

What Really Matters in Paediatric Wound Healing: Sustainability Comes First

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After seven years since the first “Garden Class”, built around the benefits of a more natural and ecological approach to wound healing, particularly in Paediatric Wound Care, sustainability has now become fashionable.¹

From the EPUAP Annual Conference in Rome in 2018 to today, industry has at last begun to move in this direction. Yet it is worth recalling that sustainability is, above all, about sustaining: providing support to clinicians and to vulnerable patients, in ways that are environmentally respectful but, above all, rooted in prevention.²

The World Health Organization estimates that children under five years of age account for 88% of the global disease burden attributable to climate change. Owing to their physiological and neurodevelopmental immaturity, elevated metabolic rate, lower body mass, and pronounced dependence on caregivers, children constitute a population disproportionately susceptible to the adverse health effects arising from a rapidly changing climate.³

Avoiding any form of resource waste is essential, diverting funds away from war-related markets would, on its own, bring us closer to a real solution. And children would no longer draw attention for becoming angels, but for enjoying a better future, one where paediatric wound healing plays a more active and responsible role in education and culture.⁴

Wound healing in paediatric patients is of critical clinical, familial, and social significance, as outcomes such as hypertrophic and keloid

scarring can entail functional, aesthetic, and psychological consequences from early childhood through to late adolescence, consequences not typically observed in adults.⁵ When the fourth dimension, namely growth, is taken into account, scars and likewise the sustainability of care, constitute a lifelong temporal trajectory, unlike in later stages of life.⁶

Wound healing therefore represents a regenerative and reparative response, orchestrated at the tissue, cellular, molecular, and submolecular levels, directed towards restoring the injured tissue. This process calls for procedures, dermo-epidermal substitutes, matrices, advanced dressings, and mechanical devices, all of which demand a mature and responsible approach to environmental impact, owing to the long-term nature of both immediate and future care pathways.

There must be a shift towards a healthier balance between supporting the economy and safeguarding the social and environmental systems on which healthcare depends. In wound healing, sustainability means improving outcomes so that fewer resources are required, developing efficient and eco-friendly products, and ensuring timely access to care to reduce waste and unnecessary travel. Only innovation that is fully aware of its risks can deliver meaningful benefits for clinicians, patients, the economy and the natural world.

Sustainable wound care focuses above all on faster healing, which reduces the

volume of dressings, packaging and clinical waste. Reusable options, such as two-layer compression stockings, and smart technologies that monitor healing can further cut waste and prevent needless product changes. More efficient care pathways, including remote consultations (i.e. telemedicine), without an in-person visit, help minimise patient travel and associated emissions.

Equally important is the development of greener products: sourcing materials from renewable resources, applying principles of green chemistry, and designing biodegradable polymers that break down safely while supporting healing. Within healthcare systems, approaches such as Lean Six Sigma (and its own framework, DMAIC, Define, Measure, Analyze, Improve, Control) strong preventative strategies and continuous staff education are essential to embed sustainable practice.⁷

Recent advances in materials science have enabled the engineering of wound dressings comprising polymers, nanocomposites, contact layers, foams, hydrocolloids, hydrogels, hydrofibres, alginates, composite dressings, occlusive dressings, Ag and Cu dressings, antimicrobials, transparent films, growth-factor delivery systems, collagen matrices, xenograft and synthetic matrices, biological dressings, enzymatic debridement scaffolds, NPWT dressings, bioengineered dressings.

In addition multifunctional platforms appeared incorporating drugs, with or without biosensors, or with both therapeutic and diagnostic elements. Despite these innovations, systematic integration of green chemistry principles remains limited. Lifecycle considerations—‘cradle to grave’—necessitate renewable feedstocks, energy-efficient and benign manufacturing routes, and post-use biodegradability.

Emerging strategies to embed sustainability include biopolymer utilisation, enzymatic catalysis in the place of chemical catalysts, green solvents (DES), cheap, less toxic and with a recyclable nature. Not to mention the microwave-assisted synthesis as a unique and simple technique which offers fast and efficient processing of materials with higher reproducibility and the continuous-flow catalysis allowing for an efficient and non-stop production.^{8,9}

The clinical history teach us that pediatric malnutrition resulting from disrupted food

supplies adversely affects wound healing. Prenatal exposure to extreme heat, air pollution, and infectious diseases is associated with low birthweight, preterm birth, and congenital anomalies. Climate-related alterations in air pollutants and aeroallergens increase the incidence of respiratory disease and influence perioperative risk. Furthermore, access to surgical care is frequently compromised by climate-related disasters and ecological change.

More recently, the term sustainability is widely used for wound care programmes and actions aimed at preserving resources, but it actually covers four scientific chapters: human, social, economic and environmental.

Human wound healing sustainability focuses on maintaining and enhancing society's human capital. It includes investment in health-economics, basic and advanced education, rapid access to public health services, good and regular nutrition, acquaintance and interactive skills. As natural resources and space are limited, growth must be balanced with public health and shared economic wellbeing.

In wound care business, a responsible growing market organisations promotes values that respect human capital and its ethical and moral integrity, especially when it fully involves family units.

This includes everyone involved in producing goods or providing services, as well as wider stakeholders. Communities worldwide may benefit from—or be harmed by—business practices and sourcing methods. Human sustainability therefore involves building skills and capacity to support organisational performance while promoting the wellbeing of communities and society. And greater sensitivity must be felt when discussing wounds in fragile patients, at both ends of life, often fully dependent on family or social caregivers and suffering from severe comorbidities that ultimately represent the underlying pathology.

Social sustainability preserves social capital by supporting the services and structures that hold society together. It considers the wider impact of our actions on communities, cultures and future generations. Its focus is on social quality—cohesion, trust, reciprocity and strong relationships—supported by laws, shared rights and equality. It aligns with the UN Sustainable Development Goals, recognising that social, economic and environmental wellbeing are

interdependent.

Economic sustainability seeks to maintain capital and improve living standards. Critics argue that traditional accounting ignores environmental damage. New economic thinking incorporates natural and social capital, challenging the assumption that continuous growth is always beneficial.

Environmental sustainability aims to protect natural capital—land, air, water and minerals—so present needs are met without harming future generations. Environmentally sustainable businesses pursue economic success while avoiding environmental harm, and integrate all four pillars of sustainability equally.

Together, the four pillars highlight that genuine sustainability requires addressing each dimension and making strategic choices about which approach a business will prioritise.^{10,11} And finally, Sustainability is far more than a fashionable term. It is a way of living that helps safeguard the future of our planet and the generations to come. By encouraging sustainable habits in children from an early age, we set them on the path to becoming responsible citizens who value and protect the environment.

But how can we make such an important concept both accessible and engaging for young learners? Through simple, everyday actions and routines, we can introduce children to the principles of sustainability in ways they can easily grasp and genuinely enjoy. Respect for oneself, for others, and for everything around us begins with adults, and extends to teenagers and adolescents, along with the desire to manage a wound without waste, without throwing away excessively and irresponsibly produced packaging. We increasingly live on "special" waste, which is abundant for wound healing and represents an enormous cost to current society and unsustainable for the future. But sustainability is last on our minds, and one need only consider the dozens of books that discuss AI and its connections to understand how Reduction, Reuse, and Recycling don't even involve respect for trees.

Sustainability that fails to value life is, by definition, unsustainable.

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