INTRODUCTION

Medical Physics provide a wide range of clinical services to NHS Scotland. These services include ensuring the safety of medical equipment and delivery of high technology treatments and diagnostics. Medical Physics will further the Government's objectives of a healthier Scotland by promoting both 'best practice' and the realisation of anticipatory care. In terms of ‘Sphere of Influence’, Clinical Engineering is a component of Medical Physics under our direct control and is therefore ideally suited to the shared service agenda.

The challenges facing healthcare delivery in Scotland, now and over the next 10 to 15 years, are clearly described in the new National Clinical Strategy. It gives an evidence-based high level perspective of why change is needed and what direction that change should take. There are many drivers for change including: changing patterns of illness and disability, workforce issues, financial considerations, changes in the range of possible treatments, remote and rural challenges to high quality healthcare, opportunities from increasing information technology (e-health) and a need to reduce waste, harm and variation in treatment. It sets out the case for transformational change supported by investment in e-health and technological advances.

The need for a more co-ordinated and formal approach to introducing technology has been provided in HIS’s recent ‘Driving improvement in non-medicines technologies’ consultation document. Medical Physics can guide and co-ordinate the safe, clinical and cost effective introduction of new non-medicine technologies including evidence assessment, information dissemination and meeting regulatory requirements. It could reduce duplication and variation, improve equity of access and facilitate the assessment of CE marked innovative technologies, ensuring structures are sufficiently flexible to permit assessment and ongoing surveillance. It will be of great value in the delivery of the HIS ‘Landing Zone Commission’ agenda.

Medical Physics and Clinical Engineering already operate at local board, regional and national levels and are adept at introducing new, innovative technologies. They have a highly skilled workforce of Clinical Scientists, Engineers and Clinical Technologists embedded within acute and primary care clinical services, often working within multidisciplinary teams. They have evolved over several decades with the five regional services providing some specialist services to the populations of the other health boards, with a national training programme constructed through NES support. There are now opportunities with technological advances to change both the way services are delivered in the community, but also introduce new high-capital cost technologies in specialist regional or national centres. An application has been submitted for a formal network with clearly defined goals will impact on, and assist in the delivery of the National Clinical Strategy and position services so that they are better able to address future challenges and introduce new technologies quicker and more cost effectively. It will also strengthen and further focus the delivery of Clinical Scientist and Technologist training to ensure that the future needs of NHS Scotland in terms of workforce can be delivered.

The network will support Medical Physics and Clinical Engineering to address national issues by enabling skills developed in individual Boards to be shared and applied nationwide. Work plans will be developed to assist in the delivery of ‘Best for Scotland’ solutions across the wide range of medical physics specialties. These will include optimisation of asset management, translation and the appropriate transfer of technology into the primary care sector and a focus on improvement in current work in the acute sector, particularly on improving consistency, sharing information and on reducing variation and waste. Four initial work streams have already been identified that will deliver new technologies to primary care and/ or produce significant savings to the NHS in Scotland.

This paper therefore sets out a strategic analytical approach using a PESTLE. This macro environmental framework has been used to consider six important factors: The Political, Economic, Social, Technological, Legal and Environmental landscape of Medical Physics in Scotland.
PESTLE

POLITICAL

Political factors referring to the stability of the political environment, influences, restrictions, opportunities, attitudes and approaches:

- Health is a devolved power in Scotland with the ultimate responsibility for planning and managing the Clinical Engineering services resting with the Scottish Government through NHS Scotland;
- Clinical Engineering services are primarily delivered separately within the 14 territorial Health Boards and one Special Health Board, the National Waiting Times Centre. Some services are provided on a multi-board, regional or national level;
- There is national collaboration between boards on training and some service issues but we are seeking to formalise this through establishment of a National Diagnostic Network for Medical Physics and Clinical Engineering;
- Arrangements are in place in local and regional centres for input to multi-disciplinary team meetings (MDT’s) for specialist areas;
- Bespoke, special arrangements exist between some Boards to enable calibration, maintenance of medical equipment, radiation safety and diagnostic radiology services to be performed; and,
- The National Clinical Strategy recognises technology and innovation as key drivers for implementing change. Medical Physics and Clinical Engineering has a significant role to play in driving the change from episodic to an anticipatory model of care.

ECONOMIC

Economic factors referring to the wider economy affecting Medical Physics and Clinical Engineering:

- Financial constraint of healthcare budget. Efficiency savings targets, cash limited budgets, reduced budgetary flexibility, lack of current capital funding;
- Variable local budgets held at Board and Hospital level;
- Low national economic growth levels;
- Patient and clinician expectation, new clinical guidelines and new indications for medical physics and clinical engineering services are key drivers;
- The transfer of appropriate technology and innovation to anticipatory care will improve screening, the early detection and prevention of disease to reduce pressure on acute services with appropriate economic benefit;
- National monitoring of Medical Equipment assets should enable intelligent replacement programmes to be implemented optimising financial resources;
- Transferring services from external company delivery to in-house delivery will result in significant NHS savings rather than external company profit. In Clinical Engineering this applies to both calibration and 3D printing proposals; and,
- Demand for high end imaging (CT, MRI and PET) continues to grow with added requirement for Medical Equipment services. The use of technology to shift to self care should help optimise the impact on the demand for Imaging.

SOCIAL

Socio-cultural factors representing the culture that Medical Physics and Clinical Engineering operate within:

- Public expectation/patient choice. Tests for every illness, local access, extended day access and weekend access, immediate results;
- Public expectation that health IT solutions are in place and work;
- Public expectation that primary and secondary care work seamlessly together;
• Anticipated strain on Health care due to Scotland’s aging population;
• According to the National Records of Scotland the project population will increase by 126,791 - 2.4% - by 2020;
• The number of people achieving pensionable age is increasing. This will affect future service provision as areas with a high deprivation index will be more affected by the demographic shift as lower socio-economic groups have longer period of ill health at the end of their lives;
• Staff expectation. Work life balance, flexible working, weekday working, unpopularity of night - time on call work;
• Staff mobility. Migration/movement of skilled workforce (England/Overseas);
• The specialities within Medical Physics and Clinical Engineering are small occupational groups, with associated difficulties in recruitment, retention and workforce planning;
• There are significant difficulties in the recruitment and retention of staff in remote and rural areas;
• Professional resistance to changing staff roles; and,
• Significant challenges exist for service users from remote and rural areas to gain equitable access to services.

TECHNOLOGICAL

Points referring to new developments and changes in technology:
• Advances in technology enable monitoring of physiological parameters for screening and detection of disease processes;
• There is a requirement for appropriate regulation of e-health and m-health applications;
• Optimum referral for high end imaging requires intelligent analysis of increasing volumes of patient data;
• Cloud services and cloud storage may change the game but this presents shared intelligent data mining and analysis opportunities; and,
• New technological solutions require new procurement, regulation, calibration, maintenance, data analysis and clinical interpretation.

LEGAL

Legal factors affecting Medical Physics and Clinical Engineering in Scotland:
• Medical Physicists and Engineers delivering clinical services are governed by their regulatory body: The Health and Care Professions Council;
• The six principles of the NHS Caldicott Guardians apply when using service user information;
• Caldicott rules around the security and storage of patient identifiable data applies to cross Board reporting;
• Current contracts are held at Health Board level; and,
• Medical Equipment is maintained to comply with national legislation and guidance documents1-12.

ENVIRONMENTAL

Environmental considerations:
• Implementing an anticipatory model of care may reduce the demand for imaging techniques resulting in reduced radiation doses;
• Medical Device Legislation impacts on the use of Hazardous substances;
• The development process for new devices embraces the use of environmentally friendly materials that are biodegradable where possible in preference to traditional materials;
• Risk assessment of devices includes environmental, economic and social impact; and,
Our Clinical Engineers embrace the UK Government Sustainable Development Strategy to deliver new products and services with lower environmental impacts across their life cycle.

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