Life without antibiotics

What will life be without antibiotics? To divine the future it has been said we should first look to the past.

I was born in the late 1960's, halcyon days in a golden age of antibiotic discovery. So to understand what life was like before antibiotics I looked to my father, born in the late 1930's.

This was before Florey, Fleming and Chain developed penicillin, a drug rightly heralded as a 'miracle of modern medicine'. My father's younger brother Warren died in 1943, barely three years old. This was a time when war was threatening; blackout paper on the windows, a bucket of sand in the hallway, streetlights and cars with strange black shutters exuding emaciated, pale light.

My father's family lived in small brick cottage with an avid gardener neighbour on one side and rambunctious blackberries on the other, so that there was plenty of fresh fruit and veggies to eat, as is the case today. Despite the war and the effects of rationing, Warren was a robust child in good health. Memory fades, but my father remembers his brother as a particularly happy and sunny little boy. Most friends and relatives had much the same opinion: he seemed to radiate something best described as joie de vivre.

His death was completely unexpected. Warren had what appeared to be a cold and within a day or so it had become much worse. One night he had difficulty breathing with a high temperature. Using a public phone, my grandfather and grandmother called the doctor. Warren was sent to the district hospital, but without antibiotics, he died the following day.

Infections then were regarded as part of life and death. After antibiotics they became avoidable, and now, sadly are seen as trivial as antibiotics are available to all. Horses, dogs, cats, cattle, chicken, fish, and people are given antibiotics with little thought to the past, or our future.

Multidrug-resistant superbugs *are* here.[1] They *are* spreading.[2] The antibiotic pipeline *is* broken.[3]

What will life be without antibiotics? Young children, adolescents, adults, and the elderly will die from bacterial pneumonia, wounds, poly-microbial infections, sepsis and bacteremia in numbers so high that the healthcare system will be overloaded. Doctors, nurses and clinicians will be faced with decisions as to whether to maintain duty of care, ablate the infected tissue (if possible), or move the patient to palliative care in isolation to minimize risk spreading the superbug to other patients. Operations that involve *any* invasive procedure from simple cannulas and catheters, to hip replacement, to open heart

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[1] Payne D, *et al.* Drugs for bad bugs: confronting the challenges of antimicrobial discovery. *Nat Rev Drug Discov* **6**, 29-40 (2007).

[2] Spellberg D, *et al.* The Future of Antibiotic Resistance. *N Engl J Med* **368**, 299-302 (2013).

[3] Cooper, M & Shlaes, D. Fix the antibiotics pipeline, *Nature*, 472, 32 (2011).

surgery will risk death from drug-resistant bacterial infection. Interventions such as organ transplant and chemotherapy that compromise immunity will need to be carried out in high biosecurity facilities.

Antibiotics are one of the few medicines we have in which the choice for patient care for an individual directly effects the health of the community and subsequent generations. Today ~7000 Australians die each year from untreatable sepsis or bacteremia. If we don't learn from the past, we will stand idly by to watch the demise of one of our most precious medical cures, with devastating consequences.