Academia and Clinical Practice - Working together successfully to develop skin integrity knowledge and skills

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Wound care, tissue viability and maintaining skin integrity represent a large proportion of a clinician's workload encompassing the spectrum of age ranges, from the very young to very old. The importance of ensuring that clinical practice is based on the best possible evidence and research is accepted by clinical practitioners and academics alike. However, clinical practitioners often find it difficult to devote sufficient time to search the literature and develop proposals that will investigate issues requiring development, which will enhance the patient experience. As such it is important that clinicians are able to access researchers and academics who can assist in developing research proposals, undertake service evaluation, assist with audit of current practice, develop new technology, advise on best practice and offer education that maintains the clinical knowledge and skills required of practitioners.

Of equal importance is the ability of academics and practitioners to work closely with industry to develop new interventions, test established products, plan and carry out trials and advise on the needs of the clinical areas to ensure that patients receive the most up-to-date evidence- and research-based interventions. The importance of this collaborative approach and the formation partnerships to promote, develop and implement a quality healthcare service was highlighted by the Department of Health[1].

Skin Interface Sciences Research Group

The University of Huddersfield has recognised challenges faced by clinicians in undertaking research in the specialist area of skin, and in 2011 formed the Skin Interface Sciences (SIS) Research Group. The aims of the SIS group are to develop high quality research in the field of skin, undertake research programmes that make a difference to clinical practice and drive the improvement of services through this evidence-based strategy.

Modern dressings offer the opportunity for more than simply covering the wound and protecting it from the external environment. Technological advances have resulted in dressings that can actively target different aspects of the wound healing process in acute, exudating and chronic wounds. Hydrocolloids, hydrogels, alginates, polyurethane foam/films and silicone gels can all be used for drug delivery to wounds. The challenging environment means that not all dressings are suitable for different wound types and a range of products is required. Incorporated drugs play an active role in the wound healing process either directly or indirectly for example, debriding agents for removing necrotic tissue or antimicrobials for prevention or treatment of infection. Growth factors can actively promote wound healing to aid tissue regeneration by interaction with cells or specific factors within the wound environment or even for allogeneic cells, which may provide a specific benefit, with the dressing itself acting to maintain a locally moist environment[2].

The SIS group is innovative, acknowledging that the management of skin is inter-professional and as such, research groups should replicate this. The group comprises academics, researchers and clinicians from the Schools of Human and Health Sciences, Computing and Engineering and Applied Sciences. Members of the group possess a range of skills and expert knowledge including in the fields of:

- Cell biology
- Chemistry
- Engineering
- Forensic Biology
- Forensic Science
- Metrology
- Microbiology
- Nursing - with expertise in tissue viability, vascular, wound care and diabetes
- Pharmacy

- Podiatry
- Tribology

The ethos of the group is to take a multi-disciplinary approach where the skills and expertise of a number of scientists, engineers, academics, industrialists and clinicians are brought together in order to investigate and contribute to solving real clinical challenges. Evidence of how this multi-disciplinary approach has led to the development of research in areas related to the integrity of skin can be seen in some of the work that has been done in fundamental development areas. Within our Pharmacy Research group, we can determine release of antibacterials from dressings, including hydrogels, and their delivery into the skin[3]. We also design novel formulations containing antimicrobials in combination or which have synergistic effects on antimicrobial efficacy as well as enhancing permeation into the skin and microbial niches within the skin that may play a role in harbouring bacteria[4]. Composite designs may be required to maintain the effective properties optimised for specific wound types while delivering control of the release of active agents.

The EPSRC Centre for Innovative Manufacture in Advanced Metrology with the School of Computing and Engineering is focused on development and application of ultra-precision measurement techniques. Much of the work is centered on surfaces and how they interact with the environment around them. In the context of skin as a surface, the way in which it interacts with the environment around it can be indicative of a number of things and influence how the skin will react. To take the example of pressure ulcers, the environment around the skin and how that skin is interacting with the support surfaces and other interfaces in close contact can have a huge effect on whether a pressure ulcer may develop and the time for progression. By using precise measurement to fully understand those conditions and how they influence friction and shear of the skin, a better understanding of how to develop tools can be gained. This knowledge can be used to help combat the onset of pressure ulcers in a number of ways. Guidance for best practice or engineering of new

devices in conjunction with our clinical and academic colleagues can be developed in order to provide the optimum environment for retention of skin integrity.

By ensuring multi-disciplinary collaboration and including clinical guidance from the infancy of these projects promotes the 'bench to bed' ethos whereby researchers and academics work in partnership with clinicians and industry to ensure that the results of research are tangible and are encapsulated into the 'real world' of practice. How this works in practice can be seen in the following case study.

Case Study Exemplifying the Success of Working in Partnership

The group formed in 2011 and has been successfully working collaboratively with a range of clinical and industry partners. One of our clinical partners is Salford Royal NHS Foundation Trust who are collaborating with the SIS group to investigate and explore interventions aimed at preventing Surgical Site Infection (SSI) in spinal metastatic tumour patients.

Background to the Study

It is already known that there are a host of risk factors contributing to a higher rate of SSI in patients undergoing spinal surgery[5,6]. The risk of SSI varies between the types of procedure undertaken and rises with the increasing number of implants involved. Co-morbidities such as diabetes also put patients at increased risk. Aside from these more generic contributors which affect the vast majority of patients undergoing orthopaedic spinal operations, certain patient groups present additional risk factors, putting them in the “high risk” category.

Patients undergoing surgery for secondary (metastatic) tumours of the spine are one such group. Spinal metastases are common in cancer patients, and their surgical removal is considered palliative treatment to relieve metastatic spinal cord compression (MSCC), which occurs in a significant proportion of those with bony spinal disease[7] . The surgery aims to stabilise the spine to prevent MSCC which, if left untreated, can cause pain, paralysis and incontinence, ultimately leading to

severely impaired quality of life. The overwhelming majority of such procedures involve the implantation of metalwork across multiple vertebral levels, which immediately puts the patient at higher risk over those undergoing more straight-forward spinal procedures (such as discectomy). Furthermore, many cancer patients undergo pre-operative chemotherapy and radiotherapy, which suppress the immune system thereby impairing the body's ability to fight off infection[6,8]. In addition, cancer patients often suffer from the ill-effects of malnutrition, which is another potential contributing factor[9]. It is therefore not surprising that for some time, clinicians have realised that tumour patients may be more susceptible to developing SSI than those who are not immunosuppressed or catabolic. In particular, it is believed that SSI may develop secondary to poor wound healing because of the factors outlined above.

While SSI can be a devastating complication of any type of surgery, leading to increased hospital stay, increased morbidity and even death[10] (without even counting the economic cost to the health services), a wound infection for a patient with limited prognosis and initially perceived low quality of life could have an even more pronounced negative impact on the wellbeing of them and their family. Advances in care over recent decades have facilitated a trend towards repatriating patients for nursing care in the community[11], which is all too important for those who wish to spend as much time as possible in their own surroundings and with their loved ones.

The question now is, *how can we minimise the likelihood of SSI occurring in the first instance, and ultimately expedite improved surgical outcomes and quality of life for our patients*? This question led the clinical team at the Spinal Unit at Salford Royal to contact researchers with extensive experience in wound care at the University of Huddersfield. Following an unsuccessful bid for funding to investigate one mode of treatment aimed at stimulating wound healing and preventing SSI, the group reconvened to assess what could be done to lay the foundations for a high-quality research project into preventing SSI in patients with spinal metastases. It was decided that a systematic

approach to the problem, involving a multi-disciplinary team was needed. Frustratingly, while time is of the essence in terms of trying to solve the problem of SSI, the group recognised that a well-structured project providing a solid evidence base to improve the standard of care – potentially over a number of years – was necessary to answer the research questions.

- Firstly, we wanted to know whether there were any published reports of interventions aimed particularly at reducing SSI in spinal metastatic tumour patients. This would allow us to consider current practice and the adoption of any interventions not already considered standard care.
- Secondly, we needed to find out the rate of SSI in the unit where the research was to be carried out – how big was our problem? From this we would have some baseline data if we were to go on to conduct a prospective trial of an intervention we believed would be effective at reducing SSI.
- Thirdly, we wanted to know more about standard care for these patients, in terms of the recommended guidelines on SSI – how well were we doing with the Trust's SSI care bundle for this specific patient group, and what could we do to improve care in the short-term?
- Finally, we needed more information about any potential additional risk factors for SSI in this group, which could be the basis for a prospective study.

These four components formed our bid to Foundation Urgo in 2011. After our initial application for funding and invitation to discuss the project in more detail, the group was awarded £19,000 to cover the costs associated with undertaking the project. Beginning in November 2011, the academic and clinical groups worked closely to initiate a systematic review assessing which interventions aimed at preventing SSI specifically in spinal metastatic tumour patients had already been reported (an abstract for which won first place in the "Hard-to-Heal" category at the Wounds UK conference in November 2012). Alongside this, a successful application to obtain ethical approval for a

retrospective study was submitted through the NHS Research Ethics Service proportionate review system. This study will yield important baseline data characterising the patient group, enabling us to find out the rate of SSI, the compliance with the SSI care bundle and how this can be improved through raising awareness internally of the importance of SSI in this patient group. As an additional benefit, this project has already brought forward a roll-out of the surveillance of spinal wounds by the SSI surveillance team at Salford Royal, something which has been an aim of the department for some time. This is thanks to the commitment of senior management to this important area, and in particular to this project.

As of November 2012, data collection and analysis is still underway, with expectation that the full data set will be ready for publication in the spring of 2013. Following on from the analysis, the team will produce a patient information leaflet describing the steps the Trust and the patient can take to minimise the risk of infection. Additionally, the team will work closely with the Infection Control department at Salford Royal to develop up-to-date guidelines for clinicians dealing with these patients. A re-audit one year after introduction of the leaflet and guideline will enable the team to assess whether these have been beneficial. Furthermore, the identification of any potential risk factors will be investigated further to assess whether there is scope for conducting a prospective interventional clinical trial.

The project being undertaken by the University of Huddersfield and Salford Royal has its roots embedded in two core principles: 1) the improvement in the standard of patient care through 2) a collaborative approach between the Higher Education and Health Service sectors. It is the aim of the SIS Research Group that future challenges in wound care will be tackled by further such collaboration.

Conclusion

The development of the SIS group has highlighted the significance of a multi-disciplinary approach to skin integrity issues and the importance of academia and clinical practice working in partnership to augment and develop research that enhances patient care. Time pressures on clinical staff can be alleviated somewhat by this collaborative approach, and the presence of full-time research staff employed within the healthcare sector can be a great advantage. Researchers embedded within the NHS increase the capacity to push forward innovative projects by providing a link between the clinical and academic groups.

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