Use of dermal regeneration templates in a low resource environment

Tom Potokar¹ and Pippa Anderson²

Abstract

Modern burn care in a sophisticated well-resourced centre in a rich country utilises an increasing number of expensive adjuncts to optimise outcomes such as dermal templates, cultured keratinocytes, biological and silver impregnated dressings. Translating the use of these into a low resource environment is not a simple matter of providing the materials free of charge and there needs to be careful consideration of both the positive and negative consequences and the impact on both an individual and a population level.

Keywords
Dermal templates, low resource environments, burns service systems, outcomes, health economics, population needs, Integra

It is acknowledged that under certain specific circumstances dermal regeneration templates such as Integra™ can provide excellent results in both acute and reconstructive burns surgery. However, even under the most ideal conditions complications are not uncommon, the most frequent being infection, especially if the Integra is applied late in an acute burn situation.¹ The paper by Godwin et al.² clearly shows that it is possible to achieve excellent results even in difficult circumstances and the associated logistical challenges have been well described. There are an increasing number of relatively ‘high tech’ and expensive adjuncts utilised in modern burn management in a well-resourced centre including dermal templates, cultured keratinocytes, biological dressings and silver containing products. Provision of any of these products free of charge (such as through donation which was the case in the Godwin paper) will certainly overcome some of the financial challenge (but not all of them as there are inevitable associated costs that go beyond the product itself). The question though, is not only how to make these affordable for the low-resource environment, but also how to estimate their utility within the context of an under-resourced and over-capacity health service. From a global perspective, we should be aiming for significantly less variability in outcomes and a significant decrease in the enormous discrepancy between outcomes from burn injuries in rich versus poor countries. This is only likely to be achieved through a comprehensive,
integrated systems approach in the long run, but
in the meantime, as demonstrated by the experi-
ence in Gaza, a considered and thoughtful
approach with regard to the positive and poten-
tially negative consequences of introducing
sophisticated technologies should be welcomed
and can help demonstrate what can be done
even in adverse circumstances.

In terms of general principles, the following
should be borne in mind when considering the
introduction and use of expensive or sophisti-
cated technologies, such as dermal templates, in
a low-resource environment:

(1) Burns service systems improvement
(2) Value for money
(3) Local knowledge, skills, staff and
equipment
(4) Perceived need versus real need

**Burns service systems improvement**

The use of sophisticated techniques and modern
technology can certainly impact on an individ-
ual basis and would include not only dermal
regeneration templates, but also complex micro-
surgery, tissue expansion, laser surgery, etc.
However, on a population level, and from a public
health perspective, what is needed in a
resource-poor environment or low and middle
income country (which is where most burn inju-
ries occur) is a systems-based approach that
addresses all aspects of burn prevention and
treatment aimed at primary prevention (reduc-
ing the incidence), secondary prevention
(reducing the extent of injury through appropri-
ate first aid and initial management) and tertiary
prevention (reducing the complications). This
necessitates thinking not just about what works,
but for whom and under what circumstances.3
Failure to take this wider approach risks increas-
ing the divide between those who are fortunate
enough to have access to high tech care deliv-
ered by well trained and resourced staff and
those (the majority) who are not. Clearly, any
health professional wishes to do his or her best
for the patient in front of them with the specific
resources they have available and a systems
approach should not jeopardize this, but utilisa-
tion of expensive and minimally available tech-
niques and materials should be considered in
the context of overall service improvement and
the need to ensure that all patients have access
to basic, competent services, which in the long
run will reduce the need for the more complex
and expensive specialist services.

In the acute burn scenario, to enhance suc-
cess and decrease complication rates, any dermal
template needs to be applied early ideally within
the first 24–48 h. The reality is that many patients
in a low-resource environment arrive late with
contaminated or infected wounds, and the work-
load and general resources are such that early
surgery is not possible. The focus of use is there-
fore likely to be reconstructive surgery (as was
quite rightly pointed out in the Godwin paper).
There are huge reconstructive needs, but there is
a risk that focusing on complex reconstruction
will detract from both prevention and acute care
and thus the overall incidence and poor out-
comes for burns will continue unabated.

Burns service systems improvement should
be a government-led initiative with a clear strat-
egy that takes into account the varied provision
of care from rural clinic to district hospital to
specialist centre and include those in the non-
governmental sector such as charities and NGOs.

**Value for money**

Dermal templates are extremely expensive and
consideration has to be given to what could be
done with the same amount of money if put
towards other improvement initiatives. Health
economic studies can help to inform policymak-
ers and healthcare decision-makers, enabling
them to identify which interventions, policies or
services provide the best value for money.
Policymakers, as well as hospital managers and
departmental leads who have increasingly lim-
ited budgets, have to consider the opportunity
cost of spending some of their budget on specific
interventions; money spent on dermal templates
will limit the funds available for other patients
and interventions. Thus, evidence of value for
money—that is, the relative balance of the bene-
fits and outcomes against the (opportunity) costs
from all perspectives—is vital to inform decisions
about use of dermal templates. This issue
becomes more complex when a costly interven-
tion is provided free by an external funding body
such as a charity or NGO, or even a philanthropic
individual. These are real issues that have to be
considered on a daily basis by all health service
providers throughout the world. In general,
healthcare is provided based on a system of equity
(each according to his/her needs) rather than
equality (the same for everyone), but even within
this model there are multiple confounding fac-
tors—for an individual who does not have access
to even simple burn care then, this is their ‘need’,
whereas when access is available then complex
surgical reconstruction might be an individual’s ‘need’, and balancing these difficult and diverse needs, taking into account value for money, population versus individual ‘rights’ and available resources is the job of policymakers and strategic planners.

Local knowledge, skills, staff and equipment

Before introducing any new technology, it is imperative that the knowledge, skills and staffing levels as well as available equipment are considered. Performing a complex surgical intervention without access to appropriate nursing care and long-term rehabilitation is doomed to failure. The premise of learning to walk before you run is important and it is essential that the basics of comprehensive burn care are already fully in place before introducing new non-essential techniques. In the case of non-governmental funded services, especially when supported by international agencies, NGOs, etc., it is vital to consider the long-term plan. If expensive sophisticated techniques have been introduced, will these still be able to be funded in the future? And what will the legacy be? Primarily it should be a well-run service able to provide a good standard of burn care, accessible to all those who require it to an internationally agreed standard. Again the context here is critical; a short-term emergency situation with a predicted time frame and number of patients that require treatment that can be fully provided from acute care through to discharge is not the same as a chronic underfunded and unstable environment where a long-term strategy needs to be developed with clear measurable objectives and a realistic timeframe.

Perceived need versus real need

Unfortunately, there is a temptation within modern society in general, but particularly within medical care, to be drawn to the latest innovation, whether a medical device, therapeutic agent or surgical technique. Keeping up-to-date with modern advances is important, but so is a thorough critical appraisal of the utility, practicality, efficacy, efficiency and effectiveness:

- **Utility:** is it useful?
- **Practicality:** are the conditions appropriate for its use?
- **Efficacy:** does it work?
- **Efficiency:** what is the wasted effort? (success to failure ratio)
- **Effectiveness:** what is the total benefit?

Hand hygiene is an excellent example that fulfils all the above criteria, yet is rarely achieved and implementation of a strategy to ensure 100% compliance with hand hygiene may in fact be one of the ‘real’ needs as opposed to the ‘perceived’ needs of more sophisticated medical technology.

Conclusion

Ensuring high quality burn care and prevention in regions with limited resources, in disaster situations and conflict scenarios is a complex process and the specific situation needs to be assessed taking into account the points mentioned above. An overburdened rural district hospital with minimally trained staff and extensive basic needs is clearly not the environment to introduce complex reconstructive techniques. A facility that has achieved a certain standard of service delivery, where the costs involved are not going to impact on providing adequate care to other patients and there is stringent evaluation of outcomes and effectiveness (as in the Gaza experience) might be.

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