Industrializing skin cancer care: better and cheaper?

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Skin cancer is the commonest cancer in European populations, with incidence rates in the UK for non-melanoma skin cancer (NMSC) and melanoma of 115 and 16 per 100,000 respectively (figures for NMSC are likely underestimates as registration is known to be incomplete).[1] Despite the high frequency, overall UK skin cancer-related mortality is low with absolute rates of 0.5 for NMSC and 2.6 per 100,000 for melanoma.[2] The purpose of skin cancer treatment is to reduce case-fatality by removal of cancers before they have metastasized, and to minimize morbidity and disfigurement from the direct effects of the primary tumour.

The current management of skin cancer in the UK and many countries is based on what might be termed a 'corner shop' model. Patients present to their GP or to a single-handed dermatologist in office practice and either (i) are diagnosed as not needing further treatment because the suspect lesion is benign, (ii) undergo excision of the suspect lesion by their physician or (iii) are referred to an expert (often hospital based) for further diagnosis and surgery if needed. All these consultations are likely very typical traditional 'medical' consultations, with a single doctor and patient operating in isolation with, to coin a phrase, the patient walking into the consultations room and then 'shaking hands with their physician'. I suggest that this traditional model is unnecessarily expensive and likely inferior in quality to a more industrialized model. To understand why change is necessary, we need to start with the changing epidemiology of skin cancer, and highlight changes in the skill mix of physicians.

Standardized rates of skin cancer have risen 3–5-fold over the last 30 years in many European populations.[1] Allowing for changes in age structure, such increases imply a seven-fold increase in the number of cases of the most common skin cancer, basal cell carcinoma. Today, referrals for diagnosis and management of skin cancer account for 50% of referrals to most dermatology units. Modelling suggests that skin cancer case numbers will double over the next 23 years.[3]

A second change has been the worldwide trend for dermatologists to perform most of the surgery required to manage skin cancer. Whereas historically in the UK plastic surgeons and general surgeons were key providers of care, today in major centres they are involved in only a minority of cases. The rise of Mohs' surgery and a range of 'disruptive' surgical techniques all performed under local anaesthetic, have meant that skin cancer diagnosis and management is increasingly the province of dermatological surgeons. For the majority of patients, the clinicians with the best diagnostic skills are likely to be those with the most appropriate surgical skills as well.

Based on first principals, the drivers of cost variance are likely to be: incorrect diagnosis; inappropriate surgery, meaning unnecessary excision of benign lesions; inappropriate choice of surgical procedure or poor surgical technique; and salary costs. Diagnosis of skin cancer is a classical example of non-analytical case-based reasoning.[4] It relies little on underlying biomedical knowledge but on prior experience, continued practice and exposure and structured feedback. Experts get it right more often than novices because they see more cases. The problem for the generalist is that they are infrequently exposed to the most serious lesions – a GP might only see one melanoma every five years – and the decision to remove a lesion that does not need to be removed is an unnecessary expenditure. The evidence is persuasive that experts will remove fewer benign lesions with no loss of sensitivity

for serious ones.[5,6] In this particular instance, gatekeepers are likely to increase not decrease healthcare costs.

In the UK approximately 1.6 million women have mammograms each year,[7] and while we do not have precise data, a conservative estimate would suggest over two million skin examinations for skin cancer each year.[8] Patients with suspect skin cancers need their whole skin examined and to do this at high volume means that patients need to be fully undressed[6] and the physician therefore needs to be able move from room to room seeing each patient, rather than *vice versa*. From personal experience, each physician may need up to four or more rooms to obtain maximum throughput.

The vast majority of patients with suspect skin cancers will turn out to have benign lesions, and they can be dealt with promptly following examination. A minority of patients will require either incisional or excisional diagnostic biopsies, or more advanced surgery. The former (traditionally carried out by GPs, trainee dermatologists or consultant dermatologists) are easily carried out by appropriately trained nurses or technicians. Ideally, many will be carried out on the same day the patients attend the skin cancer centre. There are two components to advanced surgical skills: the ability to undertake the surgery and the ability to determine accurately what surgical procedure is needed. Usually these two skills go together. In terms of efficiency, the skin cancer team assessing patients need ideally to have both these skill sets present at the first (and usually only) patient visit. Not only can the surgery of most melanomas or squamous cell carcinomas be performed there and then, but the need for further referral onwards to another clinician with or without photography and the associated delay and costs be avoided. Patients who do require more advanced surgery (e.g. Mohs surgery) can be booked in at a later date with the same physician who saw them initially.

The factory model

The above 'factory' model is of course familiar to any student of modern capitalism from Henry Ford's factory to the modern supermarket. The attempt to industrialize healthcare by increasing throughput at lower cost by focusing on certain care pathways is a worldwide phenomenon in specialist hospitals from North America to Devi Shetty's Heart Hospital in Bangalore.[9] If a task can usefully be demarcated from the rest of care processes – just as dentistry is distinct from medicine, and mammography distinct from other aspects of woman's health – then there are opportunities to both increase quality and reduce cost. The proposal however is not just about cutting costs. Just as generalists face significant limitations in the acquisition and, perhaps more importantly, maintenance of expertise (because their case throughput is too low), the same applies to those who provide skin cancer care. We do not build a mammography service based on radiologists reporting an occasional film,[10] nor do we build a breast screening service with upwards of 1.6 million visits without building audit and quality control into the service. In this context, some patients who need biopsy and perhaps all suspected melanomas need to be seen by more than one clinician. Just as radiologists routinely double report under some circumstances,[10] so should clinicians.

What is disturbing from a UK perspective is that we seem to be moving in the opposite direction. Thus, there is constant pressure to provide care closer to home, and the re-invention of the lone (medically qualified) peripatetic dermatologist with no non-physician professional support or opportunity for peer interaction. This merely deskills the expert to a level closer to that of the generalist. An irony is that the NHS is in a better position to encourage large-scale specialist centres than many countries with more fragmented healthcare systems.

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