Institution: The University of Huddersfield

Unit of Assessment: 3 Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Context

Our research is focused on the benefit to patients of optimising treatments to secure improvements in health, well-being and prevention of disease. Pharmacy is a new research area at the University, with the appointment of most staff between 2010 and 2013, hence impact must be considered in terms of there being limited time to accumulate external evidence. We undertake studies on material and basic biomedical and formulation science, then extend this to the evaluation of the impact of current therapies as well as the development of novel therapies and targeted interventions of medication and treatment for difficult to treat conditions. Focusing on health concerns that are currently hard to manage effectively, we have developed the group and made strategic appointments to deliver high-quality research from the laboratory bench (particularly in materials technology and its impact on formulation and drug delivery) for improvements to therapy of conditions such as chronic wounds, pain and asthma, to the end-user. This approach strengthens our capability to collaborate with industry and clinicians as findings from our research can be put into practice.

Examples of impact: Despite being a new research area to the University, we have made a contribution to a wide range of different forms of impact including international consensus guidelines on inhaler use (**Chrystyn**), international consensus and best practice guidelines on wound care, (*Ousey***, Leaper**), e.g. healthcare-associated infections and appropriate use of silver dressings in wounds (Wounds International, 2012) and promotion of health issues to the public on educational websites for national charities (*Patel*). Collaborations with industrial and clinical partners are essential in driving innovation in these areas. **Conway** works with Revolymer, a technology company that designs, develops and formulates novel polymers to develop buccal delivery formulations, **Chrystyn** collaborates with Chiesi (Italy), Orion (Finland), MundiPharma (UK) and Teva (Israel), while *Javid* is driving developments with GW Pharmaceuticals on the use of cannabinoids for a range of conditions. *Ousey* is working collaboratively with industry partners (Molnlycke, Smith & Nephew, BSN Healthcare, KCI, Convatec, Advancis Healthcare) and the NHS (Calderdale and Huddersfield Foundation Trust, Mid Yorkshire NHS Trust, Salford Royal Foundation NHS Trust). She has developed an e-learning wound care tool, Challenges in Wound Care, an on-line teaching and learning tool for practitioners involved in wound care and tissue viability.

These examples highlight our commitment to high-quality, timely and relevant research that ultimately impacts the health of end-users and the broad range of networks and collaborators we use to ensure effective dissemination of our results.

b. Approach to impact

Overview: The University's approach places a large emphasis on enterprise and innovation as recognised by the THE award for Entrepreneurial University of the Year, 2012. This supportive and enabling attitude is passed to the research group via the Research and Enterprise Directorate and the Schools' Research Committees, who work within a culture that promotes excellence with impact at every level of research activity and the approach of the group to impact can be demonstrated clearly using the example of the establishment of the Skin Interface Sciences (SIS) group (see impact case study).

Identifying and supporting impact: Establishing a new research group has enabled us to recruit academics who have either evidence of demonstrating impact or, have the potential to do so, within our key areas. Professorial staff (**Chrystyn, Conway** and **Leaper**) have a strong history of industrially and clinically relevant research and the networks to disseminate research for the benefit of the public. Chrystyn leads on all aspects of inhalation studies that include in-vitro, in-vivo and ex-vivo (incorporating patient inhalation manoeuvres with in-vitro methods) and is now supported by material science research by **Larhrib, Laity** and **Supuk**. **Conway, Leaper, Supuk, Laity, Smith, Larhrib** and *Merchant* also have considerable experience across a range of pharmaceutically-relevant industries, having either worked for pharmaceutical industry or on projects directly sponsored by industry, thus providing real-world expertise. **McHugh**, **Olajide**, *Javid* and *Airley* have recently concentrated biomedical sciences research in applications that focus on the genetics of disease and identification of biomarkers with funding from the Pain Society and private sources.

All researchers are asked to consider at the earliest possible stage of investigation who might benefit from their research, how they might benefit, and what should be done to ensure that potential beneficiaries can access those opportunities. This impact culture is sustained by training and development opportunities in knowledge transfer and public engagement; by schemes to recognise and reward enterprising activity, and by activities to expose researchers to innovative thinking in the context of collaboration with the end users of research. The University has demonstrated its support of our strategy by providing funding to support specific projects with research users (e.g. Collaborative Ventures fund **Conway, Larhrib**- Development of a Contra-low Centrifugal Fractional Filtration System with Milne Technology Ltd, and studies with Pharma (**Chrystyn**- in-vitro inhalation studies with Chiesi, Mundipharma and AGT LTD, Bradford, patient studies with RIRL Ltd, Cambridge), International Networking Fund, (e.g. *Ousey* resulting in MOUs with the Australian Catholic University, Queensland University of Technology and soon Curtin University to extend our research into effective wound-care therapies and produce a new quality of life educational tool for patients with wounds). The Intellectual Climate Fund (**Smith**) provided support (along with industrial sponsorship from Nestle, Stable Micro Systems Ltd, Malvern Instruments Ltd, NanoSight Ltd and Wyatt Technology Corporation) for the first UK Hydrocolloids Symposium, a multi-disciplinary conference in the Researcher Hub here at the University, focussing on hydrocolloid research in food science, pharmaceutical usage and biomedical applications.

Working with industry and stakeholders: Our approach is exemplified by recent studies by **Chrystyn** who received industrial support from Teva Pharmaceuticals, Mundipharma, Chiesi as well as Research in Real Life (RIRL) for studies on how patients use inhalers (includes electronic measurements of inhalation profiles).The collaboration with the International Primary Care Group and RIRL has involved patient studies in the UK, France, Germany, Italy, Spain, The Netherlands, Sweden and Norway as well as Australia. The ultimate outcome from such international efforts is the adoption of best practice guidelines (see case-study), recommending changes in treatment or approach with the end-point of direct patient benefit.

We encourage our staff to represent their profession on national boards and public committees and we manage their workload accordingly. *Patel* is an elected member of the Royal Pharmaceutical Society and through his role as Ambassador for NHS Evidence provided by NICE, he developed a pilot programme linking students from medical, nursing and pharmacy disciplines across universities nationally. In 2011, the NHS Evidence Student Champions Programme was approved by the NICE Executive Board to be rolled out nationally. Currently more than 25 universities participate in the programme spanning medicine, dentistry, nursing, and pharmacy.

Engaging the public: Our highly successful public lecture series exemplifies our commitment to communicating our work with audiences other than our immediate peers and stakeholders. These events regularly attract up to 200 people, including school children, and invariably end in enthusiastic Q&A sessions. Appearances in the media have become increasingly frequent and high-profile during the census period. We have signed up to the Manifesto for Public Engagement and *Waters* is an ambassadorial representative for the group and the University, embedding public engagement in all our activities and was awarded the Intelligent Formulation Award in 2011 for her work in education and public communication and British Science Association Darwin Award for public engagement.

c. Strategy and plans

Our strategy is to harness the multidisciplinary nature of the research in order to maximise the effectiveness of our current links and to establish new links into practice.

1. Continue to foster an impact focus to research: Our future plans for supporting the impact of research are to promote and develop those successful mechanisms for generating impact that the University and the School provide. We will exploit the multi-disciplinary nature of the group through effective communication via departmental and institutional procedures and information systems, which will be better tailored to recording and archiving impact-related data. This will ensure effective development and dissemination of examples of good practice. ECRs and our staff who are developing an external research presence are closely mentored by those with a track-record in successful impact and communication.

2. Maximize effectiveness of our collaborative network and further develop relationships with existing and new partners: We will formalise mechanisms for supporting research impact where experts can work together across disciplines and sectors to tackle major health concerns.

Our more experienced staff have built a network of collaborators both nationally and internationally, from industrial partners to practitioners. We are committed to developing a team-based approach to translate our scientific advances into benefits for patients. Our investment in staff and training regimes has become increasingly aligned with the impact opportunities afforded by collaboration with business and industry. As discussed above, this approach begins with our recruitment policy and is a key consideration throughout the researcher mentoring process. Our plans to support impact in the next five years include the nomination of a Business Development Manager (BDM). The University has recently opened the 3M Buckley Innovation Centre (3M-BIC). The department will map its technology platforms to those of the companies resident in the 3M-BIC and the BDM will be responsible for liaising with 3M-BIC companies, with local and national industry. The business development manager will be a first point of contact for BIS supported programmes including Knowledge Transfer Partnerships (KTPS).

3. To effectively communicate our research to the public: Over the next assessment period, we will ensure that a discussion of the research impact is more deeply embedded in our annual review processes. This will include: discussion of impact in the department's research open-days and postgraduate research conferences; a part of the annual PDR of research-active staff will cover research impact; a review of research impact will be included within the annual away day events attended by all staff. Finally, we will expand our out-reach activities, presenting work to lay audiences at public lectures and at school events where staff will be required to identify the impact of their research.

4. **To further invest in impact-enhancing advisory boards:** Going forward, we will continue to review our research strategy and approaches to impact in consultation with our International Strategic Advisory Board. We will explore the recruitment of additional industrial and policy advisors to the Board. Impact goals will be reviewed to ensure their continued relevance and revised accordingly and evidence of our embracing and promotion of the advancement of science into practice will be recorded in a systematic manner.

5. To recognise and reward staff endeavours: In recognition of our commitment to public engagement, we have promoted two members to the newly created role of Principal Enterprise Fellow (*Waters* and *Patel*).

d. Relationship to case studies

The University of Huddersfield has a long track record for participating in applied research which, by its very nature, has provided impact to both business and to society. Staff have always worked closely with industry and a substantial number of our research programmes have been funded by industrial partners. This is clearly identifiable in our research on skin care and pulmonary delivery where industry has been both sponsors and partners for past and current research programmes. The aims of the SIS group are to develop high-quality research in the field of surgical site infections and wound care, undertake research programmes that make a difference to clinical practice and drive the improvement of services through this evidence-based strategy. The beneficial effect of our approach of appointing staff with relevant research experience is evident in the surgical site and wound care case study, including formation of the SIS group with the overarching premise of dissemination of results to a wider audience.

Research in the field of inhaled therapies includes in-vitro and in-vivo studies with the focus on how patients use inhalers. In-vitro studies include adapting Pharmacopoeial methods to reflect patient use. Patient use characteristics are obtained from patient studies making electronic measurements of how patients use their inhalers in a real-life setting. This work is linked to urinary pharmacokinetic methods developed by the group to identify the pulmonary and systemic fate of an inhaled drug and the best method of inhalation through a particular inhaler. The patient studies involve extensive collaboration with internationally recognised, research-active respiratory physicians throughout Western Europe (in the UK, France, Germany, Italy, Spain, the Netherlands, Sweden and Norway) as well as Australia. Discussions have commenced on maintaining the joint European Respiratory Society and International Society of Aerosols in Medicine Task Force on inhaled therapies.

Our impact case studies show direct evidence of benefits to health and quality of life in humans in terms of influencing performance, policy and practice. The outputs are important nationally and internationally and relevant to health professionals, clinicians, industry and the public.