You put a geneticist and a pharmacist and a tinsmith, all these people together and you’ve begun to move a bit of the mountain… y’know this was a kind of corporate effort of survival simply because of all the different skills that we all had. And if you had enough energy and enough guts and enough of a willingness to do it then it worked, and I think that was pretty magical.¹

Gunner Jack Chalker was a Far Eastern prisoner of war (known as FEPOW) held in camps in Singapore and Thailand for three and a half years from 1942-1945. In the quote above, taken from the transcript of his oral history interview recorded for the Liverpool School of Tropical Medicine’s FEPOW oral history study in 2007, he described the ‘magic’ of medical creativity in prisoner of war camps in the Far East. Denied basic medical equipment and drugs by their captors, Allied doctors battled to keep the men alive using their knowledge combined with the skills of a ‘citizens’ army’ of talents. In his interview, Jack Chalker described the privilege of witnessing this work at first hand when, as a gifted and trained artist, he was asked by Allied medical officers to document this lifesaving work, and in so doing record for posterity the ways in which doctors and medical orderlies battled to keep the men alive. Thanks to Chalker and other FEPOW artists like him, all of whom took enormous risks in recording the conditions that prevailed, a priceless insight exists into life, and the Herculean task of survival, in the camps.

Over three hundred years of western colonial rule in the Far East – Dutch, British, Portuguese, French and American – came to an end when, by late April 1942, over 132,000 Allied servicemen had been taken prisoners of war by the Japanese. Neither captor nor captives had anticipated or planned for such an eventuality. Nevertheless, the Japanese quickly sought to turn the situation to their advantage in preparation for their planned invasions of India and Australia. Their need for reinforcements in the front line was interrupting vital industrial output at home; Allied prisoners of war could provide the necessary labour force to fill the gap. The Japanese felt no duty or obligation to care for enemy forces as, to the Japanese military mind, surrender was dishonourable and therefore inconceivable. They had not ratified international agreements on the care and welfare of prisoners of war and they held all those captured, along with the colonial powers that they represented, in contempt.

¹ LSTM oral history interview with JB Chalker, 2007.

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Around 50,000 British prisoners of war were held in camps across South East Asia, initially concentrated in three main areas: approximately 32,000 in Singapore, 8,000 in Hong Kong, and roughly 10,000 prisoners scattered across the former British colonies of Borneo, New Britain as well as in the Netherlands East Indies. All FEPOW spent over three and a half years as prisoners of war and it is worth noting that over two thirds of all British FEPOW worked on the construction of the jungle railway in Thailand and Burma at some time. Almost 25 per cent of FEPOW died in captivity, as opposed to a less than five per cent death rate among British prisoners of war in Europe. Large numbers of British service personnel, newly arrived in the tropics in early 1942 (just prior to the fall of Singapore on 15 February and the Netherlands East Indies on 8 March), had little or no time to acclimatize or adapt to conditions before capture. These defeated troops were in shock and demoralized initially and had to learn very quickly to cope with overcrowding, lack of food and hygiene, disease and almost non-existent medical care. However, it was the vast array of skills which these ‘ordinary’ and not military men brought into the camp from civilian life that proved such an asset in captivity: the tinsmiths, carpenters, plumbers and engineers, the artists, entertainers, teachers and academics, all found they were able to help ameliorate conditions for their fellow prisoners of war.

In the early weeks of captivity there were large numbers of battle casualties and a growing number of sick. In each camp, whether in towns, jungle or on airfields, establishing a clean water supply and effective sanitation, shelter and a sense of order, were the imperatives. The Japanese, initially overwhelmed by such large numbers of prisoners, left Allied senior officers to take control of discipline and organisation within the camps. However, before long the prisoners of war were ordered to supply groups of men for forced labour working parties across the region, resulting not only in appalling journeys on foot, by train or ship, but also the dispersal of medical teams, as doctors and orderlies were required to accompany each party. Indiscriminate brutality from an unpredictable captor added to a sense of hopelessness and despair felt by many FEPOW. Allied medical officers battled to preserve life pleading daily with the Japanese on behalf of sick men.

What could doctors do without medicines and facilities to ply their craft? How did British FEPOW, subjected to wanton neglect and abuse, survive captivity? What tangible evidence is there to examine and what does it tell us? This paper will concentrate on five specific examples of life-saving creativity in captivity in prisoner of war camps in South East Asia – sanitation, hygiene, relief of symptoms, medical equipment and dental prosthetics.

Scrutinising artefacts and images, primary source material and personal accounts written by Allied medical personnel, highlights the creativity and

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ingenuity of the ‘citizens' army’ which contributed significantly to the survival of so many of them. In addition, recently recorded oral history interviews with FEPOW, collected by the Liverpool School of Tropical Medicine, have provided a unique long-term perspective of captivity as well as an invaluable insight into the experiences of a handful of survivors who were directly involved in medical work in the camps. These interviewees were chosen from a cross section representing different services, rank and areas of captivity in the Far East. However, as most of the veterans interviewed were in their nineties, the difficulties of failing or altered memory must be considered. Over recent years many of those interviewed have either published memoirs or have read those published by others and this has a bearing on their witness. While a few recently published accounts are based largely on contemporaneous notes or diaries kept at the time, many do rely solely on memory.

_Medical ingenuity, sanitation and latrines_

Allied medical officers faced huge problems throughout captivity in coping with those under their care: minimal cooperation from their captors, a desperate shortage of drugs, tropical diseases with which many of them were not familiar, a lack of water and sewerage systems and overcrowding in the camps, extreme weather conditions, and the inadequate diet on which they all had to subsist. In city areas it took time to re-establish bomb-damaged water supplies and effective drainage to buildings housing thousands of men; in other areas hurriedly constructed camps had few, if any, basic services.

The problems of finding an adequate food supply were matched by the difficulties encountered in safely and hygienically eliminating the human waste from the little that FEPOW ate. Diarrhoea due to gastro-intestinal infection was endemic. Initially some of the men were either too demoralised or lazy and simply squatted in any convenient place. To one eye witness, Private Jack Spittle RAMC, who meticulously recorded his observations whilst in captivity, the memory of the early days in camp, especially the sight, smell and condition of the paths between the huts and tents, was appalling:

> Particularly nauseating at that time was the all-pervading stench of decomposing organic matter excreta, flesh and other residues of war. Defecation veered from a stark natural and individual affair, to crude open communal pits.  

Dysentery (bacillary or less commonly amoebic) swept through camps and for many was a permanent and often lethal feature of captivity. Cholera epidemics, notably on the Thailand-Burma railway in 1943, exacted a very sudden and heavy death toll. There were few hospital facilities in which to segregate and

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care for the weak and with only hastily-dug, open pit latrines and a few overworked orderlies on hand, sick men all too frequently fouled where they stood or lay. Such poor personal hygiene combined with the careless littering of empty food tins, which were discarded wherever the contents were consumed, resulted in both material and bodily waste attracting millions of flies. In many camps a permanent war was waged on the fly population though it was never enough to eradicate the problem. Major Lendon, a Royal Army Medical Corps (RAMC) medical officer in camps in Thailand wrote:

> The house fly (Musca domestica) bred freely in swill pits and around the open urinals, while the green bottle fly (Lucilia Caesar) favoured the latrine ... the maggot content of open trench latrines (sometimes deep) was stupendous.  

Mosquitoes and the spread of malaria were a great cause for concern especially as in the early days men bartered their mosquito nets for food or cigarettes. Before war broke out in the Far East, the British were very aware of the mosquito hazard and, in November 1941, had sent specialist RAMC anti-mosquito squads to Singapore to tackle the problem by spraying breeding areas with chemicals and oil. Inevitably some of these men became FEPOW, like pre-war sanitary inspector Private Spittle who was captured on the fall of Singapore. An amateur entomologist and keen ornithologist, Spittle made copious and meticulous notes throughout his captivity (he remained in Singapore between 1942 and 1945) and these were illustrated with detailed drawings, diagrams and plans all of which had to be kept hidden. In 1944 he was moved from Changi to Kranji hospital camp. Here he described in detail the method for creating fly-proof latrines:

> These latrines are constructed by boring a vertical hole into the ground 18" in diameter and about 20 ft. deep. A special borer is used for this purpose. A metal cylinder, such as a cut-down oil drum, is then placed over the top of the hole & dug into the ground so as to make it secure. Certain framed wicker chair seats with the wicker work cut away make admirable seats. A fly-proof lid, preferably of metal, must also be provided.  

Men like Spittle were indispensable as they had vital knowledge and expertise which, when implemented, made a great difference. In some camps, senior officers working with the doctors took control of, and organised a system for, digging latrines, ensuring the optimum siting, system of rotation and maintenance of them.

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6 Spittle, *Sanitation and all that*, p. 87.
Another prisoner of war who took fly control and sanitation very seriously was Royal Northumberland Fusilier, Harry Howarth. In later life Howarth published a memoir detailing his involvement in sanitation and fly prevention measures at Tamarkan camp in Thailand in 1943-1944.7 Not long after his arrival in camp in 1943, the British camp commander Lieutenant Colonel Toosey asked the young fusilier to take responsibility for the latrines. The method used had proved to be very effective: two trenches, measuring twelve foot deep, fourteen foot long and three foot wide, were dug out end to end. The top of each trench was covered over with bamboo poles tied together tightly to form a platform. At intervals along this platform, the bamboo was fashioned into tightly fitting hinged lids, the space between these lids being used to stand or squat on. After each use the flap was shut tight thereby preventing too many flies from settling on the waste matter below. After a week using one trench, the bamboo cover was transferred to the adjacent trench while the contents of the former was covered over with soil, effectively cutting out light and air and so preventing any maggots from maturing. Using the latrines back and forth like this meant they lasted two weeks before fresh trenches needed to be dug.

Colonel Toosey also instigated fly swatting squads in his camps; every man, including all but the most sick, had a quota of fifty flies a day to kill. The homemade fly swats were made by a platoon of volunteers out of bamboo, wire and leather strips. Such simple measures helped to reduce the incidence of dysentery.8 In late 1944 at Nakhon Pathom camp in Thailand, men were paid at the rate of ten cents per 15,000 flies caught.9

Strict rules prohibited the fouling of rivers and streams, with water for cooking drawn from upstream away from where bathing or the cleaning of utensils, bedpans and laundry was carried out. In some camps elaborate water courses constructed from bamboo piping - long lengths cut lengthways in half and the intersecting discs removed - worked efficiently, delivered a continuous supply of fresh water to different parts of the camp for cooking, ablutions and medical purposes.10

As the Japanese withheld basic medical supplies Allied doctors with little but their knowledge to rely on sought the help of men like the local Volunteers (men from the colonial commercial and scientific communities) who had worked in the region for years. Enlightened Allied medical officers observed the native labourers – Malayans, Chinese, Javanese and Eurasians (the latter from across the Netherlands East Indies) – who knew which plants were medicinal or edible and which were not. Bamboo, in plentiful supply across the Far East from the Tropics to Japan, proved to be life-saving and was used for everything

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8 Ibid, pp. 216-17.
10 Duncan, Makeshift medicine, p. 30.
from huts to utensils, bedpans to intravenous needles (made by boring out the centre of four inch thorns of the bamboo spinosa).

**Sterile water for medical purposes**

Dysentery is a disease of the large bowel marked by the passing of blood and mucus which if left untreated can cause gross debility. Bacillary dysentery was the most prevalent and responded well if sulphonamide drugs were available. They seldom were. In the absence of suitable drugs in Formosa, Canadian medical officer Major Ben Wheeler of the Indian Medical Service treated patients with a diet of rice water and home-made ground charcoal to ameliorate symptoms, which proved quite effective. Elsewhere, warm tea enemas given by using bits of rubber tubing passed into the rectum helped to relieve symptoms.

Away from the large hospital camps in Singapore and Java, other medical officers were using microscopes. For example, in Ban Pong transit camp in Thailand Captain Ian MacIntosh of the Federated Malay States Volunteer Force (FMSVF) set up the microscope kit which he had kept with him since his capture in Singapore. Dutch Army doctor, Lieutenant Gerrit Bras arrived at Omuta camp in Japan in 1944 with one he had made from bamboo and a field glass lens. In an interview in 1986 Bras described another homemade microscope, housed in a section of tailpipe from a Japanese motorcycle, which he had used successfully in Thailand. Microbiology, though rudimentary, played a vital role in the early diagnosis of specific diseases and was critical in preserving the dwindling stocks of drugs available to the doctors. Malaria, mainly BT (benign tertian), affected the majority of FEPOW; the more severe MT (malignant tertian or cerebral) malaria was rarer and often fatal. Quinine and plasmoquine were always in short supply, despite the former Netherlands East Indies providing much of the world’s supply, and the work of the microbiologist was vital in preserving stocks and targeting treatment effectively.

Distilled water was required for many medical applications including sterile solutions for intravenous infusions, anaesthetics and drugs which could then be administered orally as well as intramuscularly. Establishing a reliable and continuous supply of sterile water was an illicit process in many camps, the product of bizarre though effective Heath Robinson-style stills like the one shown in Figure 1.

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This one, like the latrines mentioned previously, was used at Tamarkan camp. The inventor, Lieutenant Gordon Smith of the Argyll and Sutherland Highlanders regiment, had been a medical student in Edinburgh pre-war. Not long after arriving in Thailand to work on the railway in October 1942, he had become seriously ill with malaria and was transferred for treatment to the large Tamarkan hospital camp. While recovering, RAMC medical officer Captain Jim Mark, having learned of his past medical experience, asked him to take over the microbiology work to relieve the doctors’ workload. Smith soon realised there was an urgent need for a supply of sterile water to clean the slides effectively. As well as studying medicine he was also an engineer and he quickly put this skill to good use in building a distillation unit. This comprised two, one-gallon gula malacca (a type of molasses) tin cans, lengths of copper piping from a Morris 10 car with the heat source provided by home-made charcoal. A Japanese beer bottle collected the sterile water.  

Another useful by-product of these illicit stills was a supply of alcohol which provided an effective sterilising agent. Smith was also involved in haematology work, specifically blood grouping and matching to enable blood transfusions to be given to the worst cases of gross debility. In the nearby Chungkai hospital camp the medical staff successfully performed over 3,800 blood transfusions in an eight month period in 1943. A detailed illustration of

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15 J.G. Smith, *War Memories, A medical student in Malaya*, (Coventry, 2008), p. 120.
16 Idem.
17 Ibid., p. 115
18 J Markowitz, ‘I was a Knife, Fork and Spoon Surgeon’, *Canadian Digest* (1946), p. 83.
the blood transfusion hut at Chungkai was drawn by another artist, Private Ashley George Old.\textsuperscript{19}

Distilled water was produced clandestinely in many FEPOW camps. Dutch medical orderly and former chemist Christoffel van Boxtel, at 55 kilo camp in Burma, used distilled water to convert his only bottle of extract of ipecacuanha into approximately one hundred and fifty doses of intramuscular emetine (the drug used in the treatment of amoebic dysentery which was in very short supply).\textsuperscript{20} In Singapore and Formosa, chronic diarrhoea was relieved by dosing patients with home-made Kaolin suspension derived from locally-sourced china clay and mixed with sterile water.\textsuperscript{21} Dehydration resulting from prolonged loss of fluid due to enteric diseases was sometimes treated by means of sterile water in intravenous or rectal infusions.\textsuperscript{22} In Java and later on the island of Haruku in the Celebes, RAF Flight Lieutenant Leslie Audus, a botanist and academic, worked closely with a Dutch scientist to perfect the manufacture of yeast. They established the semi-industrial production of this vital source of vitamin B which proved to be life-saving to hundreds of men suffering the effects of gross malnutrition.

\textit{Self-retaining ileostomy tube}

However, in the worst cases of amoebic dysentery surgeons occasionally resorted to surgery, performing an ileostomy to relieve symptoms and rest the infected area of the colon. The semi-liquid faecal matter from the ileum drained, via a stoma in the abdominal wall, into a receptacle.\textsuperscript{23} The procedure worked well and could be successfully reversed later on, usually after liberation. However, it presented doctors, orderlies and the patient with quite a challenge: how to contain the constant flow of liquid effluent, discard it hygienically and let the patient care for himself? Different solutions were tried, for example adapting Dutch water flasks (which were smaller and a neater shape than British standard issue flask) by cutting a hole in the back and fixing a strap around the flask to keep it in place.\textsuperscript{24} These flasks needed regular emptying to prevent overloading and leakage.

One ingenious solution – a self-retaining ileostomy tube – was devised by Private Gordon Vaughan, an RAMC medical orderly and pre-war engineer in the General Post Office. Vaughan had been working closely with surgeons as an operating theatre orderly and quickly developed both an aptitude for surgical procedures and an understanding of anatomy. Following an ileostomy, he found

\begin{flushright}
\textsuperscript{19} The original sketch is in the Australian surgeon, Major Arthur A Moon’s collection at the Victoria State Library in Australia. \\
\textsuperscript{20} Coates, p. 755. \\
\textsuperscript{21} Wheeler, p. 175. \\
\textsuperscript{22} LSTM oral history interview with H. Hesp, September 2007. \\
\textsuperscript{23} A.E. Coates, N.H. Rosenthal, \textit{The Albert Coates Story: The will that found the way} (Melbourne, Hyland House, 1977), pp. 103-4. \\
\textsuperscript{24} J.B. Chalker, \textit{Burma Railway, Images of War} (Mercer Books, 2007) p. 90.
\end{flushright}
that when rubber tubing was inserted into the stoma for drainage it kept being pushed out due to the peristaltic action of the bowel. So Vaughan devised a way for this tube to stay comfortably inside the stoma without becoming dislodged, thereby allowing the patient greater independence. He took a piece of wide bore rubber tubing approximately six inches long and slipped a one to two inch long, lighter weight, rubber sleeve (he recommended either a condom or the finger of a surgical glove) around one end of it, fixed in place top and bottom by thread. A hypodermic needle was carefully inserted between the outer and inner rubber surfaces, taking care not to puncture either layer. To this was attached a piece of small bore (ideally stethoscope) rubber tubing. The ileostomy tube was gently inserted into the stoma so that the rubber sheath, with the needle in place, rested far enough inside the ileum to keep the end of the needle visible. A hypodermic syringe was filled with air and then inserted into the small tubing and the plunger gently depressed inflating the cuff. Trial and error determined how much air was needed to make the balloon of sufficient size to prevent it becoming dislodged, while not causing discomfort to the patient. Once done the syringe and needle were removed. Faecal liquid could then be discharged at will by the patient, via the tubing into a bucket or the latrine, with a home-made clamp attached to the outer end of the wide bore tube providing an effective seal to prevent leakage.

In 1989 Vaughan donated an illustration and detailed explanatory notes (typed and dated December 1944) pertaining to the self-retaining ileostomy tube to the FEPOW archives at the Liverpool School of Tropical Medicine. These documents illustrate the extraordinary ingenuity of a medical orderly who combined his innate practical skills, a few bits of tubing and a syringe and needle, with his growing understanding of anatomy. Vaughan was noted to be a prolific inventor of all manner of surgical equipment and instruments, some of them quite sophisticated. After the war the Canadian surgeon Captain Jacob Markowitz, who had worked closely with Vaughan at Chungkai in Thailand, paid tribute to his skill:

Vaughan’s talents as an instrument maker were developing fast. He fashioned a rectal speculum, a rib cutter, a quadruple needle for skin grafting, a tracheotomy tube and several spinal and hypodermic needles … Vaughan had a hand in practically every important operation performed [at Chungkai].  

In a personal testimonial written on 23 November 1943, Markowitz noted that ‘he [Vaughan] acted as my first assistant in the theatre during most of the major surgery. He was as valuable as a House Surgeon to me when we were short of medical officers’. In a footnote, post-war Vaughan wanted to train to be a surgeon but despite presenting this testimonial when he applied to the

25 Markowitz, pp. 85-6.
26 Private papers of Gordon Vaughan.
University of Liverpool’s Medical Faculty, Vaughan was unable to gain the necessary government bursary to do so. Instead he trained as a dental surgeon (for which bursaries were available), qualified in the mid-1950s and set up a dental practice in Cheshire.

**Wound irrigation – a treatment for tropical ulcers**

Tropical ulcers, or phagedena, were the scourge of all FEPOW in jungle camps. The smallest scratch or abrasion caused by bamboo thorns, stony or coral ground, quickly became infected. This was due to a lack of adequate clothing and footwear and was exacerbated by the filthy, hot, humid and dangerous environment in which they had to live and work which afforded no clean water supply, dressings or antiseptic preparations. In view of the debilitated and malnourished state of the average man, once skin and underlying tissue became infected it quickly broke down, within days resulting in a deep penetrating and suppurating wound framed by a raw and angry-looking perimeter. Feet and legs were the most common sites for tropical ulcers, but wherever they were sited they were extremely painful (see Figure 2). The patient was unable to rest as he was expected to carry on working, and with no supply of clean dressings this meant further infection was inevitable.

Figure 2. Illustration of tropical ulcer of the foot painted by Jack Chalker in Thailand, 1943
Doctors and medical orderlies worked with what little they had. One form of treatment was to fill the wound with maggots, which were then covered and held in place with material or banana leaves. This was left for several days before being uncovered to reveal a heaving, engorged mass of maggots. Though repulsive to witness this treatment usually did a good job of removing the dead and infected tissue, leaving a clean granulating base which, if kept protected, could heal up in time (this treatment is still used today in the treatment of deep varicose ulcers).\(^{27}\) However, many men couldn’t cope with the thought of maggots living on their bodies and so curettage was carried out. This involved using sharpened spoons or specially made curettes adapted from bits of scrap metal.\(^{28}\) Curettage was exquisitely painful as it was routinely performed without analgesia or local anaesthetic.

Another treatment was saline irrigation of the wound, as seen in Figure 3. This water colour illustration was drawn in 1943 by Private Jack Chalker who pre-war had won a place at the Royal College of Art.\(^{29}\) His detailed drawings graphically illustrate the challenges faced by medical officers as well as the effects of the treatments devised. Chalker worked in camps in Thailand, in what the legendary Australian surgeon, Lieutenant Colonel Edward E. ‘Weary’ Dunlop, described as ‘the jungle cities of sickness’.\(^{30}\) It was Dunlop who first asked Chalker to record what was happening in the base hospital camps at Chungkai and Nakhon Pathom.\(^{31}\) He did so, expertly, in stark graphic detail, almost like a medical photographer, though all the more remarkable because he had to sketch or paint hurriedly and in secret. The keeping any sort of record of captivity was strictly forbidden by the Japanese and if discovered, punishment was swift and painful, as Jack found out to his cost.\(^{32}\)

The idea of the irrigation process was to clean out pus and detritus from the wound to allow new tissue to granulate from the base. Home-made salt solution (saline) was prepared in camp from rough rock salt and distilled water. The caption on the image of the apparatus states that these are all sick men (including the artist as this was the only time he could draw, as the Japanese guards generally stayed out of the sick huts).

The scene depicts a man in the foreground, unseen but for his legs, observed by another, thin-looking and gaunt, lying adjacent on the bamboo platform, with a third man’s bent knees and legs visible beyond. This third man has a bandage on his foreleg, indicative perhaps of a tropical ulcer. The bed platform is constructed of flattened lengths of bamboo which appear ridged and slightly rounded, leading one to imagine how uncomfortable it must have been for such emaciated bodies to lie on this surface for days, weeks or months.

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\(^{28}\) LSTM oral history interview with A.N.H. Peach, April 2007.

\(^{29}\) LSTM oral history interview with J.B. Chalker, November 2008.


\(^{31}\) Ibid., p. 7.

\(^{32}\) LSTM oral history, Chalker, 2008.
Visible beneath the platform is the earth and grass floor of the hut. The patient in the foreground appears to be propped up with his right leg elevated and resting on a piece of rice sacking or cloth placed on top of a sturdy bamboo support. The shadowing beneath the support may indicate a wet area due to the dripping from above. Straddling the support is a bamboo tripod, bound at the top, with its three legs splayed out and from which is suspended by vine or string a tin carrier, out of the bottom of which is extending a small piece of rubber tubing fitted with a spigot made from a bored out bamboo thorn, which created a continuous and controlled drip of fluid. This apparatus has been positioned directly over the patient’s leg wound which is covered with a piece of cloth or gauze (often mosquito netting was used). The skin of the leg visible around the material is visibly reddened and inflamed and buzzing about above are many flies. On the left foreleg is evidence of scarring from old injury or perhaps healed ulceration. Placed above the scene there are three examples of similar types of containers, dried milk or food tins and glass Japanese beer bottles, attached to which are differing lengths of tubing, spigots and with and without clamps. These vessels would have been boiled to sterilise them before having the saline solution added.

Figure 3. Saline irrigation apparatus, pen and wash drawing by J B Chalker, Chungkai 1943.  

A fascinating account of jungle “first aid” was related by former merchant seaman Harry Hesp, a survivor of the sinking of the *Empress of Asia* off Singapore in February 1942, who was aged just 17 when he went into captivity. Incarcerated in Changi Gaol along with thousands of civilian internees, Hesp was working on a wood cutting party in the nearby jungle one day when one of the other young lads sustained a deep cut to his forearm. Panic ensued as there was nothing to staunch the bleeding until one of the older men, a former plantation manager, took charge. He knew exactly what to do. Sending several young men to find red soldier ants under a fallen tree, he instructed them to take great care in how they handled them. Taking one ant at a time and, holding the body over the arm with the large mandibles (up to five centimetres wide) presented to the pinched edges of the wound, he lightly touched the claw-like mandibles to the skin. On contact they closed immediately, effecting a closure similar to a suture or surgical clip. Once clasped the ant would not let go. The body was then snapped off leaving the “clip” in place. The process was repeated at intervals until both sides of the wound were in contact.34

**Dentistry**

There were not many Allied dentists compared to the numbers of medical officers and so they were in great demand throughout the period of captivity. In Singapore prior to the occupation, the British dental services were based at Nee Soon in the north of the island. The son of a Blackpool rabbi, Captain David Arkush of the Army Dental Corps was one of the dentists stationed there for several months before the outbreak of war in the Far East. Following Singapore’s surrender he was moved to Changi, a vast multi-national prisoner of war transit camp. Having arrived with only the instruments he could hide in his kit he joined the other dentists running a dental surgery within Roberts Hospital. Within months he and his colleagues were separated as medical and dental officers were attached to drafts of FEPOW who were transported from Changi to Thailand to work on the railway. Each dental officer was given a supply of instruments before leaving Changi.35

In Batavia (now Jakarta), the capital of Java in the Netherlands East Indies, former civilian dentists who had joined the local Volunteer Forces and subsequently been taken prisoner were occasionally allowed to transfer equipment from their surgeries into camps. In the first weeks of captivity at Tandjong Priok, a large multi-national transit camp in the dock area to the north of Batavia, the Royal Engineers set up a workshop next to the perimeter fence and made and repaired all manner of equipment, including a dental treadle drill made from an old sewing machine, for the POW dental surgery.

Most Allied dentists had very little to work with. Dental instruments and supplies such as anaesthetics like Novocaine, ‘compo’ (the soft material used

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34 LSTM oral history Hesp, November 2007.
35 LSTM oral history interview with D. Arkush, September 2008
for making dental impressions), and amalgam for fillings, were scarce. David Arkush remembered:

[with] some local anaesthetic I was able to do temporary fillings … zinc oxide and oil of cloves makes a temporary filling which is really not bad at all. It lasts, many of my fillings lasted years, so I was told.36

In many camps across the Far East there was no qualified dentist among the prisoners of war. At Taihoku on Formosa it was left to medical officer Captain Wheeler to use psychology instead of anaesthetic, by making great play of filling a syringe (with water) before doing dental extractions.37 In Thailand, Flight Sergeant Fred Margarson made and repaired all manner of equipment including a pair of long dental swab forceps belonging to Captain Eric Smith of the Army Dental Corps.38 At Chungkai, Captain Arkush asked if the men could make a dental chair. This was made from bamboo, the joints bound with strips of wet bamboo bark which when dried formed rigid bindings. It had an adjustable head rest, spittoon, attached instrument tray, woven rope seat and even a built-in foot rest with bracing bars for the unfortunate patients. At the Army Medical Services Museum in Aldershot they have re-created the inside of Arkush’s surgery at Chungkai which includes a full-sized replica of the chair.

Figure 4. Dental plate made from vulcanized rubber and repaired with wire.39

Men lost teeth mainly due to malnutrition and injury caused by beatings inflicted by the guards. Once again the citizens’ army came to the fore with the ex-rubber plantation managers among them on hand to show FEPOW how to

36 Ibid.
37 Wheeler, p. 165.
38 LSTM oral history interview with F. Scarr, April 2009.
39 Army Medical Services Museum, Keogh Barracks, Aldershot.
make use of this valuable raw material in their midst. Rubber trees were tapped using recycled tin cans attached with twine around the trunk. The latex was used in many different ways and in some camps they experimented with it producing vulcanized rubber from which dentists were able to make dental prosthetics like the one in Figure 4. Arkush recalled repairing these dentures:

You drilled a hole with a broken instrument, holes down each side and with floss silk which we had, you tied it across … or you took a Dutch mess tin … and you riveted it over the crack. There were various methods you could use.40

On occasion he also used wire, as can be seen in this photograph of a surviving, repaired denture. Aluminium mess tins were also melted down and re-fashioned into metal dental plates. Teeth were removed from the dentures of dead men.41

**Conclusion**

Many eyewitness accounts of medical care in captivity in the Far East highlight the ingenuity and resourcefulness which enabled many FEPOW to survive.42 Denied most of the necessities to sustain human life, as the Japanese did not accept responsibility for providing more than the most basic level of medical care, medical officers came to rely heavily on the skills, inventiveness and innate goodwill of the citizens’ army in the camps. Through a unique combination of medical knowledge and expertise and this vast pool of talents an extraordinary feat was accomplished: medical officers slowly overcame the seemingly hopeless odds and prevailed. Some of the sickest men recovered thanks to blood transfusions performed in huts in jungle clearings using bamboo thorns as intravenous needles; blind men stumbling around coral islands regained their sight as a result of regular doses of the home-made ‘Marmite’ which came from yeast production; and some of those close to death rallied, perhaps because a former plumber created a vital instrument out of an old powdered milk tin or table fork.

Given the appalling conditions that tens of thousands of Allied prisoners of war had to endure and the consequent high death rate in the Far East, it is quite astonishing that so many men managed to survive to return home in the autumn of 1945. Undoubtedly they, and the families waiting for them, were the beneficiaries of the skill, creativity and ingenuity of a few among their ranks in captivity.

The drawings, detailed descriptions and artefacts that also survived, in private collections or donated to museums and institutions over the years, and which are now outliving the men who originally created, then treasured and

40 LSTM oral history Arkush 2008
41 Ibid.
preserved them, enable researchers to understand and learn from them, as do the papers published in post-war professional journals such as the *Lancet*, the *British Medical Journal*, *The Engineer* and the scientific magazine *Discovery*, to name just a few, document the work of doctors and scientists who battled against the odds in such dreadful circumstances. Readers are able to marvel not just at the fortitude of Far Eastern prisoners of war but also at the resourcefulness and skill of the ordinary men whose extraordinary talents really did save lives.

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