Towards a Distributed Services Model for Laboratory Services Within NHS Scotland.

Designing for Value

“Functional distribution of laboratory resource that enables equitable delivery of high quality health care independent of location.”

Right Tests Right Place, Right Time

V 0.3 WA Bartlett November 2018
Designing for Value

The transformation of clinical laboratory services model in Scotland to that of a distributed service model (DSM) requires an application of a design process. The blueprint and guiding principles provide the framework to enable the delivery of a service that is efficient, effective, resilient, equitable and affordable within an evolving healthcare model. Ultimately there is a need also to deliver a design that increases the value from the investment in diagnostics. That value comes from optimal application of laboratory outputs (test results and reports) from appropriately configured services impacting upon outcome measures (value-based medicine, outcome/cost). If services are to be effective, then the healthcare professional requesting the investigations on behalf of patients must identify the correct testing to be applied in context and apply the results of the investigations to effect at the point of care. The high-level process is shown in Fig 1:

Figure 1. Effective Diagnostics Process

The process basically follows that described by George Lundberg in 1981, variously described as the request to report loop or brain to brain loop. This is a useful concept for planners to refer to as they progress the DSM design. The concept describes a process that ideally links a clinical problem to an appropriate action, taken on the patient’s behalf, based on the results of laboratory tests. Efficient delivery of an effective loop is dependent upon many factors, recently reviewed by Plebanni et al, which impact upon form of the DSM. Adoption of the concept by service designers will enable delivery of an agile approach to DSM design. The future user base for the DSM may be very different given the drive towards a greater focus on delivery of care in a community setting (pharmacists, nurses, physicians assistants). Changing roles and responsibilities of the many health care professionals involved means that requestors of complex services will require the support from the provider services to enable appropriate clinical actions. This requires lab teams to optimally place demand on evidence-based services and to act upon the service output through a highly functional user interface.
The following figure (Fig 2) illustrates four sectors to be considered as targets for a wider design process to deliver value improvements. The whole system view and value proposition necessitates an outward focus of service providers to enable co-production of effective pathways and processes to underpin delivery of high-quality healthcare. It also delivers a driver for development of a cohort of laboratory medicine specialist with skills in clinical informatics and IT systems specialists able to address the data, information and knowledge management processes and flows value from the DSM.

![Diagram showing four sectors: Interface with Diagnostics, Service Model, Application and Impact of reports, Fit for Purpose Reporting.]

**Figure 2. Attributes of an effective service model**

The user interface with laboratory services is critical. It is of concern that Scottish Health Boards in the main have failed to deliver a single order communications interface with services across primary and secondary care. User requirements in both settings have some commonality yet the functionality of systems deployed can be very different. Furthermore, there are Boards that do not have order communication systems in place in one or both settings setting.

Figure 2 indicates that the service model should be of appropriate quality. The focus of planners and service designers here should be in the context of a future view which goes beyond the usual constructs around quality employed by laboratory service providers. The Joint Commission on Accreditation of Health Care Organisations in the USA define quality in healthcare as, the degree to which patient care services increase the probability of desired patient outcomes and reduce the probability of undesired outcomes, given the current state of knowledge”. This takes services of the future into the arena of precision medicine medicine which aims to maximise the probability of curing a disease or ailment.
whilst minimising the potential side effects of medicinal interventions in individual patients. Iatrogenic disease carries huge penalties for patients and huge costs to healthcare providers. There is a critical role for laboratory diagnostics here that establishes the need for laboratory service model transformation to enable required test result delivery, the need to deliver accessible knowledge rich reports to the point of care to support understanding and application of lab reports at the point of care, and the need for user processes to be put in place to enable their application. Future key performance indicators (KPIs) therefore need to be developed to enable identification of efficacy of laboratory services in terms of whole system benefits. Efficiencies need to be delivered and monitored, but with a view to investment of resource released through efficiency improvements into an effectiveness agenda which delivers bigger downstream benefits (e.g. Fig 3).

Fig 3. New approach to KPIs

Design of service with the value focus will require service providers and stakeholders to seriously challenge the present state and deliver a new model that meets future requirements that is blueprint compliant and compliant with DSM guiding principles. This is a difficult task to undertake and until there is a clear vision put in place for a future state there will be a tendency for service providers to put in place solutions to fix the issues of the present state and perpetuate the old model rather than deliver the required ambitious transformation.

A specimen driver diagram that might be developed further to enable the DSM design is shown in Appendix 1. Design of a DSM which delivers the aim will necessarily involve a co-production by a range of stakeholders (Fig. 4 Indicative high level only). Early engagements with these stakeholders will enable
definition of required function and form with delivery underpinned by the leading-edge technology. The potential importance of the Diagnostics Industry in the design process should not be underestimated; their products, services and experience of knowledge of service delivery models worldwide will define the art of the possible technologically.

Figure 4. Stakeholder that should be Involved in defining and delivering the DSM design

Requires:
• New thinking
• Collective ownership of a shared vision
• Ambition
• Willingness to embrace change and to think whole system

Summary

The design of the future state DSM for delivery of Scotland’s laboratory services should be consistent with the national blueprint and guiding principles. Planners should approach the transformation with a clear focus on delivering increased value from the investment in services from a whole system perspective. The brain to brain loop provides a concept that enables a focus on the whole process within the system to enable the design process. A changing user base within an evolving model of health care delivery system, an increasing breadth and depth of laboratory medicine services, and the development of precision medicine delivers drivers for development of electronic user interfaces that are common to secondary and primary care with functionality to optimise demand and maximise impact of diagnostics.
Design of patient centric services operating at the forefront of technology requires co-production by many stakeholders. The example driver diagram delivered in Appendix 1 identifies areas for focus that will inform the design process. There is a need for new thinking with early delivery of a co-owned vision of an ambitious future state that meets needs to avoid expensive band-aides being applied to a present state model that is known to be flawed.

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Appendix 1

To provide high quality fit for purpose and efficient form follows function DSM for laboratory services, able to operate in new and evolving healthcare environments, maximising cost utility (value).

### Blueprint Consistent Driver Diagram for Development of Laboratory Services V0.2

**Primary Drivers**

1. Optimal use of skills and knowledge: workforce development across systems
2. Optimal use of space, equipment and resources
3. Realisation of benefits from new and emerging technologies and knowledge
4. Integrated support functions
5. Effective Clinical Interface; Input & Output
6. Infrastructure to enable and support research and development within and outwith the services.

**Secondary Drivers**

1.1 Embed lean processes and thinking
1.2 Define and develop specialist/generic work concept
1.3 24/7 Service Design
1.4 Culture of staff engagement and involvement
1.5 Maintain and develop specialist/generic competencies
1.6 Alignment of staff profiles to work profiles
1.7 Enable cross border working
1.8 Effective training and CPD for laboratory staff
1.9 Role development with six steps workforce planning

2.1 Embed lean processes and thinking
2.2 Assessment of current and future space requirements and exploit existing resource
2.3 Explore resource sharing between disciplines/localities
2.4 Effective management of resources.
2.5 Functional consolidation of services to ensure optimal patient flow, capacity and outcomes
2.6 Develop logistics and communications
2.7 Standardisation and convergence (methods, SOPs, nomenclatures, codes etc)

3.1 New technologies: automation, molecular, mass spec
3.2 Ensure appropriate degrees of automation and modern testing strategies.
3.3 Digitisation
3.4 Artificial/augmented intelligence
3.5 Rapid translation of best evidence and new knowledge into practice
3.6 Develop do once and share capability
3.7 Make outcome based business cases that demonstrate whole system value the norm

4.1 Development of generic support functions to co-ordinate activities across traditional laboratory discipline, professional and geographical boundaries.

5.1 Electronic interface with decision support to enable optimal service demand by an evolving user base
5.2 Infrastructure to enable closer collaborative working with users to improve clinical effectiveness.
5.3 Support for clinical audit and development of clinical and laboratory based practice.
5.4 Development of laboratory based clinical informatics functionality
5.5 Development of whole system view of service with outcome KPI development
5.6 Engagement with evolving health care delivery initiatives/structures to enable shaping of service and focus of resources (Triple Aim/realistic medicine/precision medicine)

6.1 Develop R & D programme for laboratory services.
6.2 Staff/systems support clinical research.
6.3 Sufficient resource to support medical education and R&D
George Lundberg (JAMA 1981:245:1762-1763)

[https://www.researchgate.net/publication/51807567_The_Brain-to-Brain_Loop_Concept_for_Laboratory_Testing_40_Years_After_Its_Introduction](https://www.researchgate.net/publication/51807567_The_Brain-to-Brain_Loop_Concept_for_Laboratory_Testing_40_Years_After_Its_Introduction)

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