

Application of design-thinking to the prevention and management of lower limb pressure ulcers.

Introduction

Pressure ulcer prevalence rates in the UK are predicted to be around 202000 patients, with an associated cost of between £501 and £573 million per year to the NHS (Guest *et al.* 2020). Recent research into the biomechanics of pressure ulcer formation includes emerging themes around load tolerance, capillary closing pressures and tissue metabolic demand. These are widely recognised as useful parameters to measure the effectiveness of heel pressure ulcer prevention and management devices (Gefen *et al.* 2021). However, what is yet to be considered is how limited current devices are at addressing the individual risk factors of the diverse range of patients within this population who are currently managed with generic off-the-shelf devices.

Aim

To explore how devices designed to prevent and manage pressure ulcers on the lower limb can be optimised for individual patient characteristics.

Objectives:



provide a comprehensive overview and examination of existing evidence from systematic reviews focused on pressure relieving devices for the lower limb (publication 1)



identify and map intrinsic patient risk factors that predispose patients to pressure ulcers on the lower limb to aid the development of a more personalised approach to lower limb pressure ulcer prevention and management



understand the complexities of individual patient risk factors and how they can influence the design specification of a new innovative pressure relieving device (publication 2)



produce a product design specification that will be refined for clinical application. The product will be personalised to enhance concordance and user experience (publication 3)

Methods

The British Design Council's (2005) Double Diamond Design process is proposed to provide an underpinning structure to this multi-phase research study, as an evidence based practical framework for applying design thinking in a research context. It will provide an opportunity to explore and understand the design problems with current heel specific pressure ulcer prevention and management devices and highlight opportunities for improvement, that will inform the new and innovative device design. It is divided into four phases: discover, define, develop and deliver. These have been linked to key phases in this PhD research, of which there are 3 (See Figure 2).

The research team have placed a strong emphasis on the value of patient and clinician informed design by the inclusion of person-centred design principles and design-thinking methodologies. This is essential to ensure that the values, preferences and needs of device users are addressed. Design-thinking prioritises the inclusion of the device users (i.e. patients, their carers and health care professionals) working with the research team to create solutions to complex problems.

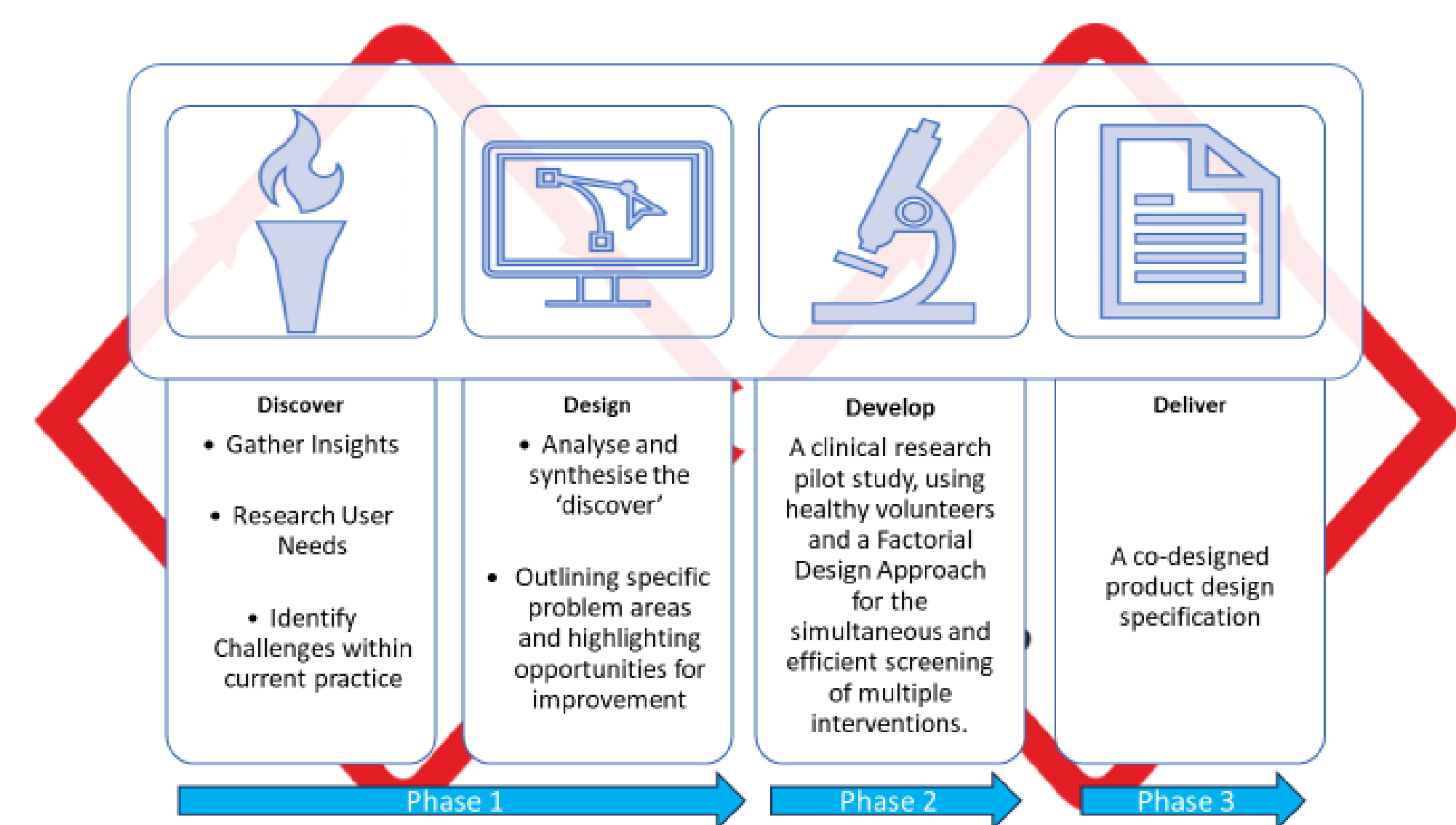
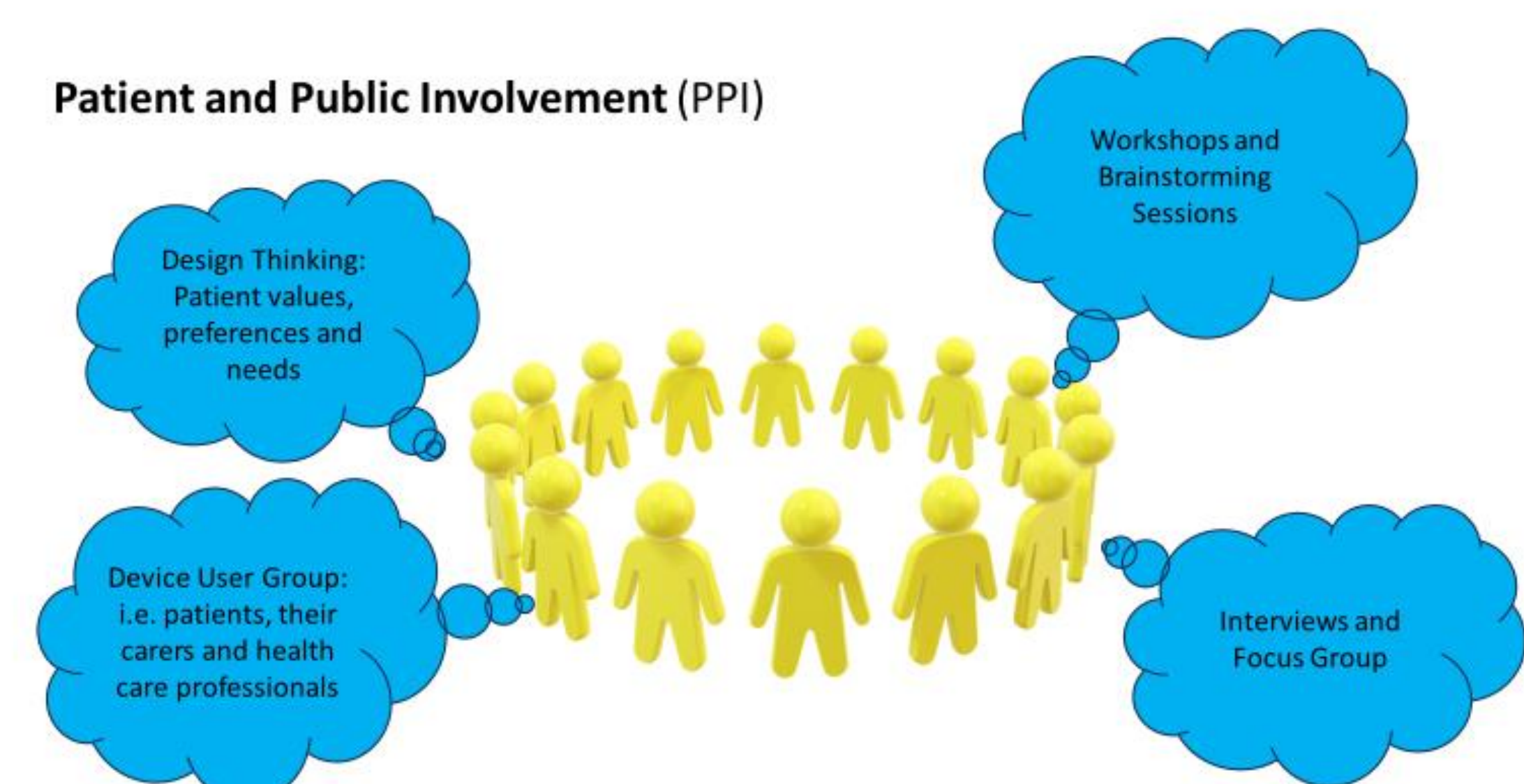


Figure 2 Research Design Adapted from the British Design Council (2005) Double Diamond

Personal and Public Involvement (PPI) helps to ensure that our research is truly person-centered and addresses the real-world needs and concerns of those it seeks to benefit. PPI helps to ensure that our research is truly person-centered. The Device User Group will be working alongside the PhD researcher, the multi-professional PhD supervisory and device development project teams to achieve the research aim. PPI activities may include workshops, brainstorming sessions, interviews and focus group (Figure 3).

Patient and Public Involvement (PPI)



Results

The evidence-based device design parameters identified in the literature review will then be tested in the next phase of the research. A clinical research pilot study will be undertaken utilising a factorial design approach which allows for the simultaneous and efficient screening of multiple intervention components in a timely manner (Baker *et al.* 2017). The findings from will be analysed and synthesised to inform the design of an innovative heel pressure ulcer prevention and management device.

Conclusion

A personalised medicine approach offers an exciting opportunity to understand the benefits of its application to lower limb pressure ulcer prevention and management devices.

References

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