Executive summary

Advancing the development and use of diagnostic target product profiles for cancer

June 2024

CANCER RESEARCH UK

Together we are beating cancer

About this report

This report, and the research conducted to inform it, has been undertaken by researchers at RAND Europe and the Office of Health Economics.

RAND Europe is a not-for-profit policy researchorganisation that helps to improve policy and decision making through research and analysis.

The Office of Health Economics supports better health care policies by providing insightful economic and statistical analyses of critical issues.

About Cancer Research UK

We're the world's leading cancer charity, dedicated to saving and improving lives through research. We fund research into the prevention, detection and treatment of more than 200 types of cancer through over 4,000 scientists', doctors' and nurses' work. In the last 50 years, we've helped double cancer survival in the UK, and our research has contributed to around half of the world's essential cancer drugs. Our vision is a world where everybody lives longer and better lives, free from the fear of cancer.

Our values

Our values help guide our behaviour and culture in an ever-changing world, building on the best of what we do today and what we aspire to be in the future. They unite and inspire us to achieve our ambitious plans and mission of beating cancer together.

Our values are:

Bold
Act with ambition, courage and determination

Human
Act to have a positive impact on people

Credible
Act with rigour and professionalism

Together
Act inclusively and collaboratively

Reference

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The context

Tackling cancer is a priority for health system decisionmakers. Early and improved cancer detection and diagnosis are central to improving long-term patient prognosis and outcomes. Achieving timely and accurate diagnosis depends, in part, on developing and adopting innovative diagnostic tests.

Innovators need a clear steer on the diverse requirements for novel diagnostic tests for cancer. Diagnostic Target Product Profiles (TPPs) help provide such clarity. Those who might use and pay for diagnostic tests must give innovators a clear demand signal on test types needed so they can respond to areas of unmet need. Diagnostic TPPs are product-specification documents that can serve as a tool to achieve this. There is growing interest in their use to support the development of novel diagnostic tests for cancer. To the best of our awareness, TPPs in the diagnosis space have been developed in other areas (most notably infectious diseases) but not in cancer.

Research aims and approach

Cancer Research UK commissioned RAND Europe and the Office of Health Economics (OHE) to research and establish a guide for developing diagnostic TPPs for cancer. The research aimed to advance practical knowledge on approaches to developing diagnostic TPPs for cancer, focusing particularly on the UK context. Cancer Research UK commissioned the research in light of the growing interest in supporting innovation to improve cancer diagnosis.

The project sought to produce a 'general' (tumour-site agnostic or for cancer generally regardless of where it started in the body) guide for developing cancer TPPs that can serve as a tool and resource for future efforts to design bespoke TPPs for specific cancers, test types and use cases. We used a mixed-methods approach combining scoping desk research and interviews, workshops with diverse stakeholder communities and an early economic modelling tool to inform the requirements of a TPP for cancer and develop the guide.

Key findings: the guide for developing diagnostic TPPs for cancer

The guide covers the following aspects relevant to developing diagnostic TPPs for cancer: (a) the *features that need to be considered, (b) the stakeholders to involve, (c) considerations for TPP prioritisation, and (d) the process in terms of approaches and methods.*

What features need consideration in diagnostic TPPs for cancer?

Identifying the core features and feature combinations driving the central value proposition (i.e. improvement offer) for a novel test and associated specifications for them is key to TPP development. The specifications can include minimal, preferred or optimal requirements (where possible), undesirable characteristics, and an accompanying rationale for the chosen specifications. Identifying and integrating the key features within diagnostic product development can help increase (though not guarantee) the chances of developed tests' successful adoption and innovators considering more than just technical performance criteria. TPPs must provide specifications for a diverse range of features because the latter should reflect the appropriateness of any test developed for eventual real-life use.

Thus, we have outlined features covered as part of TPP development to increase understanding of features and key considerations relating to them.

Drawing on a systematic review by Cocco et al. (2020),[1] and refining it through our research, we found that the types of features that TPPs can provide specifications for broadly fall into nine core categories, each of which can include multiple features:

Unmet need: The unmet need a diagnostic test should respond to and its application scope (e.g. its intended use, the medical decision(s) supported, use setting, target user and target population). It is also important to clarify how it should interact with other tests and care decisions a patient may encounter.

Analytical performance: Requirements relating to the test's accuracy. It is important to consider how the context of real-world use might differ from that of experimental laboratory settings.

Clinical validity: Requirements reflecting how far a test will measure an appropriate disease marker in a specific population;

Clinical utility: Requirements related to the test's influence on downstream care outcomes, such as patient survival and quality of life. Proxy diagnostic measures may be required because it can be challenging to link a diagnostic test with patient outcomes.

Human factors: Requirements relating to individuals' interaction with the test. Examples for healthcare professionals include specifications for training needs, test preparation and administration, and interpreting results to ensure effective use. It is also important to specify requirements related to patients as end users, e.g. patient acceptability, accessibility and experience, and how the test may affect inequalities.

Infrastructure: Requirements related to facilities, equipment, supplies, IT systems or other operating conditions that need to be established and maintained.

Cost and economic considerations: Requirements related to economic and commercial matters (e.g. the test's price and commercial routes to market). It is vital to consider cost-effectiveness, for which early economic modelling can help.

Regulation: Features related to regulatory (i.e. safety and efficacy) requirements.

Environmental impact: Requirements about the test's environmental impact.

TPPs are typically formatted as tables detailing the desired specifications for each relevant feature. Additional contextual information helps ensure the TPPs are clear and transparent. At a minimum, this should cover the TPP's purpose and target audience, a glossary of terms to ensure accessibility, a list of those who helped develop the TPP and adequate justification for its final specifications.

Who needs to be involved in developing diagnostic TPPs for cancer?

Given the issues needing consideration when developing a TPP, multiple stakeholder groups play important roles. Such stakeholders include **academic, clinical-academic and research communities; healthcare professionals and diagnostic laboratory experts; industry; patient, carer and public representatives; research and innovation funders in the public sector and charities; and regulators, Health Technology Assessment (HTA) and policymaker perspectives** (in consideration of procurement realities). We cover how the TPP development process can involve stakeholders throughout and key considerations concerning particular groups. In part, relevant stakeholders will be represented via engagement in **a core working group** leading the TPP development effort. However, the process also needs a consultation with a broader range of individuals across stakeholder groups.

What should be considered when prioritising which TPP to pursue?

TPPs can be helpful in multiple contexts, but health system decision-makers must prioritise which use cases to develop a TPP for in the future. Thus, prioritisation is a critical aspect of TPP development. We aim to support this process by outlining some of the considerations that can impact prioritisation and mechanisms for achieving this. Based on stakeholder consultation, relevant considerations include (a) ***epidemiology*** (e.g. cancer incidence and prevalence, including considerations around rarity or significant incidence differentials between groups), (b) ***early diagnosis challenges*** (especially when linked with poor survival), (c) ***existing test performance*** (e.g. inadequate test performance on technical, accessibility or acceptability fronts), (d) ***health services organisation and capacity*** (e.g. where existing tests are a poor fit with workforce capacity or skills, health systems infrastructure, or provide poor economic value) and (e) ***prevention-potential*** (e.g. where testing for risk factors for cancer, such as human papillomavirus, can help with cancer prevention aims).

How to develop a diagnostic TPP for cancer: Approach and guiding principles

Developing a TPP is a complex endeavour for which no established protocol yet exists. However, **developing a TPP typically involves two key stages**: (a) ***the inception stage***, which establishes a core working group, governance and coordination arrangements and an action plan, and (b) ***implementing TPP development***. Using our research to build on a conceptualisation from the recent systematic review by Cocco et al. (2020),[1] the TPP implementation stage of TPP development comprises three phases:

- **Scoping the unmet need and key requirements for the novel test.**
- **Drafting the TPP** to provide information on relevant features for a novel test and, where applicable, specifications for them.
- **Consensus building**, exploring and seeking consensus on a final TPP draft.

However, these phases are not linear. For example, drafting and consensus-building often happen iteratively. TPP development can employ diverse methods, and it is essential to consider each type's rigour and feasibility. Relevant methods include:

- **Desk research**, e.g. systematic reviews or rapid literature assessments, diagnostic test and patent database analysis, and policy and clinical guideline analysis to understand unmet needs and key test requirements.
- **Stakeholder consultation**, e.g. workshops, interviews with experts, core working group meetings, TPP draft reviews and Delphi (a method for consensus surveys and workshops).
- **Modelling**, e.g. early economic modelling to help model the care pathway, explore a test's health economic value with a specified set of features, and test the features with the most influence on the value proposition.

The methodologies and rigour applied to TPP development can vary, and 'rate-limiting' factors **influence the most appropriate methods and approaches**. Examples include the new test's urgency (based on need), policy impetus, financial resources, stakeholder engagement within the specified timeframe, and the strength of the pre-existing evidence on feature specifications. Decisions must ultimately balance optimal methods with real-world pragmatism while ensuring sufficient rigour. **We identified four overarching principles that can help support 'fit for purpose' approaches. These apply to all TPP development phases and should be used to guide the process**. These are:

1. **Inclusiveness** – engaging the right stakeholders in feasible and accessible ways.
2. **Clarity on a novel test's value proposition** – including specifying which features matter most (and must be specified in the TPP) and which can be omitted at the innovator's discretion.
3. **Balancing methodological rigour with pragmatic considerations** while ensuring objectivity.
4. **Considering a TPP's local relevance alongside the global nature of incentives for innovation** – this has implications for TPP developers considering the relevance of a TPP's specifications beyond a UK-only market.

The guide for developing diagnostic TPPs resulting from this research will help decision-makers to develop diagnostic TPPs for cancer in carefully considered, efficient and effective ways. The insights gained have highlighted TPP development's complexity, showing the multifaceted considerations necessary for deciding which features to include and the optimal methods and approaches to utilise. We hope that this research's practical and actionable focus will help those who might develop bespoke diagnostic TPPs for cancers navigate this complexity.

Future TPP development efforts will also likely help refine our insights.

Our work also identified important avenues for a future research agenda. Such avenues include approaches to prioritising which TPPs to develop, clarifying the terminology used to describe desired diagnostic test features, improving understanding of features relevant to diverse diagnostic technologies, and optimising the governance and management of TPP development.

TPPs are an important tool that can help identify the types of cancer tests a health system needs. However, TPPs alone cannot solve wider challenges in incentivising innovation and its adoption in the NHS. Any TPP development effort's overarching aim is to yield innovative diagnostic tests that reach the health service and benefit patients. However, a TPP cannot align innovative diagnostics' development and supply with demand and willingness to pay and cannot please everyone. Therefore, those developing diagnostic TPPs for cancer must carefully consider how to maximise a TPP's traction and impact as part of a broader collaborative community of practice.

This study is unique in exploring diagnostic TPPs in the cancer field, where they have not yet (to the best of our knowledge) been used to signal the demand for innovation and thus present a novel approach to aligning supply and demand. It is a robust and timely analysis combining diverse research methods and harnessing many peoples' expertise across diverse stakeholder communities. The results are relevant to a wide range of individuals, groups and organisations interested in improving cancer diagnosis and patient outcomes.