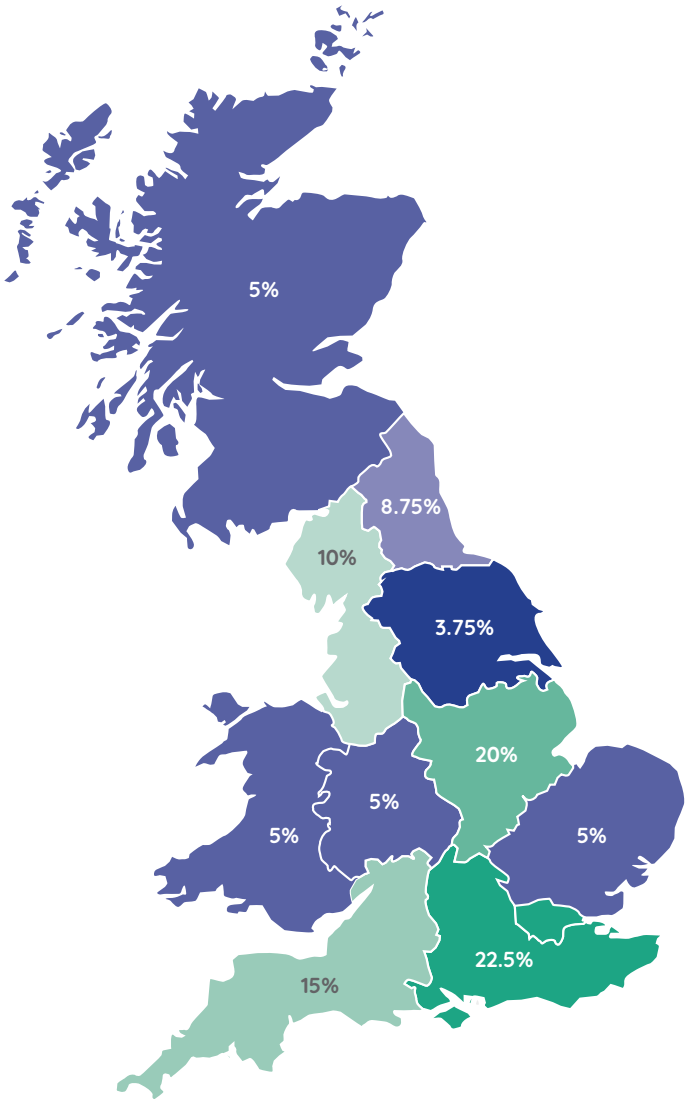
We suggest that a statistical analysis on the NCCF beneficiary pool be conducted to contrast with these results and the UK regional population density figures. This should then indicate two broad categories for future action:

- Where the regional beneficiary pool is under the respective UK regional density then publicity in the regional media should be considered to try and increase the local beneficiary pool.
- Where the regional beneficiary pool equates with the regional population density but application levels are below the expected norm then internal NCCF publicity needs focussing on the regions beneficiaries to publicise the help available.

Breakdown of Applications from UK Regions

Region % of Total Applications

- London & South East 22.5%
- East Midlands 20.00%
- South West 15.00%
- North West 10.00%
- North East 8.75%
- Eastern England 5.00%
- Scotland 5.00%
- Wales 5.00%
- West Midlands 5.00%
- Yorkshire & Humberside 3.75%



Complexities of Resolution

These statistics relate to the improvement of the time it has taken from application submission to offer across the different provision categories.

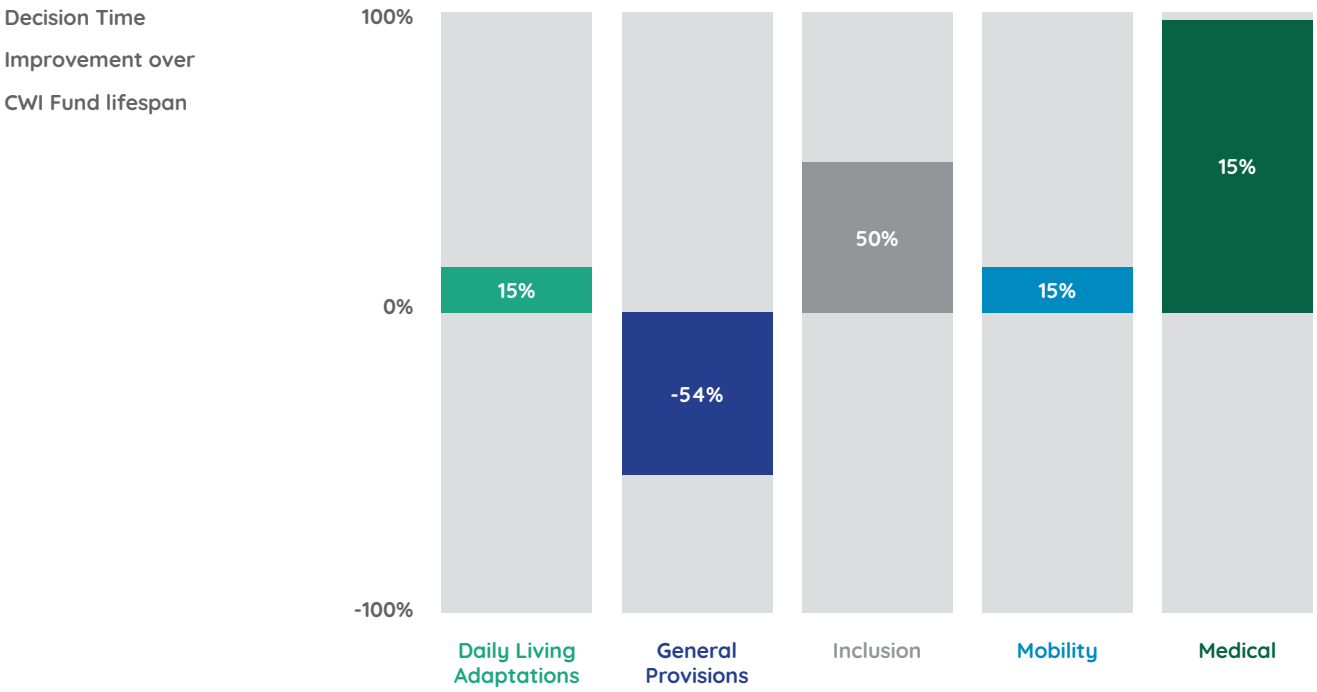
The significant Improvements on the timescales for Medical and Inclusion are impacted by the reduction in application numbers for the categories, this has meant that management focus has been more definite. We have learned the right questions to ask of care providers and developed the appropriate contacts to progress cases.

The greatest concern from these figures is the negative improvement for general provision category applications. This is impacted by the diversity of requirements and in many cases the need to identify local tradesmen and obtain quotes for work to be completed.

This can be increasingly time consuming and is something we have attempted to address by developing national supply contacts.

We anticipate 2021 will reveal a positive improvement in General Provisions and Daily Living Adaptations.

Application to Decision across to Provision Areas



Application Processing Time Analysis

A major consideration of the charity during the past five years has been the time it takes to fully process an application. A delicate balancing act considering timescale, suffering identification, provision identification and charitable purpose obligations has to be conducted for every case.

The NCCF has encountered two occasions where a potential beneficiary has passed away before they have been able to render assistance. The trustees chose not to view this as an unfortunate event but as a tragic failure. The consequence of this was to harden the resolve of the charity to continue to improve its procedures and practises to reduce the time it takes to process applications within a safe accountable window.

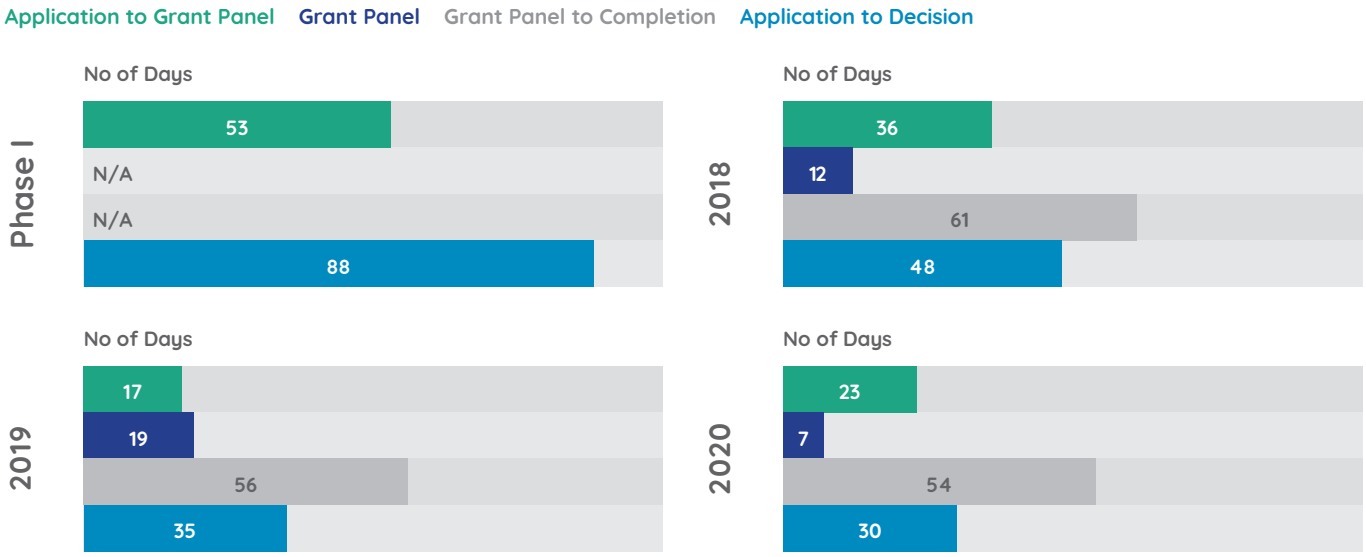
The greatest achievement by the NCCF since undertaking the CWI Fund has been to drive the timescale of 'Application to Decision' down from an average of 88 days under Phase I to just 30 days in 2020.

This figure will improve even further because the 2020 figure was inflated by COVID restrictions preventing the timely delivery ILA's as part of the pre-decision process.

One figure we have not quoted in this report is the time taken between the fund making an offer and the beneficiary signing the acceptance. This has remained fairly constant since the end of postal only offers during Phase I.

In Phase II we utilised the E-Sign system whenever we had internet communication ability with applicants. This reduced the acceptance lead time considerably. 2021 will see a further improvement to the system as we have now streamlined an email based acceptance system and are encouraging all applicants to make use of email communications to expedite their applications.

Application Processing Time Analysis in Days



Improvement of Applications Processing Time

A key goal of the charity is continuous Improvement and nowhere more so than in the timescale of managing applications. Comparison of performance of 2020 over Phase I really highlights achievements in this area.

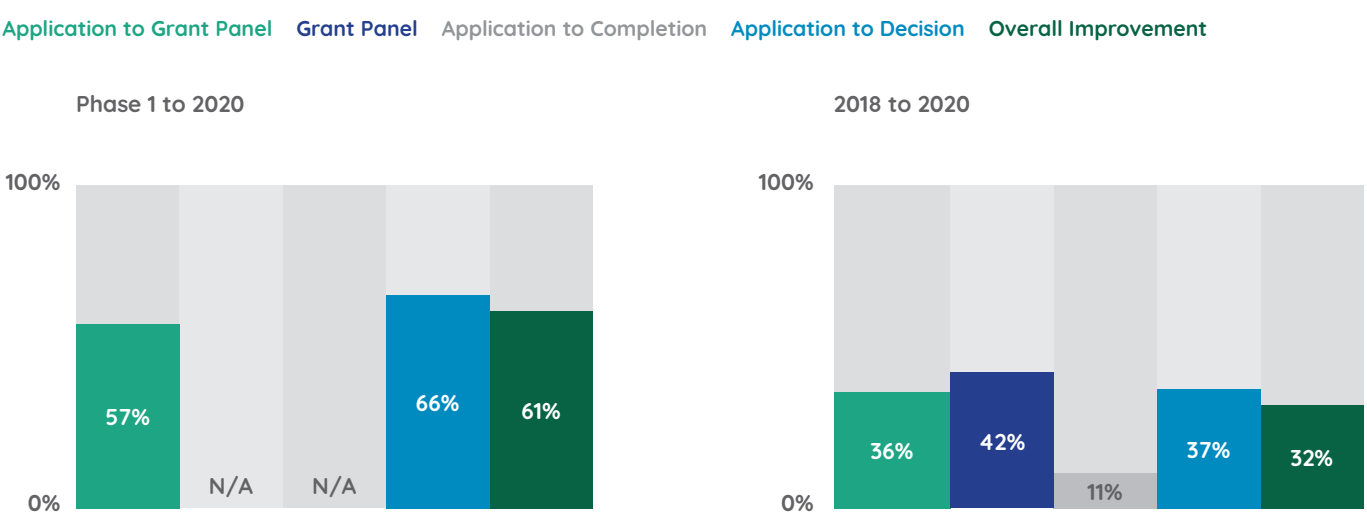
We can now get an application before a Grant Panel 56% faster than during Phase I. What is even more remarkable is that this is despite the covid impact.

The Application to Decision timescale has improved by an amazing 65.91%.

The charity is looking forward to even more improvement in this year with the impact of the new systems developed by BH Associates to automate Application form completion and creation of Grant Panel reports. Additionally BH Associates have now developed an IT solution to conducting and producing Independent Living

Assessments which achieve increased effectiveness and a reduced timescale. All this plus increased discipline amongst Grant Panel members should result in 2021 being a landmark year for the performance of the Nuclear Community Charity Fund's Care Wellbeing and Inclusion Fund.

Improvement of Applications Processing Time



Don't Get Scammed!

Police, Public Bodies and Charities are reporting a big increase in the number of scams being used by criminals to get their hands on cash. The isolation and uncharted territory of the Covid situation has been a windfall for the unscrupulous.

Letters pop through the door, emails drop into your inbox everything seems fine. "The Post Office has a parcel for you, just pop on line and put your details in, pay the outstanding postage charge and we can arrange delivery". Before you know it you have handed your personal details to a criminal.

It's not just your bank details, they will take any information they can get: Date of birth, Place of birth, Schools attended, Places worked, First car, Pet names, Mothers maiden name, Childrens names, Favourite song, Favourite movie.

These are all gold dust to the modern thief. Answers to these questions can be used to obtain credit using your identity, provide clues to passwords and security numbers.

Anyone on social media will have seen posts that ask a series of questions, usually under the guise of "Lets play a game and get to know each other better". The scammer just unleashes this and waits for people to start sharing it. A quick search and they have a list of information about you combined with your social media profile, all they do then is fill in the blanks.

Age UK have a lot of information on scams and how to avoid them on their website. Here is a summary.

Telephone Scams

Bank scams

Calls claiming to be from your bank saying there's a problem with your card or account. They often sound professional and try to convince you that your card has been cloned or your money is at risk.

They may ask for your account and card details, including your PIN number, and even offer to send a courier to collect your card. They may also advise transferring your money to a 'safe account' to protect it.

This is a common scam and your bank would never ask you to do this.

Computer repair scams

A scammer may call you claiming to be from the helpdesk of a well-known IT firm, such as Microsoft. They'll tell you that your computer has a virus and will ask you to download 'anti-virus software', possibly at a cost.

This turns out to be spyware, used to get your personal details. Legitimate IT companies don't contact customers this way.

Compensation calls

This is a call from a company asking about a car accident you've supposedly had claiming you may be entitled to compensation. Some of these could be genuine but many are not.

Don't engage in these calls. If you've had an accident, call your own insurance company on the phone number provided on your policy.

HMRC scams

You may get a call from someone claiming to be from HMRC saying there is an issue with your tax. They may leave a message and ask you to call back.

HMRC will never contact you this way and would never ask you to reveal personal financial information such as your bank account details.

Number spoofing

Scammers can mimic official telephone numbers so it comes up on your caller ID display. This can trick you into thinking the caller is really from a legitimate organisation.

If you're in any doubt, hang up and call the organisation directly. If possible, call them from different phone as scammers can keep the phone line open, so that even if you hang up to call the organisation directly, the line may still be connected to the scammer. If it's not possible to use another phone then wait for at least 10 minutes before you call.

Pensions and investment scams

This is a call about an 'unmissable' investment opportunity, or offering you the opportunity to access your pension cash earlier.

Do not respond to these calls. If you want pension or investment advice consult an Independent Financial Adviser.

Postal Scams

Here are common types of postal scams you should be aware of and what to do if you spot them:

Lotteries and prize draws

You may receive a letter congratulating you on winning a cash prize. But you won't receive any prize, and you may be asked to call a premium rate number or to pay fees to 'release' your prize.

Don't respond to these letters, even if they look genuine. A genuine lottery won't ever ask you to pay a fee to collect your winnings.

Psychics and clairvoyants

Psychics and clairvoyants may send a letter claiming to have seen something in your future and asking for money to disclose what it is. Sometimes the so-called clairvoyants co-ordinate with lottery and prize scams to give the impression that they are 'predicting' a piece of 'good luck'.

Don't respond – although the letter may look as if you've been specially chosen, this type of letter is sent out to millions and is a scam.

Pyramid schemes

Pyramid schemes can take the form of chain letters or investment schemes that offer profits for little or no risk. You may be encouraged to ask others to join, or told to send money to the person who has contacted you to receive your return on investment.

Don't join the scheme – if it seems too good to be true, it probably is. Pyramid schemes often involve overpriced products of no real value. You may receive a threat intended to scare you into responding, ignore these too.

Hard luck stories

With these types of stories, the fraudster may claim to have lost all of their money in unfortunate circumstances or that they need to pay for an operation, and will ask you for money.

These stories are fake. Don't respond, even to say no, as this will encourage the fraudster to keep contacting you.

Unclaimed inheritance

You may receive a letter addressed to you, which tells you that someone has left you money in their will. These letters can refer to real law firms and even have seemingly genuine email addresses, postal addresses, or websites.

Always check with the Solicitors Regulation Authority as to the authenticity of such letters. They regularly receive reports of similar scams and post them on their website.

Advance fee fraud

You may receive a request to help transfer money out of another country in return for a substantial reward. Often the letter will appear to be from a Government official or lawyer.

Do not reply to the letter and never send your bank or personal details. Often these kinds of scam letters are badly written. If you see spelling mistakes and poor grammar, this is a good indication that it's a scam.

Internet Scams

Basically almost every telephone or letter scam can be found on the internet. Emails and fake websites are common place.

Many telephone and letter scams will attempt to get you to use the internet to provide details to seemingly official web pages. In the next edition we will look more closely at the world of internet based scams.

Keep Safe

There are a few simple rules to keep safe:

- If something seems too good to be true then it probably is
- Stop and ask yourself "Does this seem legitimate"
- Do not provide any information to someone who contacts you
- Validate callers by taking their details and then contacting their organisation
- Do not use easy to guess simple passwords
- Do not pass your credit or debit card to anyone to use or swipe for you, they can easily steal your details.

If you have been the victim of this type of crime please ensure you report it to the Police. You may feel foolish to have been 'duped' but remember these scammers are duping people every single day, you are not alone and it isn't your fault.

NCCF Motorchair Giveaway

In the last issue we offered a Motorchair we had possession of to anyone in the Nuclear Community who could make use of.

The chair was offered on a first come first served basis with the proviso that they would be able to drive the chair with ease from their property and be able securely store the chair of out of the elements.

We are please to announce that the chair was delivered in a Covid safe manner by 2 members of our team to one of our veterans. They were extremely happy to receive the chair and explained how it would make a big difference to their life.

Steve Bexon - BH Associates

CHRC
Centre for Health Effects of Radiological and Chemical Agents

Exposure Editorial April 2021

A round up of what's been happening at the CHRC

P28

Ionising Radiation and Cancer: Part 2

We discuss the occurrence of radiation-induced cancers in defined groups of people using a science called radiation epidemiology

P29

Exposure Editorial Spring 2021

CHRC
Centre for Health Effects of Radiological and Chemical Agents

Spring is very welcome this year with an abundance of daffodils and the easing of restrictions lightening everyone's spirits. This comes after yet another challenging period of lockdown which has again impacted us all in very many different ways. Fortunately, we have been able to continue with the analysis of all the samples we have received for the 'Genetic and Cytogenetic project' and our expectations remain on-course for submissions for peer-review publications of the outcomes of parts of this study through the course of this year.

CHRC is committed to building capacity and training our future scientists. As part of this, I am delighted to report the progress our doctoral research students are making with their respective research projects and, in their own personal development. A snapshot of their achievements includes George Collett's paper titled 'The psychological consequences of (perceived) ionizing radiation exposure: a review on its role in radiation-induced cognitive dysfunction' is now published and available through our website (**www.chrc4veterans.uk/articles/peer-reviewed-articles**).

Isabella Bastiani received the US Radiation Research Society Scholars-In-Training poster award for Outstanding Achievement with her work titled 'Cytogenetic effects of a mixed radiotherapy treatment'. Jade Stephens won the online poster award for the UK Association for Radiation Research providing her with a bursary and the opportunity to present her research 'A systematic review of evidence for the trans/intergenerational effects of parental pre-conceptual exposure to ionising radiation: Human evidence' as an oral presentation at the upcoming meeting ARR 2021. These are highly competitive awards and excellent achievements.

Others of note include Amy Prescott's bursary award to present her work at the British Society of Gerontology 'Resisting the negative stereotypes of ageing: How Britain's nuclear test veterans try to maintain health and wellbeing in older age'. Similarly, George Collett also received a bursary to attend the same conference and present his research examining 'Health Perceptions in British Nuclear Test Veterans', while Justin Dankwa received a poster prize at Brunel Universities, College of Health, Medicine and Life Sciences post-graduate Conference with his research 'The impact of radiation exposure on neuronal cytotoxicity, ageing and transcription'. You can see more details of all our projects, their progress and how they relate to each other by reading our 3rd Annual Report (**https://chrc4veterans.uk/wp-content/uploads/2020/12/CHRC-3rd-Annual-Report.pdf**) and, a reminder that all publications arising from all work will be shared after completion of the peer-review publication process.

In this edition of Exposure, we continue our series of articles which encompass 'Radiation and Health' with Part 2 of 'Ionising Radiation and Cancer'. In Part 1 (published in Exposure December 2020) we introduced the common causes of this medical condition and discussed the possible mechanisms that have been proposed by scientists for carcinogenesis.

In Part 2 we discuss the findings of researchers who have investigated the occurrence of radiation-induced cancers in defined groups of people using a science called radiation epidemiology. We present the evidence for an association between ionising radiation and specific types of cancer known as radiogenic cancers and whether it can be proven that individual cases of cancer were caused by radiation.

I would like to finish by highlighting our 'Basic Information' series which are available as either flip-books or interactive versions. Both are available through our **Knowledge Hub** page on our website **www.chrc4veterans.uk** and also available to order as hard copies. Thank you again to all our volunteers who have contributed to all of our projects. CHRC staff are contactable via email at **CHRC@brunel.ac.uk**. During this period there may be a delay in replying. But please get in touch if you have any queries and please all keep well.

Dr Rhona Anderson, Director, CHRC

Ionising Radiation and Cancer: Part 2

This is the second part of a two-part article. In Part 1 we introduced the prevalence of cancer, the survival rates and the common causes of this medical condition. We discussed the hallmarks (traits) of cancer cells and the mechanisms that have been proposed by scientists for carcinogenesis.

In Part 2 we discuss the findings of researchers who have investigated the occurrence of radiation-induced cancers in defined groups of people using a science called radiation epidemiology. We will present the evidence for an association between ionising radiation and specific types of cancer known as radiogenic cancers and whether it can be proven that individual cases of cancer were caused by radiation.

Epidemiology of the atomic bomb survivors

The health of the survivors of the atomic bombings of Japan over the course of their lifetimes is being investigated in the Life Span Study by a Japanese-American research organisation called the Radiation Effects Research Foundation (RERF). RERF have compared the survivors' health with a control group of people who were living in Japan at the time of the atomic bombings but who were not exposed to radiation. In particular, RERF have investigated whether there are relationships between health outcomes and the doses of radiation which individuals had received.

The investigators estimated radiation doses for the participants based on their locations when the atomic bombs exploded (Figure 1); being closer to an explosion increased the dose and being indoors reduced the dose due to the buildings providing some shielding[1].

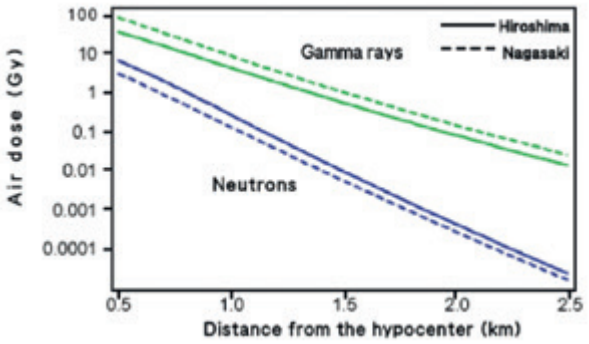


Figure 1. The radiation dose received versus distance from the nuclear explosions in Hiroshima and Nagasaki.

The RERF scientists have calculated the excess number of leukaemia deaths produced by exposure for different doses of radiation (Table 1)[2].

Table 1. Leukaemia Deaths, 1950-2000, RERF

Weighted Marrow Dose (mSv)	Number of People	Observed Deaths	Observed Deaths
5 - 100	30,387	69	4 (6%)
100 - 200	5,841	14	5 (36%)
200 - 500	6,304	27	10 (37%)
500 - 1000	3,963	30	19 (63%)
1000 - 2000	1,972	39	28 (72%)
> 2000	737	25	28 (100%)
Total	**49,204**	**204**	**94 (46%)**

For example, if we consider the third row of data in Table 1:

- 6,304 survivors received a dose to the bone marrow in the range of 200 – 500 mSv.
- 27 people in the survivors' group died of leukaemia.
- The epidemiologists calculated that 17 people in a control group of the same size also died of leukaemia.
- Thus, there are 10 (27-17) excess leukaemia deaths due to radiation.

RERF researchers also calculated the excess number of solid cancers (non-leukaemia cancers) produced by exposure for different doses of radiation (Table 2)[3].

Table 2. Solid cancers, 1958-1998, RERF

Weighted Colon Dose (mSv)	Number of People	Observed Cancers	Observed Deaths
5 - 100	27,789	4,406	81 (1.8%)
100 - 200	5,527	968	75 (7.6%)
200 - 500	5,935	1,144	179 (15.7%)
500 - 1000	3,173	688	206 (29.5%)
1000 - 2000	1,647	460	196 (44.2%)
> 2000	564	185	111 (61.0%)
Total	**44,635**	**7,851**	**848 (10.7%)**

Overall, the data from the Japanese atomic bomb survivor studies indicate that the higher the radiation dose received the higher the increased risk of cancer.

The Linear No-Threshold Model

The data points from the Life Span Study have been used to contribute to the Linear No-Threshold (LNT) Model, which states that there is no dose that is too low to progress to cancer (no threshold) and that increasing the dose increases the risk in a linear manner, e.g. doubling the dose doubles the excess risk of getting cancer (Figure 2)[4]. There is no relationship between the size of the dose received and the severity of the cancer.

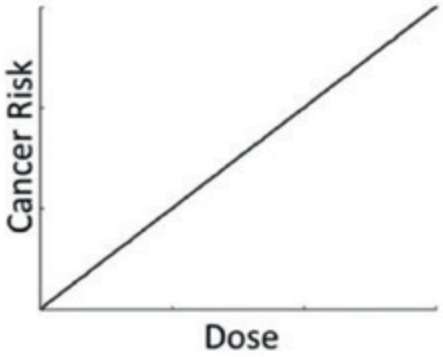


Figure 2. The Linear No Threshold Dose Response Model (RERF)

The American research body the National Academy of Sciences have used this model to estimate that if 100 people received a dose of 0.1 Sv, one person may get cancer. This compares with 42 out of 100 people who would get cancer during their lifetime for other reasons (Figure 3)[4].

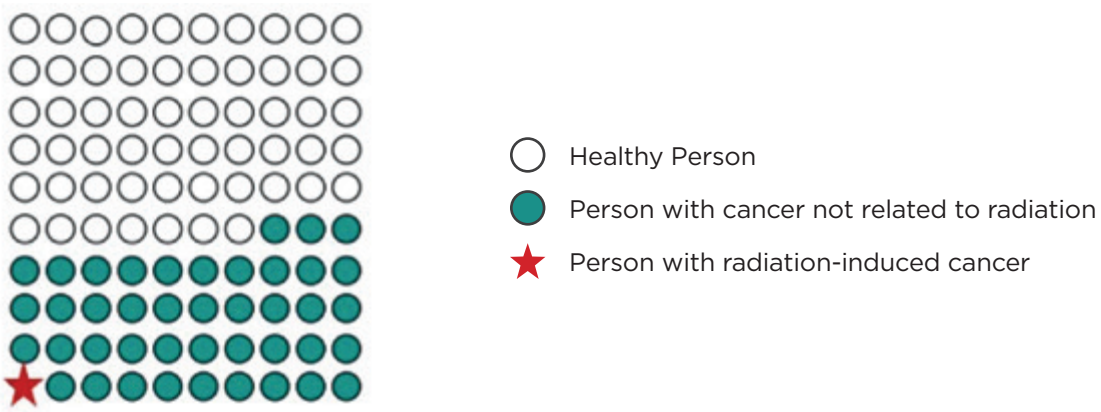


Figure 3. The Cancer Risk Posed by a Dose of 0.1 Sv (National Academy of Sciences)

The American National Council on Radiation Protection and Measurements (NCRP) have assessed epidemiology studies for different groups of people including X-ray workers, nuclear power workers and patients who had received CT scans[5]. NCRP found some of these studies were more supportive of the LNT model than others, however, there was sufficient evidence for the NCRP to conclude that overall, these studies supported the use of the LNT model for radiological protection. This means that this model should be used, for example, for setting dose limits for radiation workers.

The accuracy of the LNT model has been disputed by some scientists for doses below 100 mSv, partly because there are not enough data points. Epidemiologists have calculated that a study group of 50,000 is sufficient to assess the effects of a 100 mSv dose (approximately 87,000 survivors were recruited for the Life Span Study), but 5 million participants would be required to assess the effects of 10 mSv[6].

Alternatives to the linear no-threshold model

Researchers have proposed alternatives to the LNT model for doses below 100 mSv with the intention of reconciling epidemiology with current knowledge about cell biology (Figure 4).

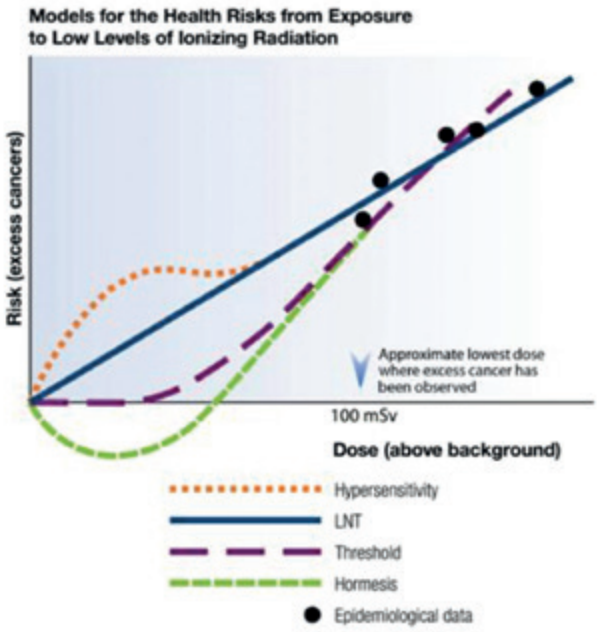


Figure 4. Low Dose Radiation Response Models (Canadian Nuclear Safety Commission)

For example, if we consider the third row of data in Table 1:

- The hypersensitivity model states that health risks may be greater than LNT predicts at low doses.
- The threshold model implies a dose below which there are no health risks.
- The hormesis model suggests that low doses of radiation may be beneficial to health.

Researchers who are researching the possibility of hypersensitivity are considering the non-targeted[7] effects of ionising radiation especially the bystander effect and genomic instability, and we have already discussed the latter (in Part 1). The bystander effect is when unirradiated cells show effects as a consequence of receiving signals from cells which have been irradiated (Figure 5).

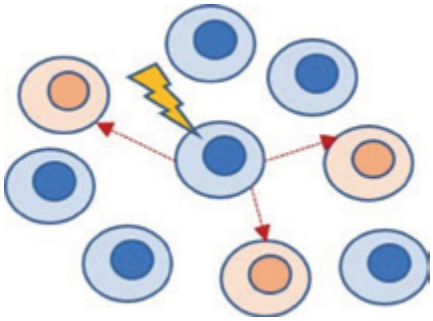


Figure 5. The Bystander Effect. Image shows one cell directly irradiated and neighbouring unirradiated 'bystander' cells (orange) showing response.

Both genomic instability and the bystander effects could potentially result in a low dose of ionising radiation having a greater biological effect than predicted by the LNT model. However, it is not understood how non-targeted effects impact the health risks of radiation.

Advocates of the threshold model maintain that the LNT model over-estimates the health risks of radiation[8,9] because this model does not take into account that living organisms have evolved in the presence of low dose radiation. This means that certain responses of the cell to DNA damage such as DNA repair, cell death and pausing the cell cycle should be considered to be evolved defences against cancer. They maintain that cancer can only occur if a dose is large enough (above a threshold) to overcome these defences.

Researchers who support hormesis hold that radiation can be beneficial in small amounts. They contend that organisms can adapt to benefit from receiving a low dose of radiation, e.g. there have been some studies which show that treating cells with small doses of radiation reduces the effects of subsequent larger doses[10]. This may be due to the initial small doses activating the DNA repair response in the exposed cells.

Currently none of these three alternative models has sufficient evidence to replace the LNT model, which continues to be used by most scientists, though with an awareness of its potential limitations.

Radiogenic Cancers

The results of the Japanese Life Span Study and other epidemiological studies indicate that receiving a dose of radiation increases the risk of getting certain types of cancer (called radiogenic cancers) and not others (Table 3)[11].

Table 2. Solid cancers, 1958-1998, RERF

Cancers due to ionising radiation
Leukaemia (other than chronic lymphatic leukaemia), Breast (male and female), Testis, Thyroid, Bone, Colon, Liver, Lung, Stomach, Ovary and Bladder.

The type of cancer that an individual may get due to ionising radiation depends upon the type of radiation and the route of exposure (Figure 6).

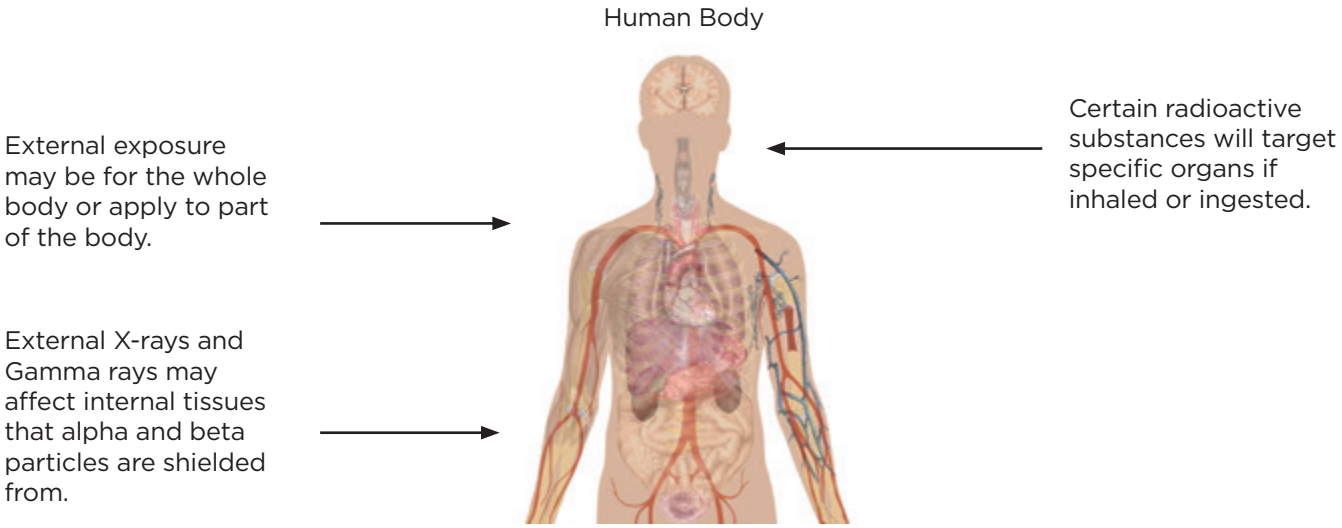


Figure 6. Type of Radiation and Route of Exposure

The survivors of the atomic bombings of Japan were externally exposed to gamma and neutron radiation, which had the ability to reach all of the body's organs and hence cause multiple types of cancer.

In contrast, some types of exposures are more localised and have more specific health consequences such as when radioactive iodine, an emitter of beta particles and gamma rays, was released into the environment by the 1986 Chernobyl nuclear power plant accident. This radioactive iodine entered the food chain via grass eaten by cows, which then produced contaminated milk that was drunk by people.

This issue was most serious in parts of Ukraine, Belarus and the Russian Federation where the highest level of radioactive substances were deposited by the accident (Figure 7).

Figure 7. Map of Deposits of Radioactive Substances in Ukraine, Belarus and the Russian Federation

The human body naturally concentrates iodine in the thyroid gland located in the throat and the concentration of radioactive iodine in the thyroids of the Chernobyl accident survivors has increased the occurrence of thyroid cancer in this group. This is a more common problem for those exposed as children, because they had smaller thyroids than adults and hence received higher doses from drinking the contaminated milk[12, 13].

Historically, radioactive iodine was a short-term hazard, because it has a half-life of 8 days, meaning that its abundance in the environment decreased to negligible levels a few months after the Chernobyl accident[14].

People can reduce this particular risk by taking potassium iodide (iodine pills), which prevent radioactive iodine from being absorbed by the thyroid. In addition, thyroid cancer can be successfully treated by killing the cancer cells with the same chemical agent which brought them into being, radioactive iodine[14].

Scientific knowledge of radiogenic cancers comes primarily from epidemiological studies. A limitation of this is that epidemiology cannot say whether an individual case of cancer was due to radiation. A goal of ongoing research is to find biomarkers (specific DNA mutations or patterns of mutations) which could prove this, as currently none are known.

Summary

In this article we have discussed the epidemiological evidence for the linear no threshold model which states that the probability of having cancer but not the severity of the cancer increases with increasing dose. We have pointed out that the LNT model is disputed by some scientists for doses below 0.1 Sv and have described some of the alternative models whilst recognising that none of them has sufficient evidence to replace the LNT.

We have described radiogenic cancers with a particular emphasis on thyroid cancer. We have shared the scientific consensus that it is not currently possible to know if an individual case of cancer was caused by ionising radiation, though the search for appropriate DNA biomarkers is ongoing.

We at the CHRC do hope you have found this article informative and references are included for further reading. Please also refer to the Basic Information which can be found on the CHRC website: Basic Information – Centre for Health Effects of Radiological and Chemical Agents (**chrc4veterans.uk**)

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Monarch Mobility

Now in its 20th year, Monarch Mobility has brought many innovative products to the mobility market place in its tenure, with its folding scooter being amongst its most successful. Now, after being forced to adapt its operations during the COVID-19 pandemic, this nationwide supplier of mobility scooters, powerchairs and adjustable beds is branching into e-commerce, as well as gearing up to launch a new range of products. We caught up with Managing Director Martin Sampson to find out about the company's plans for the Future.

Monarch Mobility was established by David Leach 20 years ago, and he is still fully involved in the business on a daily business. Four years ago Martin Sampson joined him as Managing Director. Martin, whose background in the industry was predominantly as The Sales & Marketing Director for Niagara Healthcare-owned Adjustamatic Beds, liked how Monarch was leading the way with an innovative product offering.

One such example was when the company brought the Mobie folding scooter into the marketplace eight years ago. As Martin explains: "Many Trade dealers and consumers laughed at us and our folding scooter concept initially; however, the folding scooter now appears everywhere. Not only was the folding scooter good for the dealers, but it also was – and still is – the answer to many consumers' problems and provided just the answer."

An accredited Motability dealer and manufacturer, excellent customer service is at the core of what makes Monarch stand out from its competitors, explains Martin.

"It is predominantly focused around the after-care service we provide and the way we service our clients around the UK," he notes.

"In fact, when the country went into lock-down we were pretty much covering most companies in the UK as they were all pretty much closed down with their repairs. Customers had nowhere to go. We functioned throughout the whole pandemic and were picking up new customers from across the country."

The Impact of COVID

As well as having a retail outlet/showroom in Halifax the firm operates a sales force which drives across the country doing demonstrations of our products. The initial impact of the COVID-19 pandemic was a "dead stop" explains Martin. The way the UK Government helped business with initiatives such as the furlough scheme helped the company a lot, says Martin, but Monarch still had to adapt, and fast.

"Obviously there was that worry and concern out in the big wide world, and then everything suddenly stopped. We had to be reactive to our marketing in a different way.

"Not only to maintain the outgoings of the business but to obviously maintain the business itself and maintain the support to our customers. We had to make a lot of changes which we probably wouldn't have done if there hadn't been a pandemic."

Throughout the pandemic, because of furlough, Monarch ran its warehouse operation from its retail outlet/showroom just so that the business could maintain productivity.

Explains Martin: "It's a working showroom. Customers will come in on a regular basis - especially the local people. They come in with problems and faults and we'll repair them. Or they'll come in and view the products themselves."

The most significant development for the firm was in transforming its website into an e-commerce website.

The website the company had devised before the pandemic was pretty basic. "Basically we had a website which just showed our products with a contact phone number and people would just ring in," says Martin.

Vogue XL, 8 mph, Class 3, Road Legal Mobility Scooter

Smarti Folding Mobility Scooter

"We now have a brand new fully-built e-commerce website so customers can look for products, enquire about products and pay for them online.

The e-commerce model has been working so well it is set to stay for good, comments Martin. "The world is moving online," he says. "It means that when customers go onto the internet now they can see the price, so we are now getting a more solid appointments coming through on the telephone because they know the price."

New Mobility Range

"Pre lock-down we were just about to launch, at the Naidex event an event for Mobility users, a completely new Monarch mobility range, going from folding scooters all the way up to 'eight-mile-per-hours' and obviously it all stopped so we never got to launch those products," says Martin.

There is light at the end of the tunnel though. Monarch is looking forward to launching its new product range at the BHTS (British Healthcare Trade Show) in June, he says.

"We have now a complete new 'four-miles-per-hour' range, which has various scooters for different customers needs. Some of them break down, some of them don't. All of them are now on the Motability Scheme.

"We have some new powerchairs, particularly our Carbon Lite, that are becoming increasingly popular because of their weight.

"Our massive 'eight-miles-per-hour' range has been very successful for ourselves currently and, again, all those products are on the Motability Scheme.

As a manufacturer of products on the Motability Scheme, the firm is proud of its service offering, but it is also keen to challenge itself by pushing forward with new goals, states Martin.

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Mobility issues can have a huge impact on quality of life for seniors and for people living with disabilities. When easy movement is problematic, certain rooms in the house may pose more of a danger. Those of us who have to live with restricted movement often find our bathrooms can become a difficult and dangerous place to navigate. Bespoke Bathing specialises in mobility bathroom designs and bathroom installations.

If you are planning a revamp of your bathroom adapting it in anticipation of future needs is a great way to stop accidents happening and make life easier for yourself and your family, if your mobility does begin to decline. If you're looking to the future and thinking about how to ensure your bathroom will be safe and easy to use later in life, this is again a good consideration.

Why Walk-in showers?

A low threshold shower is a perfect choice if you find yourself struggling to get in and out of the shower.

Plenty of room
When you have a standard bath in your bathroom, it can make the area look cluttered and smaller in size. However, with a low-level walk-in shower, you can establish more of an open space and add a design feature to your bathroom. You can even increase the openness of the space with shower side panels which are often made from glass.

Low maintenance
Most walk-in showers are now fitted with waterproof boarding to cover or replace tiles. These are easier to maintain as there are fewer corners and crevices. The smooth surface and lack of grout prevent a build-up of dirt and mould. A further advantage is that they are quicker and easier to install leading to savings for your pocket.

Disability access
If you live with someone who requires a wheelchair, you will know how hard it can be for them to get in and out of a bath. Due to this, a low-level access walk-in shower is the ideal solution. They'll find accessing the shower easier and this will decrease dependency on friends or family members.

Why Walk-in Baths?

A walk-in bath is a type of bath that is ideal for a variety of people. It provides an experience that is both luxurious but is also beneficial to your health and wellbeing. Relaxing your body and mind in a relaxing tub is an ideal way to unwind after a stressful day. The calming water in a bath provides so many benefits to your body. Moreover, just because you experience mobility issues does not mean you should be deprived of having a nice bath at the end of a long day.

Reduce Stress
Soaking in the tub is an ideal way to relax and unwind as well as a massive stress reliever. With a walk-in bath you can select your preferences, for example if you would like to sit or lie down, increasing your options and letting you choose which is more suited for you. Various walk-in baths might come with the addition of air jets, the small bubbles produced from these will also help to lower stress.

Increased Versatility
Relaxing in the tub is not the only benefit of a walk-in bath. These units can be put in with shower systems which are hand-held. This indicates that a person can enjoy the benefits of a shower while sitting down. Walking into a bath will be just like walking into a shower stall.

Sooth your Skin, Muscles and Joints Walk-in baths can come equipped with water and air jets for optional relaxing techniques. Water jets can offer a deeper massage experience by focusing on specific areas of the body for optimum relaxation. The use of a walk-in bath is a great option for people who suffer with some skin conditions, back pain, arthritis, and other muscle or joint conditions.

Why Wet Rooms?

Wetrooms are amazing to add functionality and style to any bathroom. Not only do they establish a stylish and modern look, they also decrease cleaning and maintenance and are very appealing to potential buyers should you ever opt to sell your property.

Accessibility
Although not necessarily always designed with this in mind, wet rooms are particularly ideal for those whose movement is restricted, such as the elderly or disabled.

Space saving
Wetrooms offer an ideal space-saving solution, particularly in smaller bathrooms and support you in creating a functional, practical and usable area without requiring bulky fittings and fixtures.

Easy to clean
Given the absence of fittings and fixtures, wetrooms are very easy to clean. Shower enclosures, with the frameworks and runners, are well known for gathering limescale and grime, so when it comes to wetrooms, it is great having nothing to clean other than a single piece of frameless glass or tiled floors and walls. If you consider installing a wall-hung loo and floating basin you will have a bathroom floor completely free from obstacles or any kind of clutter.

Increased safety
For many people requiring easy-access, wetrooms are perfect. With the lack of shower tray and non-slip flooring, wetrooms are ideal for wheelchair users as well as those with disabilities or little children.

Aesthetic value
As well as the practicalities, wet rooms have a definite impact, offer an incredibly chic and sophisticated look and feel to any bathroom. From the wall to tiling, minimal fixtures and open design, this will create a simplicity and contemporary elegance.

Some other beneits of having a bespoke bathroom fitted in your home.

- Stay in your own home
- Increase Value of your home
- Keeps you safe in your own home

If you're in need of tailored bathroom installations to help with mobility issues, get in touch with the team at Bespoke Bathing.

We offer solutions for clients in England, Scotland and Wales and can visit your home to assess any needs you might have. With a range of walk-in showers, baths and wet rooms available, give us a call today or visit our website to find out how we can assist you with your mobility needs.

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