Impact and value of the NIHR Clinical Research Network

Financial years
2016/17 – 2018/19

July 2019

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# Glossary

<table>
<thead>
<tr>
<th>ABPI: Association of the British Pharmaceutical Industry</th>
<th>IIT: Investigator initiated trial. These are trials that are sponsored by an NHS Trusts or universities but where funding for the trial or trials drugs are provided by industry.</th>
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<tbody>
<tr>
<td>BRCs: Biomedical Research Centres</td>
<td>IRAS: Integrated Research Application System</td>
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<td>CPMS: Central Portfolio Management System</td>
<td>LCRN: Local Clinical Research Network</td>
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<td>CRO: Contract Research Organisation</td>
<td>MHRA: Medicines and Healthcare products Regulatory Agency</td>
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<tr>
<td>CRN: Clinical Research Network</td>
<td>NHS: National Health Service</td>
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<td>CTUs: Clinical Trial Units</td>
<td>NIHR: National Institute of Health Research</td>
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<td>DHSC: Department of Health and Social Care</td>
<td>NIHR CRN: National Institute of Health Research Clinical Research Network</td>
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<tr>
<td>EHR: Electronic Health Record</td>
<td>ONS: Office of National Statistics</td>
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<tr>
<td>EU: European Union</td>
<td>PET: Portfolio Eligibility Team</td>
</tr>
<tr>
<td>FTE: Full Time Equivalent</td>
<td>PI: Principal Investigator</td>
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<tr>
<td>FY: Financial Year</td>
<td>RCT: Randomised Control Trial</td>
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<tr>
<td>GCP: Good Clinical Practice</td>
<td>R&amp;D: Research and Development</td>
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<td>GP: General Practice</td>
<td>SOP: Standard Operating Procedure</td>
</tr>
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<td>GVA: Gross Value Added</td>
<td>Sponsor companies: An inclusive term for all companies funding commercial clinical research. This includes (but is not limited to) pharmaceutical companies, biotech companies and medical device companies.</td>
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<tr>
<td>HRA: Health Research Authority</td>
<td>UK: United Kingdom</td>
</tr>
<tr>
<td>Industry-supported: all commercial and investigator initiated studies funded by industry (i.e. a pharmaceutical company or medical device company)</td>
<td>UKCRC: UK Clinical Research Collaboration</td>
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Executive summary

About the study and the framework for analysis

The National Institute for Health Research (NIHR) was established by the UK Government in 2006 to ‘create a health research system in which the NHS supports outstanding individuals, working in world-class facilities, conducting leading-edge research, focused on the needs of patients and the public.’ It supports the NHS to undertake such research by funding a range of infrastructure facilities, including the NIHR Clinical Research Network (CRN). The CRN aims to make it possible for patients and health professionals across England to participate in clinical research studies, in both the NHS and in the wider health and social care environment.

The CRN, which engages with a range of stakeholders to support the delivery of clinical research studies on the CRN Portfolio, comprises:

— the CRN Coordinating Centre (CRN CC), which manages the CRN on behalf of the DHSC; and

— 15 Local Clinical Research Networks (LCRNs) which directly coordinate and support the delivery of research across 30 different clinical specialties in England, each led by National Specialty Leads, overseen by the CRN CC.

In November 2018, the CRN commissioned KPMG to undertake an update to KPMG’s 2016 study, to assess the impact and value of its activity from financial year (FY) 2016/17 to FY 2018/19, cumulatively and in each individual year.

Our study focuses on the impacts generated through the activity of delivering CRN-supported clinical research, rather than the outcomes of the research itself (i.e. it does not include any health impacts associated with any new treatment pathways, drugs or medical equipment developed as a result of the clinical research conducted). While the CRN facilitates the realisation of these important impacts, for example through its role in study set up and delivery support, it does not directly influence the types of clinical research that are undertaken on its portfolio of studies.

Notes:
(2) The CRN Portfolio refers to the database of studies registered with the CRN.
(3) NIHR. Local Clinical Research Networks. https://www.nihr.ac.uk/nihr-in-your-area/local-clinical-research-networks.htm
(4) The CRN financial year runs from the 1 April to the 31 March of the following year. E.g. FY 2016/17 runs from 1st April 2016 to 31st March 2017.
For our study we specifically conducted an analysis of the following impacts that the CRN directly generates:

01. the overall economic contribution associated with the CRN Portfolio of clinical research studies, measured in terms of gross value added (GVA) and full time equivalent (FTE) employment;(5);

02. the monetary value to the NHS resulting from CRN-supported commercial clinical research delivered at NHS sites, specifically the direct cost savings associated with pharmaceutical products being provided free of charge by sponsor companies during clinical trials and the commercial income payments to NHS Trusts for the delivery of clinical studies on the CRN Portfolio;

03. the wider impacts in the clinical research market generated by the CRN’s activities and contributions made by the CRN, such as through its provision of study support and its database of study-level data.

Our study provides a quantitative and qualitative assessment of these impacts in gross terms(6), drawing on samples of primary data collected for the study, publically available data and information and insights gathered though a series of stakeholder interviews based on stakeholders selected by the CRN. Due to the limited number of stakeholder interviews conducted, and limitations to the data made available to us for some areas of our analysis, it should be noted that the findings and results of our analysis may not be fully representative of all CRN activity linked to the portfolio of clinical research studies it supports. Full details of our approach, data sources, limitations to the study and how we have sought to mitigate these limitations are included in Section 4 of the report.

Key findings: the economic contribution associated with CRN-supported clinical research studies

Our analysis estimates the economic contribution of CRN-supported clinical research studies in terms of GVA and employment. Our analysis, detailed in section 5 of this report, indicates that over the period from FY 2016/17 to FY 2018/19, an estimated total of £8 billion in GVA and 47,467 FTE jobs were generated by CRN-supported clinical research activity. This includes the direct GVA and employment impacts from the clinical research activity and activities within the CRN, as well as those generated in the UK supply chain (indirect effects) and in the wider economy, through spending by employees (induced effects).

Notes: (5) GVA measures the contribution to the economy of an individual producer, industry or sector, net of intermediate consumption (for example goods and services that are used in the production process). It is a measure of the economic value of the activity. In our analysis we report employment in full-time equivalent (FTE) terms. This adjusts part time or temporary staff into an annual full-time equivalent based on the proportion of full-time hours worked over a year.

(6) Gross impacts reflect the total effect of an intervention or activity. Net impacts take into account only those impacts that are additional, i.e. impacts that are brought about, over and above what would happen anyway. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/181517/Additionality_Guide_0.pdf
The total cumulative impact\(^7\) over the period FY 2016/17 to FY2018/19 is comprised of approximately:

- **£2.7 billion in GVA and 18,935 jobs associated with CRN-supported non-commercial clinical research activity**
- **£5.2 billion in GVA and 28,113 jobs associated with CRN-supported commercial clinical research activity initiated and funded by the life-sciences industry**
- **£0.08 billion in GVA and 420 jobs associated with the CRN CC activities, which supports both commercial and non-commercial research**

**Figure 1: Cumulative impact of CRN-supported clinical research FY2016/17-FY2018/19 \(^7\)**

- **£0.9 billion in GVA**
- **£1.6 billion**
- **£0.08 billion**
- **£4.4 billion**

**GVA**

- Non-commercial clinical research activity: Charities and other grant providers
- Commercial clinical research activity: NHS Trusts
- Non-commercial clinical research activity: LCRN infrastructure at NHS Trusts
- CRN Coordinating Centres

**Employment**

- 420
- 8,429
- 5,701
- 22,412
- 10,506

**Source:** KPMG analysis\(^7\)

In terms of the impact in FY 2018/19, our analysis shows that the CRN supported a total of **£2.7 billion in GVA and 47,467 FTE jobs.** This annual impact is comprised of approximately:

- **£0.9 billion in GVA and 18,935 jobs associated with CRN-supported non-commercial clinical research activity**
- **£1.8 billion in GVA and 28,113 jobs associated with CRN-supported commercial clinical research activity initiated and funded by the life-sciences industry**
- **£0.03 billion in GVA and 420 jobs associated with the CRN CC activities, which supports both commercial and non-commercial research**

Our analysis shows that over the three years covered by our study:

- Both the number of studies and number of recruits onto clinical research studies on the CRN Portfolio has increased by approximately 30% from FY 2016/17 to FY 2018/19.
- The economic contribution in terms of GVA has increased over the time period from an estimated £2.6 billion in FY 2016/17 to £2.7 billion in FY 2018/19, linked to increased GVA from commercial clinical research activity supported by the CRN.
- Employment contributions have also increased over the time period, with estimated total direct, indirect and induced employment increasing from 47,102 in FY 2016/17 to 47,467 in FY 2018/19.
- These increases in clinical research activity and economic impact have occurred in the context of a reduction in funding from Government of 1.9% in nominal terms over the period, and a reduction in staff costs of 2.9% in nominal terms.

**Notes:** (7) Individual estimates do not sum to the totals due to rounding.
Key findings: the monetary value to the NHS associated with the CRN Portfolio of clinical research studies

Within the scope of the study we assessed the value of the CRN’s clinical research activity in terms of the monetary value to NHS Trusts, in the form of:

— revenues received from life-sciences industry sponsor companies in return for delivering commercial clinical research; and

— direct cost savings relating to sponsor companies’ provision of pharmaceutical products, free of charge, for use in clinical research.

Payments to NHS Trusts by industry sponsors

NHS Trusts and other care providers receive income for the commercial clinical research they deliver. This income compensates the provider for the costs associated with delivering the research, as well as an allowance which is intended to enable investment in research capacity and capability longer term.(8) This income enables the provider to undertake more clinical research than they otherwise would as well as enhancing the provider’s ability to deliver clinical research going forward.

It should be noted that our analysis of payments to NHS Trusts was limited by the small sample of CRN stakeholders from whom we were able to obtain patient payments data. Whilst the presence and direction of any potential bias in the analysis resulting from this is unknown, the limited sample means that the data may not be fully representative of all payments for studies on the CRN Portfolio.

Based on data obtained from CRN stakeholders(9) covering 66o site level payments for commercial studies on the CRN Portfolio, we estimate the average payment, on a per patient basis, was £9,189 over the period between FY 2016/17 and FY 2018/19. This has increased compared to the per patient payment of £6,658 estimated for FY 2014/15 in our previous study.

The data analysed shows that the per patient payment varies depending on type of study (e.g. study specialty) and the region of England in which it was conducted.(10) For example, across the time period of our study, the average per patient payment for oncology studies was £13,143, whilst the average per patient payment for cardiovascular disease studies was £4,093.

We aggregated the average payment per patient from the sample of data received over all the studies on the CRN portfolio using a weighted approach to adjust for the study specialty and location.

Using this approach we estimate that the total value of payments to NHS Trusts and other care providers relating to the delivery of commercial clinical research supported by the CRN reached approximately £950 million over the period from FY 2016/17 to FY 2018/19. Of this, approximately £355 million of payments were made in FY 2018/19.

Cost savings to the NHS

In addition to the commercial revenues (per patient payments) NHS Trusts receive for conducting commercial clinical research studies on the CRN Portfolio, as part of our study we assessed wider monetary impacts of this activity.

In all commercial trials involving new pharmaceutical products, sponsor companies will provide the pharmaceutical products used in the trials free of charge to NHS Trusts. In some cases these pharmaceutical products are used in conjunction with the standard treatment, in which case there is no direct cost saving to the NHS. However, in instances where the new pharmaceutical product replaces the standard treatment that would otherwise have been administered, this represents a cost saving to the NHS.(11) Our analysis estimated that this scenario occurred in at least 31% of our sample.(12)

Our analysis covering the period FY 2016/17 and FY 2018/19 suggests an average pharmaceutical cost saving to the NHS from the provision of free pharmaceutical products used in trials in place of the standard treatments, within the range(13) of £4,143-7,483(14) per patient across all study specialties and in the range of £5,691-17,971(15) per patient for oncology studies.

Aggregating these savings across all studies on the CRN Portfolio over this time period, we estimate the total value to the NHS of pharmaceutical products provided free of charge was approximately £77.1 million from FY 2016/17 to FY 2018/19. Of this, approximately £28.6 million of savings were made in FY 2018/19.

Notes:
(8) This is known as capacity building and represents an allowance of 20% on top of costs. See: NIHR (2017). User manual for the NIHR CRN Industry Costing Template. See: https://www.nihr.ac.uk/funding-and-support/documents/study-support-service/Early-contact-and-engagement/Costing_Templates/USER%20MANUAL%20Industry%20Costing%20Templates%20May%202017.pdf
(9) These included NHS Trusts, LCRNs, the CRN CC and a pharmaceutical company.
(10) Driven by the Market Forces Factor applied to adjust for location dependent variation in costs.
(11) It is possible that in some instances, if the trial drug is ineffective, the standard treatment may need to be administered following the study anyway. However, we would expect this to occur in the minority of cases. Furthermore, there will be instances where industry-sponsored clinical research studies deliver value beyond this cost saving where the trial facilitates free access to more expensive pharmaceuticals that may be licensed in other indications, but are now being trialed in a new disease-area. In the absence of the study, patients would not have access to these expensive pharmaceuticals.
(12) This excludes protocols that did not contain sufficiently complete data to allow us to identify whether a cost saving would occur.
(13) At the 90% confidence level.
(14) The mean value in our distribution is £5,813. The margin of error is £1,670 for a 90% confidence interval.
(15) The mean value in our distribution is £11,831. The margin of error is £77.1 million from FY 2016/17 to FY 2018/19. Of this, approximately £28.6 million of savings were made in FY 2018/19.
While our analysis estimates the direct costs savings to the NHS from the free pharmaceutical products provided, we note that commercial sponsor companies may recoup, to some extent, the costs of providing these products free of charge from future sales of the trial product or from the sale of other products to the NHS. However, we were unable to assess this as part of this study due to data availability.

Key findings: the added value of the CRN

The CRN forms only one part of the overall clinical research landscape and not all the impacts generated from the clinical research activity it supports can be directly attributed to the network’s activity. Therefore, through our study we sought to assess the additional value the CRN contributes.

Stakeholders interviewed as part of our study identified examples of the routes through which they consider that the CRN generates wider financial, economic or social value, and the additionality of its activity – that is how the CRN’s activity adds value relative to a situation without the CRN and with no alternative in its place. As a limited number of stakeholders, selected by the CRN, were interviewed, their views may not be fully representative of all stakeholders involved in clinical research in England.

CRN support for the set up and delivery of studies entered onto the CRN Portfolio

A number of the stakeholders interviewed identified benefits they consider result from the CRN’s provision of feasibility services and study set-up support. In summary, the key themes emerging from stakeholders, are as follows:

— The CRN’s provision of feasibility services and study set-up support has a positive impact on the successful delivery of a study, specifically in terms of enabling the study to be set up on time and meeting recruitment targets.

— By offering feasibility services and set-up support, the activity of the CRN may lead to an overall increase in the volume of clinical research undertaken in England as more potential NHS sites for conducting clinical research may be identified and higher recruitment may be achieved on studies.

— The early stage support provided by the CRN results in an increase of reach of clinical research: through site identification support, the CRN allows for more NHS Trusts to be involved in clinical research. This ultimately results in an increase in patients’ access to clinical research, and the improvement of health outcomes.

Provision of CRN infrastructure

Stakeholders identified impacts in terms of the efficiency, speed and costs with which organisations deliver trials resulting from the CRN infrastructure and support in studies delivery. Specifically:

— When asked about how clinical research delivery would differ without the CRN’s support and infrastructure, there was consensus amongst the majority of stakeholders we consulted that without the CRN there would be a loss of efficiency in the way clinical research is delivered.

— The CRN infrastructure and support in the delivery of studies was generally considered by stakeholders to increase the speed at which clinical studies can be delivered, which ultimately has benefits to patients’ health outcomes, as it allows patients to access improved treatments more quickly.

— The provision of research nurses by the CRN was considered a significant benefit, as stakeholders considered that this represents a sizeable cost saving to the organisations which are undertaking clinical research in the country, meaning they can deliver more research with the resources otherwise available to them.

Wider CRN engagement and other activities

A range of impacts relating to the CRN’s engagement and wider activities were also highlighted by stakeholders, specifically associated with:

— Engagement with non-commercial stakeholders: Charity stakeholders reported that recent increased engagement with charities has enabled stakeholders to deliver larger studies and more targeted investment in clinical research.

— The provision and use of data: Stakeholders identified that the data gathered and provided by the CRN contributes to the UK’s attractiveness for conducting clinical studies; reduces the risk of study duplication meaning improved research outcomes; and increases efficiencies in patient recruitment.

— Support for clinical research in primary care: Our consultation with three Principal Investigators (PIs) in primary care identified particular challenges and barriers associated with clinical research in a primary care setting that they considered the CRN is particularly valuable in helping to overcome. They considered that helping to support clinical research in primary care is particularly important given that the research often relates to general diseases that affect large populations and as clinical research in this area presents a significant opportunity for patient recruitment into secondary care studies.
Key findings: stakeholders’ views on how the NIHR could increase its impact

In general, the stakeholders interviewed as part of the study indicated that they recognise the value the CRN brings to the delivery of clinical research in England. However, areas were identified where stakeholders considered that the impact of the CRN could be increased through the role it could play in helping to address the ongoing challenges in relation to the delivery of clinical research in England.

The three main areas for improvement noted by stakeholders related to:

**Staffing resources:**
Whilst most stakeholders recognised the value of having research nurses on the ground allocated to delivering research, they identified that there is pressure on staff resources which can impact study delivery. Stakeholders raised concerns around the ongoing ability of the research staff to handle the current volume of research, and a perceived bias towards non-commercial clinical research.

**Consistency across the Network:**
According to three of the six commercial stakeholders(16) we spoke to, there are inconsistencies in performance across the Network, which creates problems and affects confidence in delivery across the Network. This issue was not raised by the non-commercial stakeholders we consulted.

**Introduction of study set-up and patient recruitment targets:**
A number of stakeholders interviewed provided views on the impact of these targets,(17) with some considering that the targets are not appropriate for all studies and while some stakeholders reported that they considered them to be ‘too loose’, others deemed them ‘too tight’.

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Note: (16) Including four pharmaceutical companies and two CROs.
(17) The CRN has set a targets of getting the first participant recruited within 30 days of the site being confirmed; getting all sites confirmed within 40 days being selected.
About this study

The National Institute for Health Research (NIHR) was established by Government 2006 to ‘create a health research system in which the NHS supports outstanding individuals, working in world-class facilities, conducting leading-edge research, focused on the needs of patients and the public’[18]. Its work is directed by the Chief Scientific Adviser at the Department of Health and Social Care (DHSC) and by the Senior Management Team of DHSC’s Science Research and Evidence Directorate.

The NIHR supports the NHS to undertake such research by funding a range of infrastructure facilities. One component of that infrastructure, established in the same year, is the NIHR Clinical Research Network (CRN) which aims to make it possible for patients and health professionals to participate in relevant research. More details of how the CRN operates can be found in section 3.3.

In the context of increased scrutiny of public sector spending, in 2016 the CRN commissioned KPMG to undertake an analysis of the impact of CRN-supported clinical research activity, in particular the delivery of studies on the CRN Portfolio[19] of clinical research studies, referred to in this report as the ‘CRN Portfolio’, and the value delivered from this. The aim of the study was to improve the CRN’s evidence base in relation to the impact of its activities.[20]

In particular, the CRN asked KPMG to assess:

01
the overall economic contribution associated with the CRN Portfolio of clinical research studies, measured in terms of gross value added[21] (GVA) and full time equivalent (FTE) employment

02
the monetary value to the NHS resulting from delivery of commercial clinical research, specifically the direct cost savings associated with pharmaceutical products being provided free of charge by sponsor companies during clinical trials and the commercial income payments to NHS Trusts for the delivery of clinical studies

03
the wider impacts in the clinical research market generated by the CRN’s activities and contributions made by the CRN, such as through its provision of study support and its database of study-level data
KPMG’s 2016 report estimated that in financial year (FY) 2014/15, CRN-supported clinical research activity generated £2.4 billion of gross value added (GVA) and almost 39,500 jobs in England. In addition to the economic impact of clinical research activity, we estimated the monetary impacts to the NHS resulting from additional revenues and cost savings, totalling an estimated £192 million. The report also identified a range of wider impacts stemming from the activity of the NIHR CRN including more efficient delivery of clinical research and increased reach of clinical research across England.

Scope of this report

In order to update the 2016 results, in November 2018 the CRN commissioned KPMG to update the 2016 analysis to assess the impact and value of its activity from FY 2016/17 to FY 2018/19.

As in our 2016 report, our study focuses on the impacts generated through the delivery of clinical research, rather the outcomes of the research itself (i.e. it does not include any health impacts associated with any new treatment pathways, drugs or medical equipment developed as a result of the clinical research conducted). While the CRN facilitates the realisation of these important impacts, for example through its role in study set up and delivery support, it does not directly influence the types of clinical research that are undertaken on its portfolio of studies.

In addition, our quantitative analysis of the contribution of CRN-supported clinical research activity, in terms of GVA and employment impacts and the monetary impact to the NHS, assesses these in gross terms due to a lack of robust evidence available to estimate the extent to which this activity would continue to be delivered in the absence of the CRN.

However, when assessing the wider impacts associated with the CRN’s activity, our qualitative analysis includes an assessment of additionality i.e. what the CRN’s activities contribute over and above what the clinical research market would deliver in its absence.

In this report we update the quantitative analysis carried out in 2016 based on the latest available financial and performance data from the CRN and its stakeholders. We also explore the wider value of the NIHR CRN through qualitative interviews to supplement and update the qualitative analysis carried out in 2016.

Analytical approach and sources of data

Our impact assessment has been conducted in line with the approach used in our 2016 report, and in accordance with the UK Government recognised appraisal methodologies set out in HM Treasury’s Green Book.

Full details of our approach to the analysis are set out in section 4. As part of our analysis we have drawn on a range of primary and secondary data sources. These are summarised below, and set out in full in section 4.5:

- financial and management data received from the CRN;
- study level information provided by the CRN and sources from the CRN Portfolio;
- financial data relating to commercial study income, provided by NHS Trusts and LCRNs;
- supplementary financial and performance data provided by pharmaceutical companies;
- information and insights gathered through interviews with sponsor companies, CROs, charities, and principal investigators;
- publically available data, including from the Office for National Statistics (ONS), Association of British Pharmaceutical Industry; and the UK Clinical Research Collaboration (UKCRC);
- data from drug databases including Zenrx and eMC databases.
Report structure

The following sections of this report are structured as follows:

— In section 3 we set out the context for this report, including changes to the clinical research market over recent years and the role of Government and the CRN in the clinical research landscape.

— In section 4 we set out our approach to our analysis and the framework we have applied to assessing the impact and value of the CRN, including sources of data used and the limitations of our analysis.

— In section 5 we present our findings in relation to the economic and monetary contribution of CRN-supported clinical research activity, comprising:
  - the GVA and employment impacts associated with commercial and non-commercial clinical research activities supported by the CRN; and
  - the monetary impacts associated with the commercial income payments to the NHS Trusts for the delivery of clinical studies and costs savings to the NHS associated with pharmaceutical products being provided free of charge by sponsor companies during CRN-supported clinical trials.

— In section 6 we present the results of our stakeholder consultation, and our findings in relation to the wider value of the CRN and the additionality of its impact within the clinical research environment (i.e. the net impact after making allowances for what would have happened in its absence).
In this section we set out the context for the report in terms of the clinical research undertaken in the UK. This includes:

- an overview of the current clinical research environment in the UK, including global clinical research trends and clinical research activity in the UK
- the case for Government intervention in the clinical research market and recent Government support for clinical research
- the role of the CRN in supporting clinical research and how it fits within the clinical research ecosystem in the UK

The current clinical research environment

In 2018, the size of the global market for clinical research is estimated to be between £33 billion and £47 billion (25) ($44 billion and $63 billion) (26) in terms of revenue, and is expected to expand to £52 billion (27) ($68.9 billion) by 2026 (28).

As shown in Figure 2 below, the number of global clinical research studies continues to rise through the years, at an average of 14% per annum. Grand View Research (29) reports that further growth in market size is expected to be driven by further innovation, technological evolution and globalisation of clinical trials.

Figure 2: Global number of clinical research studies, 2010-2018

![Figure 2: Global number of clinical research studies, 2010-2018](image-url)

Source: ClinicalTrials.gov 2019.
What is clinical research?

Clinical research refers to a type of medical and health research intended to produce knowledge valuable for the understanding of human disease, preventing and treating illness, and promoting health.\(^{29}\)

Clinical research is the final stage of medical research prior to a drug, device or procedure coming to market or being adopted. It uses the knowledge gained from basic research\(^{30}\) and preclinical research\(^{31}\) to conduct research in a clinical setting involving people as the subjects of the research. Unlike basic and preclinical research, clinical research is overseen by a clinical researcher rather than a scientific researcher.\(^{32}\)

The different stages of clinical trials are referred to as phases:

- **Phase I** is the first stage and usually involves small groups of healthy people, or sometimes patients and is primarily aimed at finding out how safe a drug is.

- **Phase II** of a trial aims to test the new drug in a larger group of people to better measure the safety and side effects, and see if the drug has a positive effect in patients.

- **Phase III** of a trial aims to find out how well the drug works, how long the effects last, and find out more about how common and serious any side effects or risks are and to compare this with existing treatments where relevant.

- **Phase IV** is carried out after a new drug has been shown to work and has been licenced to be used, and aims to find out how well the drug works when it is used more widely, the long-term risks and benefits, and more about the possible rare side effects.\(^{33}\)

Clinical research activity can also be identified as being either commercial or non-commercial:

- **Commercial research** is defined as research that is funded and sponsored by a commercial organisation, such as a pharmaceutical company or a medical device company.

- **Non-commercial studies** are initiated by non-commercial researchers. These studies are usually paid for with grant funding from charities, Government or other not-for-profit organisations. However the category of non-commercial clinical research also includes ‘investigator initiated trials’ (IITs). These are sponsored by an NHS Trust or university (which, therefore, retain the intellectual property rights for the study) but which receive funding or free pharmaceutical by a commercial company. The amount of funding provided by industry for an IIT will differ from a full commercial study.\(^{34}\)

There are three types of clinical studies: interventional, observational, and studies which are both interventional and observational.

- **Interventional studies**: patients recruited onto the studies receive interventions according to the research plan or protocol created by the investigators. The interventions can be in the form of pharmaceutical products, medical devices, procedures, or changes to recruits’ behaviours (e.g. diets).\(^{35}\)

- **Observational studies**: the health outcomes of the study’s participants are assessed according to a protocol or research plan. Contrary to interventional studies, participants do not receive specific interventions by the investigator. They may, however, receive interventions as part of their routine medical care.\(^{36}\)

- **Both interventional and observational studies**: these type of studies have both interventional and observational components.

According to data from the ONS, the UK pharmaceutical research market, of which clinical research is a part, is also expanding, but at a slower rate. Pharmaceuticals R&D expenditure in 2017 was estimated at £4.3 billion, a 6.0% year-on-year increase compared to 2016 and the highest amount of expenditure since 2011.\(^{37}\) The Office for Life Sciences\(^{38}\) reports that the UK is one of the top countries in terms of expenditure on ‘health R&D’, spending more than double many of its closest competitors from 2013 to 2015 (the latest data available), trailing only the US.

The Association of the British Pharmaceutical Industry (ABPI)\(^{39}\) reports that:

> Comparative data from the MHRA and the ABPI continue to indicate an improving and competitive performance by the UK in comparison to Europe, both in terms of clinical trial authorisations and initiation of clinical studies. Where there have been reductions in UK activity they are generally reflected by other competitor countries or by Europe as a whole.\(^{40}\)

ABPI reports that the Medicines and Healthcare products Regulatory Agency (MHRA)\(^{41}\) data for clinical study applications by phase\(^{42}\) represents a good indication of the UK performance in clinical research.
As shown in Figure 3, from 2010 there has been an increase in applications for Phase II and III trials, and, while there was a decrease in Phase I applications, there appears to be an uptick in numbers in 2017. Finally, Phase IV applications have remained relatively steady.

Research suggests that factors such as rising costs of clinical trials and difficulty in patient recruitment have led to a shift in the geographical distribution of clinical trials, with more companies choosing to operate in Eastern Europe, Latin America and Middle East.\(^{43}\)

There is evidence\(^{45}\) in the literature that the majority of clinical trials continue to be concentrated in high-income countries, but low and middle-income countries register the highest annual growth rates.

As illustrated in Table 1, North America leads global clinical research, with about 40% of clinical trials conducted just in the United States, while European countries conduct approximately 28% of global clinical research.

In terms of number of clinical trials, the UK remains competitive against other European countries, trailing only France and Germany overall, and leading its European competitors in Phase I clinical trials. The UK Government’s Life Sciences Sector Deal 2\(^{46}\) reports that the UK ranks second globally for commercial Phase I studies, trailing the US.\(^{47}\) This supports the expenditure data referred to above.

<table>
<thead>
<tr>
<th>Region</th>
<th>Proportion of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>44%</td>
</tr>
<tr>
<td>Europe</td>
<td>28%</td>
</tr>
<tr>
<td>East Asia</td>
<td>11%</td>
</tr>
<tr>
<td>Middle East</td>
<td>4%</td>
</tr>
<tr>
<td>Africa</td>
<td>3%</td>
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<tr>
<td>South America</td>
<td>3%</td>
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<tr>
<td>North Asia</td>
<td>2%</td>
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<td>Pacifica</td>
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<tr>
<td>South Asia</td>
<td>2%</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>2%</td>
</tr>
<tr>
<td>Central America</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: ClinicalTrials.gov (2019)
However, recent data suggests the UK’s competitiveness may be weakening. In 2018, the Office for Life Sciences published a series of competitiveness indicators, reporting UK’s performance in life sciences compared to a range of comparator countries.\(^{(48)}\).

These indicators show that:

- The UK’s share of recruits participating onto global studies in 2016 was 3.1%, compared with 4.2% in 2015.
- In 2016, the UK had the fourth highest share of patients recruited into global studies, trailing the USA, Germany and Canada.
- In 2017, 28% of EU clinical trials applications came from the UK, compared with 29% in 2016.

**Government support for clinical research**

As evidenced in our 2016 report\(^{(49)}\), there is evidence of market failures in the provision of clinical research, in the form of positive externalities, co-ordination problems, and imperfect information.

The most significant challenges in the clinical research market identified in our 2016 report were challenges to study start-up, information asymmetries regarding study feasibility, barriers to collaboration amongst stakeholders and positive spillovers from clinical research, in the form of positive health benefits. This creates a case for Government intervention in the UK clinical research environment in order to minimise these challenges faced by organisations when operating in the sector, and in recognition of the wider spillover benefits resulting from clinical research activity.

The CRN was established in 2006 with the intention of helping the UK to overcome these challenges, maintain the UK’s competitiveness in clinical research, and ensure that the full benefits of clinical research are realised. Details on the CRN and its activities are provided in section 3.3.

More recently, in 2017 the Life Sciences Industry Strategy was released, providing recommendations from industry, academia, charity, and research organisations to the Government on the long term success of the life sciences sector.\(^{(50)}\) Among the recommendations detailed in the Strategy, there is emphasis on the importance of reinforcing the UK science offering, including a further improvement of the UK’s clinical trials capabilities.
The Strategy reports the following strategic goal:

'To support a 50% increase in the number of clinical trials over the next five years and a growing proportion of change of practice and trials with novel methodology over the next five years.'

In order to achieve this strategic goal, the Strategy recommends the UK should focus on designing novel trials and ensuring it remains ‘at the cutting edge of translational research’.

In response to the Life Sciences Industrial Strategy, at the end of 2017 the first Life Sciences Sector Deal was released. The Deal sets out the following commitments of Government to strengthen the UK clinical research environment:(51)

— to invest £950 million through the NIHR, in research infrastructure in the NHS, starting from April 2017 for the following five years; and

— to review the Health Research Authority (HRA) research systems so as to integrate and optimise approval processes for clinical trials and reduce the burden on NHS Trust R&D departments.

The Second Sector Deal, released in December 2018, made a number of new Government and industry commitments in relation to UK clinical research, as well as highlighting the actions taken by Government since the release of the First Sector Deal(52):

— award of more than £950 million of NIHR investment in NHS research infrastructure;

— implementation of a new national model to manage excess treatment costs in non-commercial research;

— implementation of a simplifying processes for NHS research through a standard costing methodology, a model site agreement in the NHS standard contract and began implementing a single contract review to increase transparency and reduce variation;

— removal the 70 day benchmark for clinical trials in favour of the publication of accurate performance data using a standard national framework;

— increased uptake of the Clinical Practice Research Datalink in GP practices in England by almost 30% since the end of 2017; and

— improvement in the HRA and MHRA approvals process by offering a combined approach.(53)

The Government committed to further improve the clinical research environment, specifically the speed and efficiency of clinical trials, by:

— establishing five centres for late phase commercial research in 2019 and 2020, with the intention to increase the NHS’s capacity to deliver research and to enable patients’ early access to innovation;

— exploring opportunities to recognise and incentivise NHS Trusts and GP practices acting as participant identification centres;

— improving research set-up timelines by converging HRA approval to the one specified in the EU Clinical Trials Regulation; and

— addressing challenges in NHS workforce resourcing required to deliver commercial clinical trials.
The role of the CRN in delivering
clinical research in England

In addition to, and underlying, the recent
Government support for clinical research detailed
out in the section above, lies the CRN which
aims to support the delivery of high-quality
clinical research in the NHS. Its purpose is to
provide efficient and effective support for the
initiation and delivery of funded research in the
NHS.

The NIHR CRN directly supports clinical research
in England only(54). The devolved administrations
provide their own clinical research infrastructure
together with the Health and Care Research Wales, the Health
and Social Care R&D Office in Northern Ireland and
Scottish Government Chief Scientist Office(55).

The scope of this study is therefore limited to
the impacts of clinical research activity
supported by the NIHR CRN – referred to in this
study simply as the CRN or the ‘Network’.

In terms of structure, the CRN comprises:

— The CRN Coordinating Centre (CRN CC),
which manages the CRN on behalf of the
Department of Health and Social Care
(DHSC); and

— 15 Local Clinical Research Networks (LCRNs)
which directly coordinate and support the
delivery of research across 30 different
clinical specialties in England, grouped into
divisions, overseen by the CRN CC(56). Each
specialty area has a corresponding National
Specialty Group, led by at least one National
Specialty Lead.

These are collectively referred to as the CRN in
this report and work together with shared
principles, values and behaviours. The CRN
funds research posts in the NHS, provides
training to front-line staff, provides funding to
meet the costs of some research facilities as
well as providing practical help in identifying and
recruiting patients.

The CRN directly supports the delivery of high-
quality clinical research in England by(57):

— meeting the study service support costs of
NHS organisations that support non-
commercial clinical research;

— meeting the costs of any NHS facilities used
in the course of non-commercial research;

— providing specialist training to individuals
involved in clinical research in England; and

— providing a ‘Study Support Service’ which
aims to help researchers and the life
sciences industry plan, set up and deliver
high quality research to time and patient
recruitment targets in both the NHS and
in the wider public health and social
care environment.

The CRN also has a wider role in helping to
reduce the barriers to both non-commercial and
commercial clinical research including(58):

— increasing patient and public involvement
and engagement in clinical research;

— engaging with partners, for example charities
and industry organisations, to streamline
administrative procedures relating to
clinical research;

— engaging the NHS in research and promoting
a research culture in the NHS;

— reducing the duplication of effort, for
example through the development of a
consistent commercial costing template
and a model contract for use between
NHS Trusts;

— promoting England and the UK as a place to
undertake clinical research; and

— providing ‘early feedback’ which helps
researchers determine if their study can be
successfully delivered in England;

— engaging with all clinical research
stakeholders to understand and best
meet their needs in the delivery of
clinical research.

These all have the objective of increasing the
volume of, and value generated from, clinical
research undertaken in England.
In terms of trends in clinical research activity supported by the CRN, Figure 5 and Figure 6 illustrate that over the last five years there has been an increase in the number of non-commercial and commercial studies on the CRN Portfolio.

As detailed in the graphs, there is a difference between non-commercial and commercial studies in terms of the proportion of interventional and observational studies. The non-commercial portfolio is made up of more observational studies than interventional, and this difference is more marked when looking at numbers of recruits. Conversely, the commercial portfolio is primarily made up of interventional studies.

In terms of recruits there has been an increase in the number of patients recruited onto non-commercial studies, with a particular peak in commercial recruitment in 2017/18 due to a couple of very large observational primary care influenza studies.
# How the CRN fits within the clinical research ecosystem

The CRN infrastructure and support exists within an extensive and established clinical research eco-system in England, involving a large number of stakeholders.

For the purposes of this study, we have grouped these stakeholders into the following categories:

## Role of clinical research stakeholders in England

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
</table>
| **NHS Trusts and other care providers**            | - Clinical research on the CRN Portfolio tends to be delivered through NHS Trusts and, increasingly, within wider health care settings, for example GP surgeries, community pharmacists and care homes.  
  - Delivery of non-commercial clinical research is carried out by LCRN staff, funded by DHSC via the CRN.  
  - Commercial research is fully funded by commercial sponsors and generates supplementary income for NHS Trusts and other care providers, which funds additional NHS staff to support the delivery of commercial clinical research. |
| **Universities and academic clinical trials units (CTUs)** | - Universities and academic CTUs receive grant funding to design and undertake non-commercial clinical studies. Studies that are part of the CRN Portfolio tend to be delivered through NHS Trusts and in wider health care settings, by health care professionals funded by the LCRNs. |
| **Charities and other non-commercial funders**      | - Charities involved in clinical research fund doctors and scientists in hospitals, universities and research institutes across the UK to undertake clinical research.  
  - Grant funding is also provided by publically funded organisations including the NIHR and the Medical Research Council, and some international organisations and Governments.  
  - For studies that are part of the CRN Portfolio, the costs of delivering these studies would be borne by the LCRNs. |
| **Life sciences sponsor companies and Contract Research Organisations** | - Pharmaceutical and medical device companies fund large amounts of clinical research in England. These are known as commercial studies, and although they can benefit from some CRN services, the costs of the treatment as part of the trial are fully borne by the sponsor company through payments to the NHS Trusts involved.  
  - In some instances life sciences companies will employ Contract Research Organisations to provide research services, from early stage biopharmaceutical development to preclinical research, clinical research and clinical trial management. |

Source: NIHR CRN.
The framework for assessing the CRN’s impact and value

In this section we detail our framework for assessing the impact and value of CRN-supported clinical research, including:

- the scope of our study
- the high level approach taken in our quantified analysis of economic impacts and monetary value to NHS Trusts
- the sources of data used
- the limitations of our analysis
- the approach taken to our stakeholder engagement

**Scope of the study**

Our analysis relates to the economic impacts generated in the UK from CRN-supported clinical research activity over the financial years (FYs) 2016/17, 2017/18 and 2018/19 and the value added of the CRN in supporting these.

Our analysis focuses on the impacts generated through the delivery of clinical research, rather than the outcomes of the research itself (i.e., it does not include any health impacts associated with any new treatment pathways, drugs or medical equipment developed as a result of the clinical research conducted).

The framework that we have applied to assess the contribution of the CRN in the UK captures a wide range of impacts, reflecting the breadth of ways in which the CRN contributes to the clinical research environment and economy. The study does not attempt to measure all possible economic and social impacts, positive and negative, that arise from the CRN’s role in supporting clinical research. It focuses on the following areas of impact, agreed with CRN at the outset of the study:

1. the overall economic contribution associated with CRN-supported clinical research activity (presented in section 5.1), measured in terms of gross value added (GVA) and employment
2. the monetary value to the NHS resulting from delivery of commercial clinical research on the CRN Portfolio, specifically the direct cost savings associated with pharmaceutical products being provided free of charge by sponsor companies during clinical trials and the commercial income payments to NHS Trusts for the delivery of clinical studies (presented in section 5.2)
3. the wider impacts in the clinical research market generated by the CRN's activities and contributions made by the CRN, such as through its provision of study support and its database of study-level data

KPMG’s quantitative analysis of the GVA and employment impacts of CRN-supported clinical research, and of the monetary impact for the NHS, assesses these contributions in gross terms due to a lack of robust evidence available to estimate the extent to which this activity would continue to be delivered in the absence of the CRN. However, when assessing the wider impacts associated with the CRN’s activity, our qualitative analysis includes an assessment of additionality i.e., what the CRN’s activities contribute over and above what the clinical research market would deliver in its absence.

Our impact assessment has been conducted in line with the approach used in our 2016 report, and in accordance with the UK Government recognised appraisal methodologies set out in HM Treasury’s Green Book.

In the following section we detail our approach to assessing each of the specific areas of contribution generated by the CRN and by CRN-supported clinical research.
Approach to estimating the economic contribution of CRN-supported clinical research activity

Our analysis of the economic impact of CRN-supported clinical research activity looks at impacts generated by the following groups of stakeholders:

**CRN CC support:**
- CRN CC, which supports both commercial and non-commercial research on the CRN Portfolio.

**Non-commercial research:**
- LCRN, which supports the delivery of non-commercial research on the CRN Portfolio in NHS Trusts and other care providers; and
- Universities (including academic CTUs) and principal investigators which initiate non-commercial clinical research funded by charities and other non-commercial funders.

**Commercial research:**
- Life sciences industry sponsor companies and CROs which initiate and fund commercial clinical research; and
- NHS Trusts and other care providers which deliver commercial clinical research on the CRN Portfolio, funded by the life sciences industry.

Approach to estimating GVA

In our analysis, one of the measures of economic contribution used to capture the impact of CRN-supported clinical research activity is the total GVA contribution.

GVA measures the contribution to the economy of an individual producer, industry or sector, net of intermediate consumption (for example goods and services that are used in the production process). It is a measure of the economic value of the activity.\(^{(64)}\)

The clinical research activity supported by the CRN directly adds GVA to the UK economy through the employment it generates within NHS Trusts\(^{(65)}\) and other care providers, universities, sponsor companies, CROs and within the CRN itself, and through the inputs (e.g. products and services) used to deliver clinical research activity. We estimate the economic impact generated through each of these stakeholders in delivering CRN-supported clinical research.

The GVA contribution of the CRN-supported clinical research activity is generated via three main routes:

- **Direct:** the first round effects of the activity of those directly involved in the delivery of clinical research.
- **Indirect\(^{(66)}\):** the second round effects through the activity and output supported in the supply chain. To deliver clinical research studies a range of products and services are required which, for example may include supplies of medical equipment and provision of management information systems in the case of NHS Trusts and care providers. This supply chain procurement generates economic activity both at the direct supplier as well as through each of their individual supply chains, thereby multiplying the economic activity through the economy.
- **Induced:** the multiplier effects that arise in the UK as a result of direct and indirect employees spending a proportion of their wages linked to the clinical research activity in the UK economy. This spending generates additional economic activity for businesses from which these employees buy goods and services and through those businesses’ wider supply chains.\(^{(67)}\)

The direct GVA impacts are measured using the income approach to calculation of GVA.

The indirect and induced impacts are assessed based on an input-output modelling approach. Our analysis uses ONS input-output tables and the Type I and Type II multipliers derived from these.\(^{(68)}\)

These tables show, in matrix form, the inter-linkages between sectors of the economy in terms of the value of goods and services (inputs) that are required to produce each unit of the output in given sectors of the economy.

Approach to estimating employment

Our analysis also captures the employment generated as a result of the clinical research being undertaken in the UK.

These employment impacts are also assessed in direct, indirect and induced terms:

- **Direct:** staff are employed by different stakeholders to set-up and run the clinical research activity.
- **Indirect:** the additional economic activity generated by the clinical research activity in the supply chain also results in additional domestic employment.
— **Induced:** the employment supported through the additional economic activity resulting from the direct and indirect employees spending a proportion of their earnings.

In our analysis we report employment in full-time equivalent (FTE) terms. This adjusts part time or temporary staff into an annual full-time equivalent based on the proportion of full-time hours worked over a year.

**Approach to estimating the monetary value to the NHS of CRN-supported commercial clinical research activity**

As a result of supporting commercial clinical research studies on the CRN Portfolio, the NHS secures additional revenues and benefits from direct cost savings.

These impacts arise through the payments made by sponsor companies and CROs to NHS Trusts for industry-sponsored studies and the direct cost savings to the NHS that arise as a result of the pharmaceutical products trialled provided free by sponsor companies, where these replace the standard treatment which would be funded by the NHS. We quantify these as part of this study.

**Approach to estimating payments to NHS Trusts for commercial clinical research**

Clinical research is often commissioned by a sponsor company, known as commercial research.

In such studies, NHS research sites receive payments from the industry sponsor companies to fully cover the costs incurred in the process of delivering clinical research. These payments, referred to as ‘per patient payments', represent a significant income stream for the NHS Trusts. Whilst this income stream offsets costs incurred for the delivery of clinical research, it enables sites to undertake more clinical research, without there being an opportunity cost to other NHS delivery. In addition, the payments include a ‘capacity building’ element, set at 20% of costs, which is intended to be used to build sustainable research and innovation capacity to the benefit of all research partners. (69)

At present, there is limited data held centrally by the CRN relating to the per-patient payments made to NHS Trusts for conducting commercial clinical research activity. Therefore, to estimate these payments we collected data directly from two NHS Trusts, three LCRNs, the CRN CC, and one sponsor company. We obtained payment data, on a per patient basis, for a total of 660 site level payments for commercial studies on the CRN Portfolio.

This was used to both understand the overall level of payments made and to provide further insights into how these vary dependent on the type of study supported by the NHS.

A key limitation of our approach is the limited sample of stakeholders from which we were able to obtain data. While we achieved a sample of 660 site level per patient payment values(70) our sample was limited by the small sample of CRN stakeholders from whom we were able to obtain patient payments data. Therefore, the sample and results may not be fully representative of studies on the CRN Portfolio. Our analysis of the distribution across clinical specialty and geography of our sample identified some differences in coverage compared to the overall Portfolio of studies. To mitigate the impact of this when scaling up our analysis, we weighted our results based on the clinical specialty of the study and the region of England in which the study was conducted.

As well as payments for commercial studies, NHS Trusts may receive some industry funding for IITs.(71) However, funding for IITs will differ from that of fully commercial studies and payments are not consistently recorded. For this reason payments relating to these studies have been excluded from our analysis, meaning that our results may underestimate the total value of per patient payments.

Full details of the approach undertaken are provided in Appendix A1.2.1.

**Approach to estimating cost savings to the NHS for commercial clinical research**

Commercial clinical research studies that test pharmaceutical products provide NHS Trusts and patients with free access to these pharmaceuticals and treatments. This means the NHS Trust delivering the research does not incur the cost of the standard treatment that the patient would have otherwise received (in the absence of the study). This represents a direct cost saving to the NHS.

It is possible that in some instances, if the trial drug is ineffective, the standard treatment may need to be administered following the study anyway. However, we would expect this to occur in the minority of cases.

Furthermore, there will be instances where commercial clinical research studies deliver value beyond this cost saving. Some studies provide NHS Trusts and patients with free access to more expensive pharmaceuticals that may be licensed in other indications, but are now being trialled in a new disease-area. In the absence of the study, patients would not have access to these more expensive and potentially effective pharmaceuticals.
In this case, the value to the NHS stretches beyond the cost saving of standard treatment to the additional value of using these effective pharmaceuticals.

Due to data limitations, our analysis is restricted to the pharmaceutical cost savings in the cases where pharmaceuticals are known to be provided free of charge and replace the standard treatment.

To estimate the costs savings in instances where the trial drug replaces the standard treatment, we obtained data and information from the CRN Portfolio for a random sample of commercial, interventional studies which have been undertaken since FY 2016/17. Information was extracted from protocol documents provided in the CRN CC database relating to the standard treatment that would otherwise have been provided to the patient and information relating to the standard dosage and pricing of these treatments was sourced from external databases.\(^{(72)}\)

We have not included cost savings where no standard treatment is documented. In these instances there would likely be some treatment provided,\(^{(72)}\) and therefore when this is replaced by the trial drug, this would also represent a cost saving. Due to the lack of a standard treatment to base any estimated cost savings on, such potential savings have been excluded from the analysis.

Furthermore, although our analysis focuses on pharmaceutical cost savings for pharmaceutical studies, there would also be a cost saving for the NHS associated with the provision and use of medical devices in equivalent medical device studies.

Due to a lack of available data from public sources on the cost of standard treatments using medical devices on a per patient basis, we were not able to quantify these savings in the study.

Finally, as noted above, NHS Trusts may receive free pharmaceutical products for some IIITs.\(^{(74)}\) However, detail on this provision is not consistently recorded. For this reason any cost savings relating to these studies have been excluded from our analysis.

As a result of these limitations, our estimates of the direct cost savings to the NHS associated with the free of charge provision of pharmaceutical products for use in clinical trials may underestimate the full scope of potential savings.

Full details of our approach taken are reported in Appendix A1.2.2.

**Approach to assessing the added value of the CRN**

The impacts quantified in this report represent the gross impact of the clinical research supported by the CRN. That is, it does not account for the extent to which they would occur in the absence of the CRN. For this we need to consider the additionality of these impacts.

Additionality\(^{(75)}\) considers the net, rather than gross, impact after making allowances for what would have happened in the absence of Government support. As set out in HM Treasury’s Green Book,\(^{(76)}\) consideration of additionality is key to economic appraisals.

The additionality of the CRN within the clinical research market is not easily quantified. Directly capturing what the clinical research market would look like in the absence of the CRN support is not possible within the scope of the study because of the multitude of factors impacting the UK clinical research market since the CRN was established, including regulatory changes in the UK and European clinical research environment, and, currently, the UK planned exit from the EU. This not only presents a challenge in our quantitative assessment, but as also noted in our 2016 report, stakeholders we spoke with also commented that making a judgement about what the clinical research landscape would look like in the absence of the CRN presented a difficulty, as it is such an established infrastructure.

While the number of studies on the CRN Portfolio has generally increased over time (as seen in Figure 5 and Figure 6 in section 3.3), it is difficult to assess whether these studies would have been undertaken anyway, in the same way and with the same outcomes. Any changes in the level of clinical research activity undertaken in the UK are likely to be driven, at least in part, by external factors, and should not be attributed in full to the CRN.

In the absence of a robust counterfactual against which to compare impact, our analysis of the added value of the CRN draws primarily on qualitative stakeholder consultation, combined with specific examples of how the CRN generates value.

**Approach to stakeholder consultation**

Over the period February 2019 to April 2019 we consulted with 13 stakeholders including sponsor companies, CROs, charities and principal investigators. Stakeholders were selected by the CRN in order to provide views from a cross-section of stakeholders, for example selecting stakeholders involved in different aspects of clinical research and of different sizes.
All had some prior engagement with the CRN, as the CRN felt that these would be more responsive and able to provide relevant viewpoints in relation to the support of the CRN. However, due to the relatively small number of stakeholders spoken to, and the self-selection of these, the views and insights gathered through the stakeholder interviews may not be representative of the views of all clinical research stakeholders in England. Rather, they are intended to provide a range of insights into the nature of impacts generated by the CRN.

Our consultation took the form of semi-structured telephone interviews lasting between 45-60 minutes each. As part of the interviews we sought views on:

— the current UK clinical research environment and recent trends in the level of the stakeholder’s clinical research activity, for example based on number or studies or value of investment;

— the nature of the stakeholder’s role in clinical research and the extent to which it engages with the CRN and uses its services;

— the ways in which the CRN impacts the stakeholders’ clinical research activities and the nature of these impacts;

— how the stakeholder’s clinical research activity in the UK would differ if the CRN did not exist;

— how the overall clinical research landscape in the UK would differ if the CRN did not exist;

— the ways in which the CRN could deliver more value going forward.

The semi-structured nature of the interviews enabled us to explore specific responses by stakeholders to the issues listed above in more depth where required, in particular where we identified common themes emerging among stakeholders, identified in section 3.4.

**Data sources and limitations**

**Data sources**

To conduct our analysis, using the approaches detailed above and in Appendix 1, we relied on a wide range of data and information sources.

In some areas of analysis, for example estimating the economic impact of the CRN itself, we were able to obtain granular data which enabled a bottom-up approach to the analysis. However in other areas the data and information available to us was more limited and our analytical approach had to be adapted to reflect this.

For example, in order to estimate the economic contribution resulting from investment in clinical research by sponsor companies and CROs we were unable to obtain the required data from sponsor companies and CROs, due to a combination of confidentiality issues and the data not being held at the level of granularity required.

A description of the available data and approach used for the different areas of the analysis is detailed in Table 2.

**Data limitations**

Whilst we sought to obtain the most appropriate and up to date data to inform our analysis, the following limitations apply and should be considered when interpreting the results:

1. CRN CC and LCRN data on FY 2018/19 staff costs and full-time equivalents (FTEs) are provisional. This data is used in the estimation of GVA and employment generated by non-commercial clinical research in NHS Trusts and the activity of the CRN CC. Therefore, FY 2018/19 estimates are provisional and may be subject to change. Our results may either over- or under-estimate the actual impacts in 2018/19.

2. The latest available ONS data on R&D expenditure in the pharmaceutical sector, and data on non-commercial grants from AMRC, was from 2017. Therefore, in these cases, figures for 2018 are based on 2017 data uplifted for inflation. In addition, the ONS data relates to calendar year rather than financial year, therefore it does not directly relate to the same time period as for the rest of the analysis. Nonetheless, as the data does not fluctuate significantly year on year, we consider the estimates to provide a reasonable proxy for the equivalent for the financial year.

3. Due to incomplete data on the dates of studies for which we received per patient payment data we were unable to estimate the average per patient payment on an annual basis across the time period. Our analysis is therefore based on a constant value for this over the three years. The changes in the estimated impact of commercial research activity in NHS Trusts are therefore driven by changes in total recruitment onto commercial studies over this period.
### Table 2: Sources of data

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Stakeholders</th>
<th>Summary of evidence gathered</th>
</tr>
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<tbody>
<tr>
<td>Economic impact in terms of GVA and employment</td>
<td>CRN Coordinating Centre (CC)</td>
<td>— Data on the number of FTEs employed in the CRN CC and the associated staff costs, sourced from the CRN CC.</td>
</tr>
<tr>
<td></td>
<td>NHS Trusts</td>
<td>— Data on the number of FTEs employed in the LCRNs and the associated staff costs, sourced from the CRN CC.</td>
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<td></td>
<td></td>
<td>— Data on the value of commercial per-patient payments received by NHS Trusts from sponsor companies and CROs, sourced from sample of NHS Trusts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— Data on the number of patients recruited onto commercial studies over the period between FY 2016/17 and FY 2018/19, received from the CRN CC.</td>
</tr>
<tr>
<td>Sponsor companies and CROs</td>
<td></td>
<td>— Data on UK R&amp;D expenditure by the pharmaceutical sector, sourced from the ONS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— The percentage of total UK R&amp;D pharmaceutical expenditure that is undertaken in England, sourced from the ONS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— The proportion of pharmaceutical R&amp;D that is spent on clinical research, sourced from ABPI.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— The proportion of studies on the CRN Portfolio that are categorised as ‘device’ studies, sourced from the CRN.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— The proportion of commercial clinical research activity put through the CRN Portfolio, sourced from a sample of NHS Trusts.</td>
</tr>
<tr>
<td>Charities and universities</td>
<td></td>
<td>— Data on total grant funding for medical research in the UK, sourced from the AMRC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— Data on the breakdown of health research funding in the UK by types of health research activity and source of funding, sourced from the UKCRC. This provides us with the proportion of total UK grant funding that relates to clinical research activity in England.</td>
</tr>
<tr>
<td>Payments to NHS Trusts</td>
<td>NHS Trusts</td>
<td>— Data on per-patient payments made to NHS Trusts for conducting commercial studies on the CRN Portfolio, sourced from the CRN CC, LCRNs, NHS Trusts, and a sponsor company.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— Data on the number of patients recruited onto commercial studies on the CRN Portfolio, sourced from the CRN CC.</td>
</tr>
<tr>
<td>Cost savings to the NHS</td>
<td>CRN CC</td>
<td>— Information on study protocols and the standard treatment from individual study protocols sourced from the CRN Central Portfolio Management System (CPMS) database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— Data and information on drug dosages and prices for the standard treatments was sourced from (respectively) the EMC database and Zenrx database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— Data on the number of participants recruited onto commercial interventional drug studies included in the CRN Portfolio (e.g. design type, recruitment numbers and dates), sourced from the CRN CC.</td>
</tr>
<tr>
<td>Wider contributions</td>
<td>Sponsor companies, CROs, principal investigator and CRN CC staff</td>
<td>We interviewed thirteen stakeholders (4 sponsor companies, 2 CROs, 3 charities, 3 principal investigators, one CRN CC employee) to obtain more in-depth insights on:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— the main ways the CRN adds value in terms of clinical research influenced them and the clinical research market;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>— what the clinical trial landscape would look like in the absence of the CRN.</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.
The economic and monetary contribution of CRN-supported clinical research activity

In this section, we present the results of our analysis relating to:

— the GVA and employment impacts associated with commercial and non-commercial clinical research activities supported by the CRN; and

— the monetary impacts associated with the commercial income payments to the NHS Trusts for the delivery of clinical studies and costs savings to the NHS associated with pharmaceutical products being provided free of charge by sponsor companies during CRN-supported clinical trials.

Note, in some cases results may not sum to the total, due to rounding.

GVA and employment impacts

As explained in section 4.2.1, in our analysis we estimate the economic contribution of the CRN-supported clinical research activity and the activities of the CRN itself to the UK, measured in terms of direct, indirect and induced GVA and employment.

We estimate this impact across the CRN and clinical research stakeholders including NHS Trusts, charities, sponsor companies, CROs and universities. The role of each of these is detailed in section 3.4.

In total, we estimate that CRN supported commercial and non-commercial clinical research activity generated a total of £8 billion in GVA and supported approximately 47,467 FTE jobs in England in the period from the beginning of financial year FY 2016/17 to end FY 2018/19.

Figure 7: Total GVA and employment

Source: KPMG analysis.
The total GVA impact from FY 2016/17 to end FY 2018/19 comprises:

- £2.7 billion in GVA and 18,935 jobs associated with non-commercial activity, undertaken by NHS Trusts, and charities and universities;

- £5.2 billion in GVA and 28,113 jobs due to commercial activity; undertaken by sponsor companies and CROs, and NHS Trusts; and

- £0.08 billion in GVA and 420 jobs due to the CRN CC activities, which supports both commercial and non-commercial research.

The breakdown of impacts within each of these categories of activity is provided in the sections below.

**The economic impact of non-commercial research activity supported by the CRN**

We estimate the total economic impact generated by non-commercial clinical research activity on the CRN Portfolio over the last three years, to amount to £2.7 billion in terms of GVA and 18,935 FTEs.

This comprises clinical research activity funded by charities, research councils and Government. In general, this clinical research is initiated by universities, academic clinical trials units, NHS principal investigators or in some cases charities themselves. The delivery of clinical research tends to be carried out by research delivery staff within NHS Trusts funded by the LCRN.

The economic contribution generated by non-commercial clinical research on the CRN Portfolio funded by non-commercial grants is estimated to be larger than the contribution generated by the delivery of non-commercial clinical research by NHS Trusts. Over the period from FY 2016/17 to 2018/19 the total GVA contribution generated by CRN-supported non-commercial clinical research activity is estimated to comprise:

- £1.6 billion of GVA from clinical research activity undertaken within universities, academic clinical trials units, NHS principal investigators and charities, funded by non-commercial grants; and

- £1.1 billion of GVA from clinical research activity in NHS Trusts in the delivery of non-commercial clinical research funded by the LCRN.

This suggests that clinical research initiation activities (e.g. study design) carried out by universities and other non-commercial partners generated larger economic impacts than the actual study delivery.

**Non-commercial grant funded clinical research**

The estimated GVA contribution from non-commercial clinical research activities supported by the CRN and funded by non-commercial grants has remained broadly constant since FY 2016/17, reaching £536 million in FY 2018/19, as shown in Figure 8 below.

![Figure 8: Estimated GVA contribution of non-commercial activity on the CRN Portfolio funded by non-commercial grants](image-url)
Estimated employment generated by clinical research activity undertaken by these stakeholders has slightly decreased in the last three years, though it increased in the most recent year, from FY 2017/18 to FY 2018/19, as shown in Table 3 below.

### Table 3: Estimated employment impact of non-commercial research activity funded by non-commercial grants

<table>
<thead>
<tr>
<th></th>
<th>Direct FTEs</th>
<th>Indirect FTEs</th>
<th>Induced FTEs</th>
<th>Total FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016/17</td>
<td>4,141</td>
<td>3,603</td>
<td>906</td>
<td>8,650</td>
</tr>
<tr>
<td>2017/18</td>
<td>3,944</td>
<td>3,431</td>
<td>862</td>
<td>8,238</td>
</tr>
<tr>
<td>2018/19</td>
<td>4,036</td>
<td>3,511</td>
<td>882</td>
<td>8,429</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.

The economic impact from non-commercial research activity funded by non-commercial grants in FY 2018/19 is higher to the one estimated for FY 2014/15 in our last study. Specifically, in FY 2014/15 we estimated the economic impact to be £382 million in GVA and 6,747 FTE jobs, while in FY 2018/19 our estimate amount to £536 million in GVA and 8,429 FTE jobs.

**Non-commercial LCRN clinical research activity**

The estimated GVA contribution from non-commercial clinical research activities supported by the CRN undertaken by NHS Trusts decreased from FY 2016/17 to FY 2017/18, from £367 million to £358 million, and it is estimated to remain at £357 million in FY 2018/19, as shown in Figure 9 below.

This decrease in direct GVA over the three years has been driven by a reduced budget for staff costs of 2.9% over this period.

Data provided by the CRN CC finance team shows that the number of direct employees in LCRNs also fell, from 8,601 to 8,123 over the period FY 2016/17 to FY 2017/18, and correspondingly the indirect and induced employment has also decreased (as shown in Table 4). This is despite the increase in both the number of non-commercial recruits and the number of non-commercial studies on the CRN Portfolio over this period.

The decline in FTE employment of 5.6% over the three years, is driven in part by the reduced budget for staff costs noted above. However, the reduction in staff costs of 2.9% only explains part of the fall in FTEs. Wage inflation(81) of 2.6% per FTE over the same period has also contributed to the reduction in FTE employment, as it would mean that the LCRN can employ fewer FTE employees with the same budget.
The economic impact of non-commercial research activity undertaken by NHS Trusts in FY 2018/19 amounts to £357 million GVA and 10,506 FTE jobs, slightly lower than our estimates from our previous report for FY 2014/15 of £396 million GVA and 11,593 FTE jobs.

The economic impact of commercial research activity supported by the CRN

Our analysis of the impact of commercial clinical research supported by the CRN includes commercial clinical research activity conducted within sponsor companies and CROs in England, as well as commercial clinical research activity undertaken by NHS Trusts.

Commercial clinical research undertaken by sponsor companies and CRN

Of the total estimated economic contribution generated through CRN-supported commercial clinical research activity over the last three years, our analysis shows that the majority of the total £4.4 billion of GVA generated and 22,412 FTEs was generated by clinical research activity within sponsor companies and CROs.

Figure 10 below shows the GVA and employment impacts associated with CRN-supported clinical research activity conducted by sponsor companies and CROs.

Our analysis indicates that the economic contribution, in terms of GVA, has remained broadly stable over the period, increasing marginally by 1% from FY 2016/17 to FY 2018/19 to reach £1.5 billion. However, over this same period, we estimate total employment has fallen slightly (by 2%) to around 22,412.

The estimated increase in GVA is consistent with the increase we have seen over this period in number of commercial recruits and number of commercial studies on the CRN Portfolio (see section 3.3), but on a smaller scale. Our analysis suggests that the growth in GVA has been held back by a decline in the return on investment associated with pharmaceutical R&D, and a smaller proportion of commercial studies being included on the CRN Portfolio in FY 2017/18 compared to FY 2018/19.[82]

The economic contribution generated by commercial clinical research activity on the CRN Portfolio conducted by sponsor companies and CROs is larger than the contribution resulting from non-commercial clinical research on the CRN Portfolio funded by non-commercial grants (see section 5.1.1). This may be due, in part, to commercial research activity on the CRN Portfolio largely consisting of interventional studies which tend to be more complex and expensive to run than observational studies, which make up the majority of non-commercial research activity on the CRN Portfolio (see section 3.3).

### Table 4: Employment impact of non-commercial research activity undertaken by NHS Trusts

<table>
<thead>
<tr>
<th></th>
<th>Direct FTEs</th>
<th>Indirect FTEs</th>
<th>Induced FTEs</th>
<th>Total FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016/17</td>
<td>8,601</td>
<td>860</td>
<td>1,663</td>
<td>11,124</td>
</tr>
<tr>
<td>2017/18</td>
<td>8,245</td>
<td>825</td>
<td>1,594</td>
<td>10,664</td>
</tr>
<tr>
<td>2018/19</td>
<td>8,123</td>
<td>812</td>
<td>1,571</td>
<td>10,506</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.
The estimated economic impact of commercial research activity undertaken by sponsor companies and CROs in FY 2018/19, of £1.5 billion in GVA and 22,412 FTE jobs, is similar to the results of our 2016 study relating to FY 2014/15, where the economic impact was estimated to be £1.5 billion in GVA and 18,336 FTE jobs.

It should be noted that in our 2016 report we treated the R&D in the pharmaceutical sector to be non-profit making, due to the fact it does not tend to generate a direct revenue, while in the current report we treat it as profit making, on the basis that for commercial companies, across an R&D portfolio, the activity would be expected to generate a return, otherwise it would not be undertaken. This would generate an additional uplift of approximately 2% to our results relative to our 2016 study. Further details on the approach used are provided in Appendix A1.1.3.

Commercial clinical research undertaken by NHS Trusts

Commercial clinical research activity is not undertaken exclusively by sponsor companies and CROs. NHS Trusts participate in commercial research activity by delivering clinical trials for sponsor companies and CROs. Sponsor companies fund this research by providing payments to NHS Trusts based on the study design and the number of patients recruited onto the study.

Our analysis shows that the GVA contribution of commercial clinical research activity supported by the CRN and undertaken by NHS Trusts increased from FY 2016/17 to FY 2018/19 from £231 million to £318 million.

Source: KPMG analysis.
Similarly, estimated employment followed the same trend with total employment increasing from FYs 2016/17 to 2018/19.

We estimated that commercial clinical research activity delivered by NHS Trusts, and included on the CRN Portfolio, generated a total of £318 million in GVA and total employment of 5,701 FTEs, in the UK in FY 2018/19. This is a significant increase to the estimated economic impact for FY 2014/15 presented in our late report, of £137 million GVA and 2,419 FTE jobs.

The economic impact of CRN Coordinating Centre activities

In total, over the period FY 2016/17 to FY 2018/19, we estimate that the CRN CC has generated £80 million GVA and 420 FTEs though its activities supporting the delivery clinical research.

As illustrated in Figure 12, our analysis shows that since FY 2016/17 the GVA and employment generated by the CRN CC has followed an upward trend. In FY 2018/19 the estimated total GVA generated by the CRN CC, including direct, indirect and induced GVA, amounted to £28 million, compared to our estimate of £21 million for FY 2014/15.

Direct, indirect and induced FTE employment generated by the CRN CC also increased from an estimated 363 in FY 2016/17 to 420 in FY 2018/19. The CRN reports that this has been driven by two elements. First, in the last three years there have been two additional Optional Services taken up in the CRN CC contract by the DHSC: the ‘Join Dementia Research’ programme and the UK Clinical Trials Gateway (now called Be Part of Research). These optional services have increased the resource requirements of the CRN CC. Secondly, there has been move towards replacing some senior roles with more junior roles meaning higher FTE employment associated with the delivery of the same activity at the same cost.

Figure 12: Economic impact of the CRN CC activity

Source: KPMG analysis.

Monetary value to NHS Trusts of CRN-supported commercial clinical research activity

Within the scope of the study we have assessed the value of the CRN’s clinical research activity in terms of the monetary value to NHS Trusts in the form of additional revenues and direct cost savings. These are additional to the economic impacts estimated in 5.1 above.

We estimate the monetary value to NHS Trusts to total £950 million of commercial income relating to payments for commercial studies on the CRN Portfolio and £77.1 million of direct pharmaceutical cost savings across the commercial CRN Portfolio from FY 2016/17 to FY 2018/19.

In our analysis we estimate the monetary value across all relevant commercial studies on the CRN Portfolio. However, there are also studies that are initiated by non-commercial partners, but sponsored by the life sciences industry.
These studies will have the equivalent monetary value to NHS Trusts as the sponsor companies contribute in the same way as for commercial studies. However, these studies are categorised as non-commercial on the CPMS database, and there is not complete data to allow these studies to be identified. They have therefore been excluded from the analysis, meaning that our analysis may underestimate the monetary value of CRN-supported clinical research to NHS Trusts.

Details of this analysis and a breakdown of results are provided in the sections below.

**Payments to NHS Trusts**

When conducting commercial clinical trials, secondary care providers (such as NHS Trusts) and primary care providers (such as GP practices) receive income for delivering commercial clinical research. This income covers the costs of staff time used in undertaking the study, indirect costs (such as overheads) and a capacity building element, set at 20% of costs, which is ring fenced to build sustainable research and innovation capacity.(85)

Therefore, whilst some elements of the income represents compensation for the costs involved in the delivery of clinical research, the capacity building element is intended to enable sites to build sustainable research and innovation capacity to the benefit of all research partners.

Furthermore, by receiving direct payment for the clinical research they delivery NHS Trusts and other care providers can undertake more clinical research without it generating an opportunity cost in relation to NHS provision.

Our estimates show the average per patient payment over the period between FY 2016/17 and FY 2018/19 to be £9,189.

There is, however, significant variation in per patient payment values across our sample. Table 5 below shows the ‘untrimmed’ distribution of per-patient data from our sample, and the ‘trimmed 1%’ distribution, which removes the top and bottom 1% of the distribution to account for any outliers. Our analysis is based on the ‘trimmed 1%’ distribution in order to reduce the extent to which the results may be skewed by outliers. Adopting a trimming approach is consistent with the approach that was used internally by the CRN as part of the study cost analysis(86) it conducted in 2015.

### Table 5: Sample distribution of average per-patient payments, from FY 2016/17 to FY 2018/19

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Number of payments</th>
<th>Mean</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untrimmed</td>
<td>660</td>
<td>£10,036</td>
<td>£6,924</td>
<td>£0</td>
<td>£146,555</td>
<td>£13,225</td>
</tr>
<tr>
<td>Trimmed 1%</td>
<td>647</td>
<td>£9,189</td>
<td>£6,920</td>
<td>£12</td>
<td>£63,536</td>
<td>£9,363</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.

As can be seen from Table 5, the median value is below the mean, indicating the distribution has a downward skew, i.e. there is a concentration of results at the lower end of the range. The mean value is pulled upwards by a small number of study sites with very high per patient payments. Whilst these are valid figures, their representation within the sample may not reflect the proportionate representation within the overall Portfolio.
Table 6: Categorisation of clinical specialities into divisions

<table>
<thead>
<tr>
<th>Division</th>
<th>Specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 1</td>
<td>Oncology</td>
</tr>
<tr>
<td>Division 2</td>
<td>Cardiovascular Disease, Diabetes, Metabolic and Endocrine Disorders, Renal disorders, Stroke</td>
</tr>
<tr>
<td>Division 3</td>
<td>Children, Genetics, Haematology, Reproductive Health and Childbirth</td>
</tr>
<tr>
<td>Division 4</td>
<td>Dementias and Neurodegeneration, Mental Health, Neurological Disorders</td>
</tr>
<tr>
<td>Division 5</td>
<td>Dermatology, Health Services Research, Musculoskeletal Disorders, Oral and Dental Health, Primary Care, Ageing, Public Health</td>
</tr>
<tr>
<td>Division 6</td>
<td>Anaesthesia, Perioperative Medicine and Pain Management, Critical Care, Ear, Nose and Throat, Gastroenterology, Hepatology, Infection, Injuries and Emergencies, Ophthalmology, Respiratory Disorders, Surgery</td>
</tr>
</tbody>
</table>


Figure 13: Sample average per-patient payments across divisions

Assuming the per patient payments received by NHS Trusts for conducting clinical trials are representative of all commercial studies supported on the CRN Portfolio in England since FY 2016/17, scaling the average per patient payment across the CRN Portfolio (see Appendix A1.2), estimates that the total commercial revenue to NHS Trusts from FY 2016/17 to FY 2018/19 is in the region of £950 million.

As set out in Figure 14, our analysis indicates that the estimated annual commercial revenue to NHS Trust for conducting clinical trials on the CRN Portfolio has differed over the last three financial years. We estimate that the total commercial revenues increased from £257 million in FY 2016/17 to £355 million in FY 2018/19. In our analysis, this result is driven, at least in part, by both an increase in the number of commercial studies and an increase in the number of more expensive studies being carried out.

Figure 14: Estimated commercial revenue to Trusts

Studies are grouped by the CRN into divisions based on the studies’ specialities, as detailed in

Table 6. As can be seen in Figure 13 the distribution of per-patient payments varies across the 6 divisions. The highest per patient payments were received by NHS Trusts for the ‘Division 1’ studies (oncology studies) amounting to £13,143 on average. Looking at the individual specialities, the highest average per patient payments were received for Dementia and Neurodegeneration studies (£14,252) which are part of the ‘Division 4’. Other specialities recording relatively high average per patient payments are respectively Renal Disorders (£12,762), Musculoskeletal Disorders (£11,046), Ophthalmology (£10,562), and Hematology (£10,220).
The estimated per annum commercial revenues over the period between FY 2016/17 to 2018/19 are significantly higher than the one estimated for FY 2014/15 – as detailed in our 2016 report. For FY 2014/15 we estimated the commercial revenue to be £176 million. The difference in estimates is due to a lower average per-patient payment estimated for FY 2014/15 (£6,658 per patient) compared to £9,189 in FY 2018/19.

### The direct cost saving to the NHS

In addition to the commercial revenues NHS Trusts receive for conducting commercial clinical research studies, there are other monetary impacts of participating in clinical research activity. Specifically, the direct cost savings achieved through sponsor companies providing pharmaceutical products free of charge for clinical studies, where these replace the standard treatments that would otherwise have been administered.

Details of our approach to estimating these costs savings are reported in Appendix A1.3.

While our analysis estimates the direct costs savings to the NHS from the free pharmaceutical products provided, we note that commercial sponsor companies may, to some extent, recoup the costs of providing these products from future sales of the trial product or from the sale of other products to the NHS. However, we were unable to assess this as part of this study due to data availability.

Based on our analysis, over the period between FY 2016/17 and FY 2018/19, we estimate that pharmaceutical products were provided free of charge, in place of the standard treatment, in around 10% of commercial studies on the CRN Portfolio. Our estimates suggest an average pharmaceutical cost saving to the NHS in FY 2018/19, as a result of this provision, within the range of £4,143-£7,483 per patient across all specialties. As we found in our 2016 study, our latest analysis also indicates that the direct cost savings are most significant for oncology clinical research studies, with the savings estimated in the range of £5,691-£17,970 per patient over the period between FY 2016/17 and FY 2018/19. It was not possible to robustly estimate the cost savings for each individual financial year (FY 2016/17 to FY 2018/19) due to the limited sample size.

As detailed in Appendix A1.3, in order to estimate these direct cost savings we analysed information from the study protocols for commercial studies on the CRN Portfolio. Not all commercial studies result in this type of cost saving – in some cases, the study drug may be used in conjunction with the standard treatment drug so the standard treatment cost is still incurred by the NHS. In other cases, there may be standard treatment identified, so in this instance it is not possible to identify the cost saving to the NHS.

For this analysis, we consider a cost saving to occur only when the use of the study treatment drug replaces the use of the standard treatment drug. These three groups are mapped out in Figure 15 below.

### Figure 15: Groups of direct cost saving to the NHS

<table>
<thead>
<tr>
<th>Group 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No documentation on standard treatment drug.</td>
</tr>
<tr>
<td>Not possible to identify cost savings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study treatment drug used in conjunction with standard treatment drug.</td>
</tr>
<tr>
<td>No cost savings as the cost of the standard treatment is still incurred.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study treatment drug used instead of standard treatment drug.</td>
</tr>
<tr>
<td>Cost savings as the cost of the standard treatment is avoided.</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.

In order to estimate the cost savings to NHS Trusts and other care providers we conducted an equivalent exercise to the one undertaken for our 2016 study. The CRN CC provided us with the list of commercial, interventional studies open to recruitment from FY 2016/17 to FY 2018/19, and granted us access to the Portfolio. We then selected two random samples of studies to analyse: the first sample was extracted from the overall study population provided by the CRN CC team, while the second one was extracted from oncology studies population only.

Table 7 below shows the total sample considered and how studies are distributed across the treatment groups presented in Figure 15. Roughly a third of cross-specialty studies sampled, and a third of oncology studies samples were identified as Group 3, and therefore associated with a cost saving.

Table 7 below shows the total sample considered and how studies are distributed across the treatment groups presented in Figure 15. Roughly a third of cross-specialty studies sampled, and a third of oncology studies samples were identified as Group 3, and therefore associated with a cost saving.
In order to estimate the total direct cost saving across the CRN Portfolio resulting from the provision of free of charge pharmaceutical products by sponsor companies, of studies, we scaled up the estimated cost savings per patient across the CRN Portfolio. Specifically, we used the number of patients recruited onto commercial interventional drug studies in each year, and applied the proportion of these studies (31 per cent) which were of the type that resulted in a cost saving to the NHS (i.e. Group 3) to estimate the number of patients that the average cost saving should be applied to.

Based on this, we estimate that the total direct cost saving attributable to the provision of free of charge pharmaceutical products for use in clinical trials on the CRN Portfolio from FY 2016/17 to FY 2018/19 was £77.1 million.

Figure 16 illustrates the total direct saving in each individual year over this time period. The green bars represent the margin of error of our estimates. This shows that the cost savings to the NHS have increased steadily from £24.0 million in FY 2016/17 to £28.6 million in FY 2018/19. In our analysis, this result is driven by the increasing number of participants recruited onto studies providing pharmaceutical products free of charge as illustrated in Figure 16.
The added value of the CRN

Introduction to the section

As noted in section 3.4, the CRN only forms one part of the overall clinical research landscape, therefore not all the impacts generated from the clinical research activity it supports can be directly attributed to the network’s activity.

Furthermore, the channels through which the CRN impacts the economy and society extend beyond the economic and monetary impacts quantified in the previous sections.

In this section we discuss the evidence and insights identified through stakeholder consultation, relating the routes through which the CRN wider financial, economic or social value, and the additionality of its activity – that is how the CRN’s activity add value beyond what would otherwise be delivered by clinical research activity in England.

This stakeholder consultation builds upon the routes to impact and added value identified by stakeholders for our 2016 report. We have summarised below the findings of our 2016 report:

— The CRN has raised the profile of the clinical research market in the UK, which increases the likelihood of international studies being undertaken in the UK.
— The LCRN infrastructure (the ‘frontline’ staff) is integral to the delivery of clinical research, particularly for non-commercial studies.
— The CRN has improved study set-up time and processes. The pace with which recruitment can commence after study set-up was cited as a benefit of the CRN support and infrastructure.
— The CRN enables greater access for sites and patients. Sponsor companies pointed out the CRN introduced them to sites they otherwise would not have reached out to.
— The independence of the Coordinating Centre to monitor performance and allocate funding is a benefit for the market and provided a ‘critical friend’.
— The use of CRN costing templates and model agreements has process efficiencies for some stakeholders and positive impacts on the market in terms of transparency in pricing.
— Collaborative benefits, such as sharing of best practice and the use of CRN specialty leads to enhanced collaboration, was noted as a significant added-value.
— Clinical research practitioners in England benefit from training offered by the CRN. This represents a sizable cost saving to NHS Trusts and other care providers.
— There are also a number of wider positive benefits in particular benefits to infrastructure, the learning and skill development of clinicians, improved quality of care and health outcomes for patients as well as quicker uptake of new treatments in the UK.

As part of our recent stakeholder consultation we have considered whether these insights still hold and have identified new routes to impact generated by the CRN that were not raised in 2016. We also considered how the CRN could add greater value going forward based on stakeholders’ feedback.

On the whole we found that the majority of impacts identified in 2016 still hold. The exceptions to this are that our most recent stakeholder engagement also noted some negative aspects to the costing template, and did not explicitly identify the sharing of best practice or training as benefits for the CRN. However, as noted in section 6.2.2 we have evidence that the CRN continues to provide significant levels of training to support clinical research practitioners.

Due to the nature of the impacts identified, our assessment is largely qualitative. Assigning a monetary value to the wider impacts and additionality was not possible due to data and evidence limitations. However, the insights gathered through our work provide evidence in relation to the ways in which the CRN adds to the delivery of clinical research in the UK and its socio-economic contribution.

More details of our approach to our stakeholder consultation can be found in section 4.4.
How the CRN adds value

As evidenced in our 2016 report\(^{(92)}\), there are different routes to, and types of, impact attributable to the CRN. The insights gathered from our most recent stakeholder consultation on how the CRN adds value highlight what stakeholders consider to be the main ways in which the CRN impacts clinical research activity in England.

These include impacts which were also identified as part of our 2016 stakeholder consultation, as well as new routes to impact, primarily relating to new areas of activity.

We first consider the impacts of the CRN that were also raised as part of our 2016 consultation. These primarily relate to the direct support of the CRN for the set up and delivery of studies entered onto the CRN Portfolio.

Support for studies on the CRN Portfolio

The CRN Portfolio is a collection of clinical research studies that have requested, and have met the CRN eligibility criteria\(^{(93)}\) for, access to the CRN’s support.\(^{(94)}\) Acceptance onto the portfolio means that studies are eligible for CRN support in the form of site identification, study set up and performance management support, and for non-commercial studies, study delivery resource.\(^{(95)}\) Based on the total number of MHRA approvals (which all clinical studies will need to apply for) we estimate that around 90%\(^{(96)}\) of clinical studies undertake in England are entered onto the CRN Portfolio.\(^{(97)}\)

In addition to and prior to this support, the CRN provides an early feedback service which considers the feasibility of undertaking studies in England, for example in relation to patient care pathways and relevant clinical research regulation.

Study feasibility and set-up support

The CRN provides guidance on protocol development, study set-up and the feasibility of sites in England to deliver studies.\(^{(98)}\)

One way in which the CRN does this is through the feasibility services it offers. These consist of research conducted before a main study in order to establish if a study can be successfully delivered. In FY 2018/19 the CRN completed a total of 1,263 commercial feasibility services in CPMS. These studies are pivotal to estimating key parameters (e.g. number of eligible patients) which are used to design the main study. As part of its research, the CRN highlights those parameters which are uncertain and details the methods for improving their accuracy so that the main study will have a better chance of success.\(^{(99)}\)

Consultation with stakeholders informed us of the perceived benefits resulting from the CRN provision of feasibility services and study set-up support. The insights obtained from stakeholders, as summarised below, indicate that the CRN’s provision of feasibility services and study set-up support has a positive impact on the successful delivery of a study, as organisations are more likely to operate in the most appropriate site and complete the early-stages of study delivery to time and target.

Stakeholders also suggested that, by offering feasibility services and set-up support, the activity of the CRN may lead to an overall increase in the volume of clinical research undertaken. This results from its role in both attracting foreign organisations to operate in the UK, and from supporting successful study-set up, which means that more studies will go to the delivery stage. Moreover, the early stage support provided by the CRN results in an increase of reach of clinical research: through site identification support, the CRN allows for more NHS Trusts to be involved in clinical research. This ultimately results in an increase in patients’ access to clinical research, and the improvement of health outcomes.

Specific benefits reported by stakeholders are summarised below:

—— Site identification: One CRO reported that, prior to the CRN being established in 2006, the system heavily relied on acquaintances, and sponsor companies would only contact investigators with whom they had previously worked, thereby limiting the delivery of clinical research in the UK. With the CRN in place, these stakeholders considered this is not the case anymore. They reported that the Network is now the intermediary and allows access to an overview of all the investigators, which enables the organisations to choose the best site to conduct the proposed clinical trial.

—— Feasibility services: One sponsor company added that without the CRN’s provision of feasibility services, procurement of ‘high performing’ sites would be significantly more sporadic and difficult.

—— Benefits to smaller organisations: Two CROs considered the study feasibility and set-up support offered by the CRN to be of great help for smaller organisations, which would otherwise have to understand how to work with every individual site they wanted to participate on a study, having a significant impact on the study delivery timelines. The alternative would be to limit themselves to always engaging with a small subset of sites. One of the CROs added that the CRN’s site identification services and set-up support to smaller organisations had impacted positively on its decision to operate clinical research in the UK, and contributed toward the successful study set-up and delivery to time and targets.
— **Benefits to foreign organisations:** One sponsor company and a CRO held the view that the CRN’s study feasibility support is particularly useful for identifying specialty areas experts and sites. They considered that this type of support significantly benefits organisations not familiar with the UK clinical research environment, and helps to support the successful set up of studies and study delivery to time and target. The CRN is said by the CRO to represent the point of reference and advice as these organisations navigate in a foreign clinical research environment.

— **Specialists across therapeutic areas:** One sponsor company indicated that whenever the company wants to undertake a study in a therapeutic area they are not an expert in, the CRN offers its knowledge and Portfolio data to draw on. The stakeholder considered that this helps organisations to be more effective in more therapeutic areas, and helps to avoid a situation where companies focus their research on their specialty of expertise only. The stakeholder shared that the CRN can facilitate access to insights from experts in almost any disease area they are researching, enabling them to more quickly ascertain whether a trial is feasible and which investigators might be interested in being involved. Without the CRN, the sponsor company indicated that this work is based on studious research and outreach to clinicians, which results in time inefficiencies and has cost implications.

In addition, our stakeholder consultation identified that whilst most of the sponsor companies we engaged with have internal capabilities delivering similar feasibility services to the ones offered by the CRN, some companies indicated that they use the services offered by the CRN in parallel to the ones they have internally, to ensure they have the most comprehensive information available before taking decisions.

**Study delivery support and infrastructure**

Stakeholders also identified that the CRN’s infrastructure and support in study delivery have significant impacts on the efficiency, speed and costs with which organisations deliver trials. Through delivering studies more efficiently, study targets in relation to time taken to set up and patient recruitment are more likely to be met. In general, there was consensus amongst the majority of stakeholders we consulted, when asked about how clinical research delivery would differ without the CRN’s support and infrastructure, that there would be a loss of efficiency in the way clinical research is delivered. Specifically:

— **Performance management:** One sponsor company stated that studies which are on the CRN Portfolio receive more attention by NHS Trusts in terms of performance management, and are generally delivered more efficiently compared to the ones that are not on the Portfolio. This stakeholder specified that the sites delivering studies which are on the Portfolio are more motivated to deliver trials efficiently as the funding allocations to the LCRNs are dependent on performance of the LCRNs in terms of time and recruitment targets of studies they are responsible for.

— **Improved delivery to targets:** This sponsor company added to this point by stating that the connection with the Network can make the difference when delivering clinical trials, as their services and support allow them to achieve the goals they set for the studies.

— **Recruitment efforts:** The sponsor company pointed out that the target culture is a driver for recruitment, where investigators are focused on meeting the contract goals. This performance management brought in by the CRN was reported by stakeholders to be impactful and support enrolment efforts.

The increasing speed at which clinical trials can be delivered have significant benefits on patients’ health outcomes, as it allows patients to get treatments in a shorter amount of time. A number of stakeholders noted that the CRN plays an important role in terms of improving the speed at which clinical research can be set up and delivered. A number of different reasons were cited for this. For example:

— **CRN infrastructure:** One CRO reported that the CRN support and infrastructure has a significant impact on the speed at which they can deliver trials. Specifically, they referenced an instance where they were working on a study of high importance and needed to recruit amongst a small patient population. The company stated that, thanks to the collaboration with the CRN, they reached the recruitment target months before the target date. The multinational client was highly satisfied with the result and this has affected its decision to operate clinical research in the UK again. The CRO reported that the UK is amongst the fastest countries in which they deliver research, and that the high performance of the UK is largely driven by the collaboration they have with the CRN.

— **CRN set targets:** One charity noted that the Network improves the speed at which they can provide trials, strategy and coordination.
The charity reported that without the CRN set targets (e.g. recruitment target), the clinical trials would be delivered at a slow pace, potentially having negative impacts on patients’ health outcomes. In fact, the charity reported that, in its experience, the Network can allow patients to get treatments in a shorter amount of time compared to the NHS.

Another area of added value of the CRN noted by stakeholders was the provision of research nurses by the CRN. This was considered to be significant benefit, as this represents a sizeable cost saving to the organisation which undertaking clinical research in the country. Specifically, the following points were raised:

— **Decrease in costs borne:** One charity expressed that the infrastructure provided by the CRN decreases the costs borne by charities, as the Network offers research nurse support to recruit patients, as well as other support services.

— **Adding value to the studies:** One other charity reported that the research infrastructure provided by the Network, including nurses, data managers and trial practitioners, all add value to the trials they conduct.

— **Scale and efficiencies:** One sponsor company reported that sites with a strong research infrastructure and CRN staff will have scale and efficiencies that can help in the delivery of industry research.

— **Efficiency:** One sponsor company concluded that notwithstanding the internal support provided by the company, it relies on the Network’s infrastructure, which supports it in the efficient delivery of clinical trials and, if any problem arises, the CRN Research Delivery Directorate helps it get back on track.

### Wider impacts from other CRN activity

In addition to impacts identified in relation to the direct support the CRN provides for the set up and delivery of studies entered onto the CRN Portfolio there were a number of other impacts identified which related to the wider activity and engagement activity undertaken by the CRN.

Examples of the wider routes to impact of the CRN, based on insights provided through our stakeholder consultation, are detailed in this section. These are all areas of impact which were not identified as part of our 2016 stakeholder consultation. Specifically, we look at:

— Engagement with non-commercial stakeholders.

— The provision and use of data.

— Support for clinical research in primary care.

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**Engagement with non-commercial stakeholders**

The NIHR has indicated that one of the key components to its success has been collaborating with charities, and other public funders and industry. It has stated that it believes that this continuous collaboration allows the NIHR to achieve its aims and to shape and improve the UK clinical research environment.

The NIHR reports that the collaboration with charities in research has more than doubled in the last 10 years: in 2009 they collaborated on around £210 million of research, in 2017 it increased to £464 million. Moreover, the CRN CC informed us that, as of FY 2018/19, there are 136 charities listed on their customer relationship management system.

The CRN CC informed us of the activities undertaken to increase its engagement with charities over the period between FY 2014/15 and FY 2018/19. Specifically they have:

— Establishment of a dedicated non-commercial Business Development team in April 2015.

— Developed a key account management system to support relationship building and maintenance with the largest funders.

— Completed charity stakeholder analysis to identify the key stakeholder charities and the levels of support provided.

— Developed the funder resource pack for non-commercial partners, in collaboration with those partners (mostly charities) which has then been rolled out to all non-commercial partners.

— Developed a joint standard operating procedure (SOP) with the Portfolio Eligibility Team (PET) to cross-refer potential new partners to the PET team; the new applications are signposted to the CRN, which will contact the new partners and offer them a discussion about CRN support.

— Developed a joint SOP with the BI team around developing funder reports for use in discussions with key account charities.

An increased focus on engagement with charities has been reflected in the findings of our stakeholder interviews. The efforts of the CRN to actively engage with charities appeared to be reflected in the views of charities we spoke to (as summarised further below). This contrasts with the views of stakeholders engaged with as part of our 2016, a number of whom were unable to provide any, or very limited, insights as to how the CRN supports clinical research due to the charities being disengaged from the activities of the CRN.
In terms of the benefits of collaborations between the CRN and charities, the CRN considers that these include an increased focus in ensuring the maximum benefits for patients and supporting the most efficient use of resources. In addition, the CRN considers that this collaboration increases the scale and impacts of clinical research, as it reduces the risks of duplication, while supporting the charity funded studies in the UK clinical research environment.

As part of our study, we sought to understand from charitable stakeholders their views of the impacts, both positive and negative, of the CRN’s engagement and collaboration with them. This included testing with them whether they also agreed with the CRN’s views of the benefits, as outlined above. We found that:

— One charity stakeholder, that particularly noted that its engagement with the CRN had increased in the last few years, reported an increase in the size of studies supported linked to its collaboration with the CRN. It stated that the overall structure of the CRN was conducive to delivering clinical studies and that this had helped the charity to increase the size of the studies delivered. The charity also reported an increase in number of patients recruited to both interventional and observational studies, and also credited this to the support of the CRN.

— Another charity reported that its communication and engagement across the NIHR as a whole has increased in recent years, which has led to an increase in collaboration related to studies conducted by researchers in Biomedical Research Centres (BRCs).

— A further charity reported that it considers that the CRN has been pivotal in establishing the current clinical research landscape and has provided significant benefits to the overall environment. Specifically, the charity reported that the CRN has a direct impact on the amount invested in clinical research, as well as on the volume of studies delivered and the number of participants recruited to studies. The charity also noted that it considers that the Network enhances recruitment speed, and positively affects the health, social and economic outcomes of clinical studies. Specifically, the charity stated that without the CRN there would be a decrease in the amount it would be able to invest in clinical research. It indicated that without the research staff provided by the CRN the charity would have to fund research nurses itself, decreasing the amount available to invest in further studies.

Data

Through the stakeholder engagement conducted for this study, as well as discussions with NIHR CRN, a key theme emerging in terms of the additional value that the CRN provides was the role of the CRN Portfolio in enabling data analytics and the benefits that can result from this.

In this section we consider the evidence regarding the benefits of data in the clinical research environment, and then report the insights gathered from our most recent stakeholder consultation.

“Data-driven technologies have the potential to transform the way the health system works and support faster and cheaper clinical research.”

Data held by the CRN

Through consultation with CRN CC staff we collected information on the nature of the data that the Network currently holds in relation to those clinical trials that are on the CRN Portfolio. A summary of the types of data held is illustrated in Figure 17.

Figure 17: Data held by the CRN

Specialty
Recruitment site
Recruitment date
Timeframes
Results
Type of study
The NIHR CRN started collecting data on the clinical trials on its Portfolio approximately 10 years ago; allowing both longitudinal and cross-sectional analysis of data. The data held by the CRN is accessible on the ‘open data platform’ and available to anyone who has a NIHR, NHS or DHSC email address. Across these user groups, there are approximately 1,400 unique accesses a month.

As well as providing access to the data held, the CRN offers the following data services to organisations:

**Research targeting tool**

The main way for users to access the data on the Portfolio, is by using the ‘Research tool’. The NIHR has created a self-service business intelligence tool sourcing data from the ONS and Public Health England, and maps it together with the Portfolio data. This tool allows for a side-by-side comparison of macro-level data (ONS and Public Health England) with specific Portfolio data. This tool allows to easily identify where populations of interest reside, or which geographical areas have the highest incidence of specific diseases. The CRN reports that this is a strategic tool with an increasing interest from organisations in its use.

**Dashboards**

The NIHR provides dashboards with live feeds on the data held. This enables individuals accessing the dashboards to track whether studies have been completed on time. In these dashboards, the NIHR provides key data which organisations need to produce performance reviews of their clinical research activity.

**Bespoke analytics**

The CRN offers consulting services, providing bespoke analysis for organisations on specific areas of interest. This involves interrogating, manipulating and analysing the CRN Portfolio data in order to investigate specific issues/research queries from organisations.

**Impacts from the use of NIHR CRN data and data services**

As we detail below, in general, there is a wide body of evidence in relation to the impacts that can be derived from the analysis of data relating to clinical research. Our review of the relevant literature suggests that these impacts range from enhanced innovation to reduction of duplication of existing studies.

The literature indicates that greater availability and accessibility to data and information can boost innovation and efficiencies, facilitating economic growth.\(^{104}\) And, in general, sharing data and information regarding health research is said to be ‘honouring the nature of medical research as a public good’.\(^{105}\)

Furthermore, evidence\(^{106}\) from the Medical Research Council (MRC) shows that analysing and linking health-related data can have significant benefits on the scale, speed and costs of research delivery.
Specifically, there can be significant benefits resulting from
the use of large patient and population datasets, such as the
development of effective treatments, the identification of
public health risks, and ultimately improvements to the
overall health services. Moreover, the enhanced access
to data has been shown to increase the transparency and
quality of research, while boosting collaboration amongst
organisations.

By analysing and combining data on clinical trials, researchers
can improve the accuracy of research by highlighting the
risks and benefits of specific treatments, understanding the
results of specific trials and potentially discovering new
results not identified in the original studies. However,
evidence also shows that patient level data needs to be used
with caution so as not to draw incorrect conclusions when
reanalysing existing data.

The data held by the CRN is used to monitor and improve the
work of the CRN, and to monitor the studies on the Portfolio
to help to ensure they are delivered to time and target. The data also allows the CRN to make an evidence based
case for continued applied health research funding and
evaluate the most effective ways to allocate it.

Engagement with CRN CC staff informed us that it also uses
the data in key areas as it provides a central overview of the
CRN supported clinical research delivered across the country.
Specific CRN uses of these data include using it to: inform its
key objectives; identify pockets of specific specialty
expertise; and to identify GP practices which have a track
record of successful delivery of clinical research.

Through our stakeholder engagement we also sought to
understand how these organisations had used CRN Portfolio
data and data services and the impacts associated with this.

In summary, stakeholders’ views showed that the data
gathered and provided by the CRN contributes to the UK’s
attractiveness in conducting clinical studies. Moreover, a
number of stakeholders reported the social and efficiency
benefts of accessing the CRN Portfolio data.

Specific views of individual stakeholders we consulted with
are set out below:

— **Lower risk of study duplication**: One charity pointed
out that having access to the CRN Portfolio is a big draw
for those applying for funding at the charity. Moreover,
the stakeholder emphasised that by including studies on
the Portfolio, they have access to data from the CRN,
which can generate significant efficiencies, for example
by helping them to avoid duplicate existing studies, and
enabling them to better target the most relevant regions
according to the population of interest, and the most
appropriate sites according to the study specialty.

— **Focus on the ‘right questions’**: A sponsor company we
consulted indicated that by accessing the data recorded
in the CRN Portfolio, there is a benefit to society, as the
scientific research now prioritises and focuses on the
‘right questions’.
Identification of gaps in clinical research: A charity supported the above point and identified that the analysis of Portfolio metrics and historical data leads to the identification of gaps in the clinical research environment, meaning that there is more comprehensive coverage of clinical research and better patient outcomes.

Access to support services: It was noted that while some organisations have internal data analytics teams and, therefore, the need for CRN data support is reduced, one of the sponsor companies we interviewed reported that despite this it still recognised the importance of having its company’s studies on the Portfolio and having access to the support services and tools if needed is of value.

Increase England’s attractiveness as a place to undertake clinical research: One CRO expressed that the UK is very attractive as a place to undertake clinical research, thanks to the data held by the NHS and the CRN. The stakeholder suggested that there is an opportunity for the CRN to further exploit the data it gathers, and potentially link datasets with the ones held by the NHS, in order to generate even greater benefits.

Increase efficiencies in patients’ recruitment: The benefits arising from linking datasets were also highlighted by a Principal Investigator (PI) in Primary Care we interviewed. The stakeholder highlighted that GPs retain a wealth of data and that its value could be maximised by linking it to the data held by the CRN. For example, it was suggested that by linking GP data with the NIHR’s there could be efficiencies in patient recruitment, as patient identification would be more straightforward given that the majority of UK residents are registered with GPs and could be contacted directly via this route. The PI added that the availability of ‘Big Data’ should be exploited more and used as a selling point to help to attract clinical research in the UK.

By supporting clinical research in this area, the NIHR CRN plays some role in contributing toward these developments. Our interviews with three PIs in the primary care specialty informed us on the benefits and barriers which characterise clinical research in this specialty.

Two PIs we consulted informed us that there are two main reasons why research in primary care is important:

- Firstly, research in primary care addresses general diseases that affect large populations; primary care is not a disease specific specialty.
- Secondly, it provides an opportunity for larger scale patient recruitment for secondary care studies, as patients can be more readily identified due to ‘read coding’ in primary care.

However, consultation with the PIs informed us that, compared to secondary care specialties, engagement in research in primary care is low, with a low proportion of interventional studies (commercial or context-studies) being conducted. Stakeholders identified specific barriers to conducting clinical research in primary care, in terms of capacity, funding, engagement in research, training and workforce. Specifically, stakeholders reported that:

- Registrars in secondary care specialties are more likely to have to complete masters and post-graduate studies, making them more likely to undertake a career in research. Doctors who instead intend to become GPs are generally not required to undertake these type of studies in their training schemes, making them less likely to undertake clinical research once qualified as doctors.
- GP practices are small and medium – sized enterprises (SMEs) with very little spare capacity, leaving GPs with little time to any activity other than their role as GP. Moreover, as SMEs, the GP practices have to self-fund the development of research infrastructure within the organisation resulting in GPs struggling to find the necessary funding to invest in clinical research. The stakeholders we spoke to concluded that GPs have no time and not incentives to conduct research and that research is not seen as being part of the culture of GP practices.
- There is low awareness amongst secondary care specialists about the possibility of conducting research in the primary care setting.

The two stakeholders informed us that the CRN is working to reduce these identified barriers, and enhance research in the primary care specialty.

Challenges relating to clinical research in primary care

The focus on research in general practice (GP practice) and primary care is fundamental for the development of preventive medicines, early diagnosis, acute and chronic disease management and personal care. The literature reports that the UK’s expertise in this field is ‘exceptional, long-standing and internationally acknowledged’, thanks to the presence of the NHS (a single integrated health system), and the NHS provision of the universal registration system.
Firstly, in order to reduce the capacity barrier, the CRN is looking to make administrative staff in GP practice more involved and engaged with clinical research activity. In this way, the ‘burden’ of clinical research administrative tasks would not fall on time-poor GPs. Secondly, the stakeholders report that the CRN is also increasing the engagement with hospitals to encourage researchers to recruit in the primary care setting, highlighting the resourceful pool of patients which can be found in GP practices.

The CRN and primary care specialty

Approximately 85,000 participants per year (from FY 2014/15 to FY 2018/19) are recruited on to NIHR CRN clinical research studies in the primary care specialty, and in 2017 the one millionth participant was recruited in England. These high recruitment numbers for primary care specialty studies are facilitated by the relatively easy access to patients suffering from chronic diseases through GP’s patient database and the connection with hospitals.

In England there are approximately 7,000 GPs, and approximately 60 million patients registered with a GP practice. For these patients, their complete Electronic Health Record (EHR) is held by their GP practice.

One of the PIs informed us that since 2006 there has been a significant change in clinical research in primary care. The PI reported to KPMG that they consider that before the CRN was established there was no structure underpinning the delivery of clinical research in primary care, and a lack of supporting infrastructure. However, with the CRN in place, the PI believes that the environment is now more professional, better funded, and more transparent and that the CRN has generated a greater capacity to conduct research in GP practices, by enhancing engagement between CROs and GPs. The PI added that as a result of the support of the CRN, approximately 50% of GPs are currently involved in clinical research. The PI believes that, given the independent contractor nature of practices, GP practices significantly benefit from the Network’s support in delivering research.

While noting the positive impacts associated with the CRN’s involvement in supporting primary care clinical research, the PI reported that over the years the NIHR CRN has increased involvement with GPs, there had been a decline in engagement between the CRN and GP practices over the last year. The PI felt that this was because the CRN is now collaborating with fewer practices, yet the specialty was still producing good recruitment numbers. The CRN has reported that this reduction in engagement from GP practices was due to both increased pressure on GPs meaning they have less time for clinical research and merging of GP practices. The CRN reports that it is working to increase the collaboration with GP practices and to stem the decline in clinical research in primary care.

In addition to addressing this reduced collaboration, to further increase recruitment numbers, the PI suggested that the CRN could increase its engagement with the larger or ‘mega-practices’, namely practices which have more than 100,000 patients. And to improve the efficiency in the delivery of Primary Care research, the PI suggested that the CRN should seek further engagement with other providers in primary care, such as community pharmacies and dentists.

**Figure 18: Key figures at a glance: total number of studies and patients recruited onto primary care managed studies from April 2014 to March 2019**

- **All primary care managed studies:**
  - 421,465: Number of participants recruited into all managed primary care specialty studies in England from 1 April 2014 to 31 March 2019.
  - 1,098: Number of studies recruiting at least one participant in managed primary care specialty studies in England from 1 April 2014 to 31 March 2019.

- **Commercial primary care managed studies:**
  - 24,423: Number of participants recruited into commercial managed primary care specialty studies in England from 1 April 2014 to 31 March 2019.
  - 94: Number of commercial studies recruiting at least one participant in managed primary care specialty studies in England from 1 April 2014 to 31 March 2019.

Source: KPMG analysis of NIHR Business Intelligence data.
Training

The training and educational needs of those who deliver clinical research are important to address, as it is fundamental that clinical research staff are professional and knowledgeable when treating patients, and planning and delivering research.\textsuperscript{[120]} The UK Policy Framework for Health and Social Care Research\textsuperscript{[121]} requires that everyone involved in clinical research delivery is qualified by education, training, and experience.\textsuperscript{[122]} Specifically, all clinical research needs to adhere to the Good Clinical Practice (GCP), which is an international ethical, scientific and practical standard.

\begin{quote}
The NIHR Clinical Research Network will deliver e-learning courses, designed to increase awareness and understanding of innovative trial designs, supplemented with targeted learning for specific groups.\textsuperscript{[119]}
\end{quote}

The NIHR CRN offers a range of free of charge GCP training to NIHR clinical staff across the Network, as well as to UK Universities, and other publicly funded organisations involved in delivering and supporting clinical research.\textsuperscript{[123]} Clinicians can access this GCP training (either face-to-face or online) and we understand from the NIHR CRN that it is widely accepted by sponsor companies\textsuperscript{[124]} and the MHRA.

Since 2009, the CRN has delivered GCP training to approximately 147,000 individuals, and in the 2017/18 financial year 36,500 people accessed the GCP training, 29,600 accessed it online while 6,900 completed it face-to-face.

As highlighted in KPMG’s 2016 report,\textsuperscript{[125]} we understand that prior to the CRN providing this GCP training, the equivalent training was provided by NHS Trusts on an ad hoc basis, commissioned from external training providers. And for commercial studies, sponsor companies would, in some cases, require clinicians to undertake their own bespoke training to ensure the quality and competency of staff. Often, this meant staff were completing similar training multiple times if working with multiple sponsor companies.

A range of benefits associated with this training provision were identified through our 2016 study. These included that the NIHR CRN provision of the GCP training ensured consistency across NHS Trusts and individuals, as the same standards are now applied for all clinicians by a centralised body.

Efficiency benefits were also identified, as clinicians are not required anymore to undertake multiple GCP trainings, and it was considered that benefits arose from the NIHR’s early direct engagement with regulatory bodies and dissemination of necessary knowledge or changes to the Network.

Ways in which the CRN could increase its impacts

In general, stakeholders we interviewed as part of the study indicated that they are supportive of the CRN and recognise the value it brings to the delivery of clinical research in England. However, as part of our stakeholder engagement, we explored ways in which the stakeholders considered that the impact of the CRN could be increased through the role it could play in helping to address the challenges in relation to the delivery of clinical research in England.

In the following sections we detail the three main themes of areas for improvement raised by stakeholders during our consultation:

\begin{itemize}
\item Staffing resources
\item Consistency across the Network.
\item Introduction of study set up and patient recruitment targets.
\end{itemize}

These are not all things that the CRN has direct control over. However, they reflect the ongoing challenges faced by clinical research stakeholders, and the ways in which the clinical research environment could be improved. This is important to inform the CRN’s role in engaging with partners, for example charities and industry organisations, as well as with Government, to improve the process of delivering clinical research.

Staffing resources

A general point that was raised in the majority of our conversations with stakeholders related to the availability of research staff employed to carry out clinical studies (this could include either NHS funded staff or LCRN staff). This is also recognised in the Life Sciences Sector Deal 2 which notes the challenges in the NHS workforce resourcing required to deliver commercial clinical trials and highlights the Government’s commitment to address this issue.

Whilst most stakeholders recognised the value of having research nurses on the ground allocated to delivering research (as highlighted in section 4.4), they identified that there is pressure on staff resources which can impact study delivery. Stakeholders raised concerns around the ability of the research staff in handling the current volume of research, and the bias towards commercial clinical research.
Specifically, we found that:

— **Limited research staff time spent on clinical trials:** One sponsor company indicated that it had experienced a challenge in having enough research staff time spent on clinical trials, which then impacted its ability to deliver the studies on time due to the effect on the speed with which studies were set up. It identified this as being a particular issue in the last three years. The same stakeholder stated that recent pressure on staff resource had resulted in staff not being able to handle the current volume of studies which need to be delivered. The sponsor company indicated that it believes that one of the reasons behind this is the fact that many of the job positions are one year contracts, leading to a high staff turnover. The sponsor company shared that even when they have a site to undertake the clinical trial, and proceed in time with the start-up phase, the study may not proceed as the site is not ready. Whilst there are pressures on the system, the stakeholder noted that without the CRN, research staffing in sites delivery would be more severely compromised.

— **Lack of clinicians who are research oriented:** One charity shared a concern around the lack of clinicians who are research oriented. The organisation suggested that there are staffing pressures in the NHS, and therefore there is less time for clinicians to work on clinical research. Staffing pressure from the NHS is also said by one sponsor company to be pushing staff to operate more in the clinical area rather than in research. Finally, the sponsor company expressed they would like the CRN to increase transparency on how the NIHR staff on the ground are able to support commercial research, for example in terms of their ability to work on commercial trials. This stakeholder indicated that it had the impression that academic studies may be prioritised.

— **No incentives to support commercial studies:** One other stakeholder was uncertain about the level of CRN support for commercial studies. The CRO shared its concerns that LCRNs may not have financial benefits from entering commercial research patients, and that networks may prioritise academic research in order to maintain their income streams.

### Consistency across the Network

The NIHR Network consists of 15 LCRNs across England. According to three stakeholders we consulted with, there are inconsistencies in performance across the Network, which creates problems and affects confidence in delivery across the Network. This issue was not raised by the rest of the stakeholders. The 2017 Life Sciences Industrial Strategy[126] also noted the inconsistency in clinical trial delivery across the UK, reporting that “Trial activity is patchy across the UK: Shropshire and Oxfordshire CCGs have over 10 times the number of clinical trial participants than some other CCGs”.

A number of different points were raised in our consultation, for example:

— **Low collaboration with commercial organisations:** One CRO pointed out that it considers that there is an inconsistency in delivery across research sites and stated there are sites that do not collaborate with commercial organisations, and mainly focus on delivering academic research. The stakeholder suggests that there is room for improvement, and would like to see a standardised approach across the Network in terms of collaboration with commercial organisations. Standardisation and alignment across the Network was said to be critical for increasing confidence in delivery across the Network,

— **Inconsistent allocation of resources:** When asked why there may be inconsistencies across the Network, one stakeholder suggested this may be the result of inconsistent allocation of resources to the LCRNs from the CRN.

### Introduction of study set up and patient recruitment targets

The NIHR Network operates on a model based on delivery targets, in terms of set-up time and recruitment. As we detail below, a number of stakeholders we interviewed provided views on the impact of these targets, with some considering that there are inconsistencies in the targets set and while some stakeholders’ reported that they considered them to be ‘too loose’, others deemed them ‘too tight’.

The main points raised by stakeholders in relation to time targets are summarised below:

— **Reducing study set-up time:** One CRO told KPMG that it believed that the ‘70 days recruitment’ target,[127] introduced in 2011, could be damaging from a global perspective, as they considered that it represents a slow set up time relative to other countries.[128]
Mitigation strategy post-Brexit: One CRO we interviewed indicated that the current target of 40 days to obtain NHS permissions to proceed with the clinical study may be too lenient. Moreover, the organisation suggested that reducing the target to “approximately 20 days” could be useful to mitigate the potential negative impacts of Brexit, by limiting the potential decrease of clinical research activity in the country. The stakeholder considers that by reducing the days required to achieve study approval, the UK could become more attractive and converge to the US performance in delivering clinical research, while maintaining its position as one of the faster European countries. In this way, the stakeholder believes the UK will safeguard its position as a key global deliverer of clinical research.

Inclusion of national targets: One sponsor company reported to KPMG that it considers that having study set up time and recruitment targets at a Trust level is problematic. The organisation suggested that an improved approach would be to have an overall National target, so that sites are working towards one common target. This could potentially follow a ‘Hub and Spoke’ model, with lead sites for each disease area in each region. The stakeholder identified that this could broaden research opportunities whilst focussing recruitment and workloads on a smaller number of sites, thus increasing efficiency. The company believes that focussing on KPIs and financially rewarding only those sites which deliver studies to target may be limiting. Rather, the CRN should consider rewarding the top recruiting sites (adjusting for size categories).

Accelerating feasibility timeline: One sponsor company stated that the faster the UK is at delivering clinical trials, the more attractive it will be. It specified that the focus should be on accelerating the feasibility timeline and the supporting process.

Development of a standard costing template

In addition to the three main themes for areas of improvement outlined above, a number of additional points were raised by stakeholders in relation to what the NIHR CRN could do better:

The updated costing template has generated a mixed response from stakeholders in terms of the relative costs and benefits of using it. When asked about it, the stakeholders we spoke to in 2016 tended to expect benefits from the updated costing template in the form of efficiencies and transparency. However, in our 2019 stakeholder consultation there were some different views:

Transparency and simplicity: One CRO highlighted the transparency and simplicity of the updated costing template, which according to the stakeholder allows for competitive pricing. It considered it an important factor attracting clinical research to the UK.

Potential increase of administrative burden: One sponsor company noted some concerns that the new single costing model could result in increased costs of clinical research for commercial organisations due to their inability to negotiate on costs, and this could damage the UK’s attractiveness in delivering clinical research. Another sponsor company told KPMG that the costing template should not delay further the study delivery process. This sponsor company recognised the attractiveness of the new model as it will harmonise costing across England, but it felt that consideration should be given to how it is implemented in light of the potential negative impacts.

Overall, these insights relating to the ways in which impacts may be increased in the future reflect the relative trade-offs the CRN faces in providing support and infrastructure to increase the efficiency and performance of clinical research delivery, whilst avoiding creating additional burdens on clinical research stakeholders that could negatively impact delivery.
Appendix 1

Endnotes

2. The CRN Portfolio refers to the database of studies registered with the CRN.
4. The CRN financial year runs from the 1 April to the 31 March of the following year. E.g. FY 2016/17 runs from 1st April 2016 to 31st March 2017.
5. GVA measures the contribution to the economy of an individual producer, industry or sector, net of intermediate consumption (for example goods and services that are used in the production process). It is a measure of the economic value of the activity. In our analysis we report employment in full-time equivalent (FTE) terms. This adjusts part time or temporary staff into an annual full-time equivalent based on the proportion of full-time work done over a year.
6. Gross impacts reflect the total effect of an intervention or activity. Net impacts take into account only those impacts that are additional, i.e. impacts that are brought about, over and above what would happen anyway. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf
7. Individual estimates do not sum to the totals due to rounding.
8. This is known as capacity building and represents an allowance of 20% on top of costs. See: NIHR (2017). User manual for the NIHR CRN Industry Costing Template. See: https://www.nihr.ac.uk/funding-and-support/documents/study-support-service/Early-contact-and-engagement/Costing-Templates/USER%20MANUAL%20Industry%20Costing%20Template%20MAY%202017.pdf
9. These included NHS Trusts, LCRNs, the CRN CC and a pharmaceutical company.
10. Driven by the Market Forces Factor applied to adjust for location dependent variation in costs.
11. It is possible that in some instances, if the trial drug is ineffective, the standard treatment may need to be administered following the study anyway. However, we would expect this to occur in the minority of cases. Furthermore, there will be instances where industry-sponsored clinical research studies deliver value beyond this cost saving where the trial facilitates free access to more expensive pharmaceuticals that may be licensed in other indications, but are now being trialed in a new disease-area. In the absence of the study, patients would not have access to these more expensive and potentially effective pharmaceuticals. In this case, the value to the NHS stretches beyond the cost saving of standard treatment to the additional value of using these effective pharmaceuticals.
12. This excludes protocols that did not contain sufficiently complete data to allow us to identify whether a cost saving would occur.
13. At the 90% confidence level.
14. The mean value in our distribution is £5,813. The margin of error is £1,670 for a 90% confidence interval.
15. The mean value in our distribution is £11,831. The margin of error is £6,139 for a 90% confidence interval.
16. Including four pharmaceutical companies and two CROs.
17. The CRN has set a targets of getting the first participant recruited within 30 days of the site being confirmed; getting all sites confirmed within 40 days being selected.
19. The CRN Portfolio refers to the database of studies registered with the CRN.
21. GVA measures the contribution to the economy of an individual producer, industry or sector, net of intermediate consumption (for example goods and services that are used in the production process). It is a measure of the economic value of the activity.
22. Gross effects reflect the total effect of an intervention or activity. Net impacts take into account only those impacts that are additional, i.e. impacts that are brought about, over and above what would happen anyway. These excludes any impacts that would occur in the absence of the activity or intervention under consideration. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf
25. Converted using OECD conversion data: in 2018 $1=£0.750. See https://data.oecd.org/conversion/exchange-rates.htm

26. Market size estimates vary depending on the source. Grande review research reports the market to be worth $44.2 billion in 2018, while Pharm Source estimates it at $63 billion in 2017. See: https://www.grandviewresearch.com/industry-analysis/global-clinical-trials-market and http://www.pharmsource.com/market/how-big-is-the-market-for/#Clinical%20Research%20Total

27. Converted using OECD conversion data: in 2018 $1=£0.750. See https://data.oecd.org/conversion/exchange-rates.htm


31. Basic research provides the foundation of scientific knowledge for applied research and is overseen by a scientific researcher. See: https://www.aamc.org/initiatives/research/334422/basicscience.html

32. Preclinical research looks at the application of scientific knowledge to a particular biomedical problem in order to develop a new drug, therapy or procedure, overseen by a scientific researcher. See: https://statesforbiomed.org/education/background-on-biomedical-research/biomedical-research-definitions/

33. See: https://statesforbiomed.org/education/background-on-biomedical-research/biomedical-research-definitions/


35. Based on consultation with the CRN.

36. See: http://www.leicsrespiratorybru.nihr.ac.uk/public/understanding-clinical-research/

37. See: http://www.leicsrespiratorybru.nihr.ac.uk/public/understanding-clinical-research/


42. See box titled: What is clinical research?


45. See: https://clinicaltrials.gov/ct2/resources/trends


53. ‘The process involves a single submission, combined communications to request any further information required and a single communication to confirm the final decision.’ See: https://www.hra.nhs.uk/planning-and-improving-research/policies-standards-legislation/clinical-trials-investigational-medical-products-ctims/combined-ways-working-pilot/


55. See: https://www.ukcrcc.org/research-infrastructure/critical-research-networks/
63. Impact and value of the NIHR clinical research network

56. NIHR. Local Clinical Research Networks. See: https://www.nihr.ac.uk/nihr-in-your-area/local-clinical-research-networks.htm

57. NIHR Clinical Research Network. See: https://www.nihr.ac.uk/about-us/how-we-are-managed/coordinating-centres/nihr-clinical-research-network/


59. Based on discussion with the CRN and information from then NIHR website. See: www.nihr.ac.uk

60. A financial year runs from the 1st April to the 31st March of the following year. E.g. FY 2016/17 runs from 1st April 2016 to 31st March 2017.

61. Gross effects reflect the total effect of an intervention or activity. Net impacts take into account only those impacts that are additional, i.e. impacts that are brought about, over and above what would happen anyway. These excludes any impacts that would occur in the absence of the activity or intervention under consideration. See: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf


65. This report focuses predominantly on clinical research provided by secondary care providers, however we recognise these benefits are also realised for primary care providers who are also involved. With this in mind, hereafter, we will only refer to both primary and secondary care providers as NHS Trusts and other care providers.

66. We estimate indirect and induced GVA and employment impacts using sector specific GVA and employment multipliers sourced from the ONS and Scottish Government. The sector specific Type I and Type II GVA multipliers used in this calculation were sourced from the Scottish Government, because the ONS does not produce Type II multipliers

67. This defines GVA as follows: GVA = Net pre-tax profit + Compensation of Employees + Depreciation + Amortisation

68. ONS (2019), UK input-output analytical tables. See: https://www.ons.gov.uk/economy/nationalaccounts/30.0.0.07/accounts/582254/2017


70. Each study site will complete their own costings, therefore each per patient payment values are unique to each site and study.

71. These are trials that are sponsored by an NHS Trust or university, and therefore classified as non-commercial, but which received funding or free drugs for use in the trial from industry.


73. Based on consultation with the CRN.

74. These are trials that are sponsored by an NHS Trust or university, but which received funding or free drugs for use in the trial from industry.

75. Additionality is the determination of whether an intervention has an impact when compared to a baseline or a ‘do nothing’ scenario.


77. A bottom-up approach uses granular data at an individual level to scale up to capture the relevant activity to be estimated.

78. See: https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseandresearchanddevelopment2017

79. See: https://www.amrc.org.uk/Handlers/Download.ashx?IDMF=79636564-4fcd-44bd-8361-9689a8ab5a97

80. UKCRC 2014

81. Between April 2016 and March 2019 average weekly earnings for employees in Great Britain are estimated to have increased by almost 9%, before adjusting for inflation See: ONS (2019). Labour Market Statistical Bulletin. ‘LMSB SA AWE total pay WE growth yr on yr three months average’. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/timeseries/kac3tms

82. Based on the proportion of MHRA applications that relate to studies on the CRN Portfolio.

83. Optional Services are services that can be required by DHSC as part of the CRN CC contract, on top of the core services of the contract. Additional funding for Optional Services is provided by DHSC.

84. Known as industry-sponsored Investigator Initiated Trials.

86. NIHR 2015, Study Costs Data Review 2015/16

87. Statistic that measures the dispersion of a dataset relative to its mean.

88. The mean value in our distribution is £5,813. The margin of error is £1,670 for a 90% confidence interval.

89. The mean value in our distribution is £11,831. The margin of error is £6,139 for a 90% confidence interval.

90. Statistic expressing the amount of random sampling error in a survey’s results.


94. See: https://www.nihr.ac.uk/research-and-impact/nihr-clinical-research-network-portfolio/

95. Based on consultation with CRN CC.

96. Data provided by the CRN CC in 2019.

97. Many of the studies not on the Portfolio may not be included due to them not being eligible, for example due to them being PHD studies, or due to the study initiator not requiring support. However, some stakeholders also identified that there will be some instances where studies that could benefit from CRN support are not placed onto the Portfolio due to a lack of awareness. This is something the CRN is looking to improve.

98. See: https://www.nihr.ac.uk/funding-and-support/study-support-service/early-feedback/early-feedback-commercial.htm


100. See: https://www.nihr.ac.uk/blogs/better-together-how-charities-can-collaborate-with-nihr-research-programmes/9645

101. See: https://www.nihr.ac.uk/blogs/better-together-how-charities-can-collaborate-with-nihr-research-programmes/9645

102. See: https://www.nihr.ac.uk/blogs/better-together-how-charities-can-collaborate-with-nihr-research-programmes/9645


110. See: https://www.nihr.ac.uk/funding-and-support/study-support-service/performance-monitoring/recruitment-data/

111. See: https://www.nihr.ac.uk/funding-and-support/funding-for-research-studies/manage-my-study/

112. The Academy of Medical Sciences (2009), Research in general practice: bringing innovation into patient care. See: https://acmedsci.ac.uk/file-download/35182-12569153801.pdf

113. The Academy of Medical Sciences (2009), Research in general practice: bringing innovation into patient care. See: https://acmedsci.ac.uk/file-download/35182-12569153801.pdf

114. Read Codes are a coded thesaurus of clinical terms and have been used in the NHS since 1985. They provide the standard vocabulary by which clinicians can record patient findings and procedures in health and social care IT systems across primary and secondary care (e.g. General Practice surgeries and pathology reporting of results). See: https://data.gov.uk/dataset/f262aa32-9c4e-44f1-99eb-4900deada7a4/uk-read-code

115. NIHR, Delivering primary care research in the UK. See: https://www.nihr.ac.uk/nihr-in-your-area/primary-care/documents/Primary%20Care%20specialty%20profile%202017.pdf

117. NIHR, Delivering primary care research in the UK. See: https://www.nihr.ac.uk/nihr-in-your-area/primary-care/documents/Primary%20Care%20Speciality%20Profile%20201907.pdf

118. Data was provided until December 2018. We estimated the figures for the whole FY 2018/19


121. NIHR. Delivering primary care research in the UK. See: https://www.nihr.ac.uk/nihr-in-your-area/primary-care/documents/Primary%20Care%20Speciality%20Profile%20201907.pdf

122. See: https://www.nihr.ac.uk/nihr-in-your-area/north-thames/training.html

123. See: https://www.nihr.ac.uk/nihr-in-your-area/north-thames/training.html

124. TransCelerate is a consortium of pharmaceutical companies. It agrees that the CRN GCP training meets its requirements and it is recognised by all members. This avoids duplication of training for different sponsor companies. The CRN is not involved but TransCelerate benefit from the GCP training provided by the CRN.


127. A benchmark of 70 days or less from the time a provider of NHS services receives a valid research application to the time when that provider recruits the first patient for that study, introduced in 2011. https://www.nihr.ac.uk/02-documents/policy-and-standards/Clinical-Trial-Performance/Contract%20Performance%20FAQs.pdf

128. We note, however, that the Government has sought to address this and in the recent Sector from 2018 it has removed the benchmark for clinical trials in favour of the publication of accurate performance data using a standard national framework.


131. UKCRC Health Research Classification System. 2014. Available at: http://www.hrcsonline.net/pages/data

132. UKCRC Health Research Classification System. 2014. Available at: http://www.hrcsonline.net/rac/overview

133. We requested data on the number of Portfolio and non-Portfolio studies from NHS Trusts.

134. ONS, 2015 Input-Output Analytical Tables, Multipliers and effects


139. To estimate the sector average GVA per employee, in FTE terms, we had to first estimate the number of FTEs for each SIC code as the ONS does not publish FTE breakdown by industry. We estimated this using total employment figures from the ONS Business Register and Employment Survey 2014, which states both full-time and part-time employment figures which was converted to FTE using an FTE conversion factor based on the average number of hours work per week by part-time workers sourced from the ONS. This figure was then used to estimate the GVA per FTE.

140. ONS 2015 Input-Output Analytical Tables, Multipliers and effects. Available at: https://www.ons.gov.uk/economy/nationalaccounts/supplyanduse tables/datasets/ukinputoutputanalyticaltablesdetailed

141. ONS 2015 Input-Output Analytical Tables, Multipliers and effects. Available at: https://www.ons.gov.uk/economy/nationalaccounts/supplyanduse tables/datasets/ukinputoutputanalyticaltablesdetailed

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eresearchanddevelopment2016

eresearchanddevelopment2017


149. In 2016 the return to investment was 3.7%, in 2017 it was 1.9%.


151. Using inflation data provided by the ONS. See: https://www.ons.gov.uk/economy/inflationandpriceindices


160. E.g. Studies which were conducted in Greater London and South East, and are of a specialty included in Division 1.

161. From the sample of 681 studies considered for all specialties and 372 for oncology, we know the proportion of studies that will represent a cost saving (i.e. Group 3). This proportion is applied to the number of all drug-based industry-sponsored interventional studies to estimate the volume of studies for which there is a cost saving to the NHS.
Appendix 2: Technical details of methodology and analysis

Approach to estimating GVA and employment impacts

Our analysis of the economic impact was conducted in line with methodologies set out in HM Treasury’s The Green Book: Appraisal and Evaluation in Central Government.\(^{(129)}\)

The clinical research activity supported by the CRN directly adds GVA to the UK economy through productive use of inputs, including employment of labour and use of products and services within NHS Trusts, other care providers, universities, sponsor companies, Contract Research Organisations (CROs) and within the network itself, to deliver clinical research activity.

In our analysis we assess the economic impact of clinical research activity supported by the National Institute of Health Research (NIHR) Clinical Research Network (CRN) in terms of direct, indirect and induced gross value added (GVA) and direct, indirect and induced employment (which is reported in terms of full-time equivalents (FTEs)).

The analysis covers the economic impacts, in terms of GVA and employment, associated with:

- non-commercial grant funded clinical research activity, primarily undertaken by universities, clinical trials units and charities;
- non-commercial LCRN clinical research activity, delivered within NHS Trusts and other care providers;
- commercial clinical research activity undertaken by life sciences industry sponsor companies and CROs;
- commercial clinical research activity, delivered by NHS Trusts and other care providers; and
- the CRN Coordinating Centre (CRN CC) activities.

Our approach to estimating the economic impacts associated with the CRN related activity for each of these stakeholder groups differs slightly, both due to data availability and differences in the nature of their activities. Our approach to estimating the economic impacts are detailed below.

GVA and employment impacts of non-commercial grant funded clinical research activity supported by the CRN

Approach to estimating GVA

Direct GVA at the industry or organisational level can be measured through either the income approach or the production approach.\(^{(130)}\) Based on the data available to us, we have adopted the income approach in our analysis, where:

\[
\text{Direct GVA} = \text{Net pre-tax profit} + \text{Compensation of Employees} + \text{Depreciation} + \text{Amortisation}
\]

Given that the grant funded clinical research undertaken by universities, academic clinical trials units, principle investigators within NHS Trusts and some charities is non-commercial in nature, for the purposes of our analysis we have assumed that it is not profit making. We therefore use payroll costs as our estimate of direct GVA. To estimate this, we used the following data:

- data on health research grants payments by type of activity for FY 2014/15, classified using the Health Research Classification System (HRSC) sourced from the UK Clinical Research Collaboration (UKCRC);\(^{(131)}\) and
- data on the total value of medical research grants in FY 2014/15, FY 2016/17 and FY 2017/18 sourced from the AMRC.

Using the latest available UKCRC data (from 2014) we filtered the total grant payments for health research by research activities relating to staff costs only. The following research activity codes were used to filter the data: \(^{(132)}\)

- 4.2, ‘Detection, Screening and Diagnosis’: Evaluation of markers and technologies
- 5.1-5.8, ‘Development of Treatment and Therapeutic Interventions’, all except for Resources and infrastructure
6.1-6.8, ‘Evaluation of Treatments and Therapeutic Interventions’, all except for Resources and infrastructure

7.1-7.3, ‘Management of Diseases and Conditions’, all except for Resources and infrastructure

We also filtered the data to include only:

- grants awarded in FY 2014/15;
- grants awarded in England.

This yielded the total grants awarded for FY 2014/15 relating to staff costs for all clinical research in England.

In order to estimate the corresponding figures for FY 2016/17, FY 2017/18 and FY 2018/19 we:

- took the estimated value of health research grants associated with staff costs for clinical research in England in FY 2014/15 as a proportion of total value of medical grants in the UK for the same year, sourced from the AMRC;
- applied this proportion to the total value of medical research grant investment in the UK for FY 2016/17 and FY 2017/18, also sourced from the AMRC, to estimate the payroll costs associated with clinical research in England for FYs 2016/17 and 2017/18; and
- uplifted the estimated value for FY 2017/18 for inflation to estimate the equivalent figure for FY 2018/19 as data was not available for this year;
- adjusted the results for the proportion of all clinical research in England that is on the CRN Portfolio, based on data obtained from six NHS Trusts, which on average, 71% of all non-commercial clinical studies are part of the CRN Portfolio. We did not use the proportion of MHRA approvals studies that are on the CRN Portfolio for our analysis of the impact of non-commercial clinical research as this data is not available for non-commercial studies.

This approach makes an assumption that the staff costs associated with clinical research account for the same proportion of total medical research grants over time. While we have no evidence to suggest that this proportion has changed since FY 2014/15, we note that if this assumption does not hold then this could result in the results of our analysis being either overestimated or underestimated.

The indirect GVA was estimated using the following formula:

\[
\text{Induced GVA} = \text{Direct GVA} \times (\text{sector specific Type I GVA multiplier} - 1)
\]

The Office for National Statistics (ONS) Type I GVA multiplier for Standard Industry Classification (SIC) code 72, which relates to ‘Scientific research and development services’ was used.

The induced GVA was estimated using the following formula:

\[
\text{Induced GVA} = \frac{\text{Direct GVA} \times (\text{sector specific Type II GVA multiplier} - 1) - \text{Direct GVA} \times (\text{sector specific Type I GVA multiplier} - 1)}{\text{sector average GVA per FTE}}
\]

The sector specific Type I and Type II GVA multipliers for SIC code 72 were used. These were sourced from the Scottish Government as the ONS does not produce Type II multipliers.

**Approach to estimating employment**

The direct employment impacts, in FTE terms, were derived from the estimated direct GVA estimate based on the average GVA per FTE employee for SIC code 72, ‘Scientific research and development services’ that we estimated based on GVA and employment data sourced from the ONS.

The direct employment was estimated using the ONS Type I employment multipliers for SIC code 72, based on the following formula:

\[
\text{Direct employment} = \frac{\text{Direct employment} \times (\text{sector specific Type I employment multiplier} - 1)}{\text{sector average GVA per FTE}}
\]

The indirect employment was estimated using Scottish Government sector specific Type I and Type II employment multipliers for SIC code 72, based on the following formula:

\[
\text{Induced employment} = \frac{\text{Direct employment} \times (\text{sector specific Type II employment multiplier} - 1) - \text{Direct employment} \times (\text{sector specific Type I employment multiplier} - 1)}{\text{sector average GVA per FTE}}
\]
GVA and employment impacts of non-commercial LCRN clinical research activity

Approach to estimating GVA

The direct GVA impact generated by non-commercial LCRN clinical research activity delivered within NHS Trusts and other care providers was estimated using the income approach, again assuming that the activity is not profit making due to it being non-commercial in nature. The CRN provided payroll cost data for the LCRN for FY 2016/17 and FY 2017/18, and the provisional data for FY 2018/19.

The indirect and induced GVA was estimated using the ONS Type I GVA multipliers for SIC code, 86, which relates to ‘Human health services’(143), and Scottish Government Type I and Type II GVA multipliers for the same SIC code, following the same approach as outlined in section A1.1.1.

Approach to estimating employment

Data provided by the CRN on the number of FTE employees of the LCRN was used for the direct employment impacts. The FTE figure for FY 2018/19 was provisional.

The indirect and induced employment was estimated using the ONS Type I GVA multipliers for SIC code, 86, which relates to ‘Human health services’(144), and Scottish Government Type I and Type II employment multipliers for the same SIC code, following the same approach as outlined in section A1.1.1.1.

GVA and employment impacts of life sciences industry clinical research activity supported by the CRN

Approach to estimating GVA

We were unable to obtain data directly from pharmaceutical companies and CROs for our analysis. We therefore drew on the ONS UK Business Enterprise Research and Development (BERD) dataset for 2016(149) and 2017.(146) Data for 2018 was not available at the time of our analysis, we therefore used our estimate for 2017 and uplifted for inflation.

Specifically, we used ONS BERD data on total R&D expenditure and R&D expenditure on payroll costs for the pharmaceutical sector. Payroll cost data was not available for 2016, therefore we took the payroll costs as a proportion of total R&D expenditure for the pharmaceutical sector for 2017 and applied this to the 2016 total R&D expenditure to estimate payroll costs for 2016.

This R&D expenditure data captures all types of R&D activity (including nonclinical research related spend) and for the whole of the UK. We therefore, to estimate R&D payroll cost expenditure for life science industry clinical research in England which is on the CRN Portfolio, we transformed the data in the following ways:

- applying the proportion of total UK R&D expenditure that is undertaken in England, assumed to be 91.2% in 2016 and 90.7% in 2017, sourced from the ONS BERD.
- applying the proportion of pharmaceutical R&D expenditure that is spent on clinical research, assumed to be 51.4%, sourced from the ABPI(147)
- uplifting the estimate to include clinical research involving medical devices, rather than just pharmaceutical clinical research, based on the proportion of commercial studies on the CRN Portfolio that are medical device studies (14%).
- applying the proportion of commercial clinical research studies that are on the CRN Portfolio, estimated to be 87% in FY 2016/17, 84% in FY 2017/18, and 85% in FY 2018/19, based on MHRA and CRN data

This allowed us to estimate the total payroll costs associated with CRN-supported commercial clinical research activity in England undertaken by sponsor companies and CROs.

We also include a profit element as part of our GVA calculation, based on the estimated return on investment(148) of the pharmaceutical clinical research sector for 2016 and 2017(149) and the total R&D expenditure in the pharmaceutical sector in 2016 and 2017.

We summed the total estimated payroll costs and profit to estimate the direct GVA associated with CRN-supported commercial clinical research activity undertaken by sponsor companies and CROs.

We calculated the indirect and induced effects using the same approach as previously described in section A1.1.1, using SIC code 72, ‘Scientific research and development services’(150)

In order to estimate the GVA impact for 2018, we adjusted the 2017 figures for inflation(151)
Approach to estimating employment

We sourced FTE employment data relating to R&D in the UK pharmaceuticals sector from the ONS(152) for 2016 and 2017. We adjusted this figure in the same way as for payroll costs, to capture only the effect of clinical studies in England on the CRN Portfolio and to also include medical device studies. This provided us with a direct employment estimate.

We calculated indirect and induced employment effects using the same approach as described in section A1.1.1 using multipliers for SIC code 72, ‘Scientific research and development services’.¹⁵³

GVA and employment impacts of CRN-supported commercial clinical research activity delivered by NHS Trusts

We estimated the economic impact as a result of commercial studies undertaken within NHS Trusts using the average ‘per patient payments’ received by the NHS Trusts, LCRNs, CRN CC, and a sponsor company. Details of our calculation of the average per patient payment can be found in Section A1.2.

Approach to estimating GVA

Given that the NHS is non-profit making, we used payroll costs as a proxy for the direct GVA generated.

We obtained a breakdown of costs by staff costs and non-staff costs for 162 studies across 12 NHS Trusts. From this we took a weighted average which estimated that staff costs make up, on average, 62% of total clinical research costs. We multiplied this proportion by the total payment received by NHS Trusts for commercial clinical research supported by the CRN to estimate the direct GVA figure.

We estimated the indirect and induced GVA in the same manner as set out in section A1.1.1, using GVA multipliers associated with SIC code 86, ‘Human health services’.¹⁵⁴

Approach to estimating employment

To estimate the direct employment impact, in FTE terms, we used our GVA estimate and converted this to an employment estimate using the same approach as set out in section A1.1.1, using the GVA per employee for SIC code 86, ‘Human health services’¹⁵⁵ sourced from the ONS.

We calculated the indirect and induced employment in the same way as set out in section A1.1.1, using employment multipliers associated with SIC code 86, ‘Human health services’.¹⁵⁶

GVA and employment impacts of impacts of the CRN Coordinating Centre

Approach to estimating GVA

We used payroll cost data, sourced from the CRN, relating to the CRN CC for FY 2016/17, FY 2017/18, and provisional figures for FY 2018/19, as our estimate of direct GVA.

We calculated indirect and induced GVA in the same manner as set out in section A1.1.1, using GVA multipliers associated with SIC code 84, ‘Public Administration And Defence; Compulsory Social Security (Non-market)’.¹⁵⁷

Approach to estimating employment

We used data provided by the CRN on the number of FTE employees within the CRN CC for the direct employment impacts. The FTE figure for FY 2018/19 was provisional.

We calculated indirect and induced employment in the same way as set out in section A1.1.1, using employment multipliers associated with SIC code 84, ‘Public Administration And Defence; Compulsory Social Security (Non-market)’.¹⁵⁸

Approach to estimating the monetary impact on the NHS

Approach to estimating commercial payments to NHS Trusts

— We received aggregate data on per patient payments, therapeutic area, and number of patients for studies conducted from FY 2016/17 to FY 2017/18 from two NHS Trusts out of seven we approached.

— Three LCRNs and the CRN CC provided either completed costing templates or aggregate data capturing the above variables for studies conducted in their local network relating to the period FY 2016/17 to FY 2018/19.

— One sponsor company provided data on the average payment on a per patient basis, paid to the NHS Trusts it engaged with, from FY 2017/18 to 2018/19, covering 17 studies and 228 patients.

In total we received ‘per patient payment’ data for 660 study sites.
Analytical framework

As we received data from a limited selection of stakeholders the sample of per-patient data received may not be fully representative of the payments received by all study sites relating to studies on the CRN Portfolio over the relevant time period. To reflect that the per patient payments are likely to differ dependent on factors including the location in which the study was conducted and the specialty focused on, these characteristics for the sample data were compared to the overall population of studies on the CRN Portfolio. This showed that our sample over-represented studies from the South London LCRN, while the specialties of the studies in the sample data were broadly similar to those on the overall CRN Portfolio. To address this, the sample data was reweighted based on groupings of study location and of specialties from the overall Portfolio. These two weighting variables were used as the CRN considered these to be the variables that would most impact study costs, and therefore the per patient payment.

Geographic locations of studies were grouped in to two areas: Greater London and South East; and rest of England. Smaller geographic areas could not be used due to the limited sample data in some areas. We considered it important, however, to group Greater London and the South East separately from the rest of England to reflect the higher costs of NHS sites in these areas – as reflected in the market forces factor (MFF) across NHS sites which estimates the cost differences between NHS Trusts. This was considered by the CRN to reflect the main cost differences across regions.¹⁵⁹

Figure 19: LCRNs and regional grouping

**Midlands, North and South West Peninsula**
- East Midlands
- Eastern
- Greater Manchester
- North East and North Cumbria
- North West Coast
- South West Peninsula
- Wessex
- West of England
- Yorkshire and Humber.

**Greater London and South East**
- Kent Surrey and Sussex
- North Thames
- North West London
- South London
- Thames Valley and South Midlands.

Source: KPMG.

The studies from the sample data and overall population of studies on the CRN Portfolio were also grouped based on specialty, using the 6 divisions of therapeutic areas, already used by the CRN.. These are detailed in Figure 19 below:

**Figure 20: Categorisation of clinical specialities into divisions**

<table>
<thead>
<tr>
<th>Division</th>
<th>Specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 1</td>
<td>Oncology</td>
</tr>
<tr>
<td>Division 2</td>
<td>Cardiovascular Disease, Diabetes, Metabolic and Endocrine Disorders, Renal disorders, Stroke</td>
</tr>
<tr>
<td>Division 3</td>
<td>Children, Genetics, Haematology, Reproductive Health and Childbirth</td>
</tr>
<tr>
<td>Division 4</td>
<td>Dementias and Neurodegeneration, Mental Health, Neurological Disorders</td>
</tr>
<tr>
<td>Division 5</td>
<td>Dermatology, Health Services Research, Musculoskeletal Disorders, Oral and Dental Health, Primary Care, Ageing, Public Health</td>
</tr>
<tr>
<td>Division 6</td>
<td>Anaesthesia, Perioperative Medicine and Pain Management, Critical Care, Ear, Nose and Throat, Gastroenterology, Hepatology, Infection, Injuries and Emergencies, Ophthalmology, Respiratory Disorders, Surgery</td>
</tr>
</tbody>
</table>

We estimated the average per patient payment in each of the 12 sub-groups of geographic location and division.(160)

We estimated the total payment received by NHS Trusts for commercial studies for each sub-group using the following formula:

\[
\text{Induced GVA} = \text{Payments received} = \text{Average per patient payment} \times \text{number of patients recruited}
\]

Finally, we summed the values for each category and to estimate the total payments across studies on the CRN Portfolio for each year.

However, it should be noted that this did not cover patients recruited onto industry-supported IITs, as data on payments relating to these studies is incomplete and would differ from payments for a fully commercial study as they do not always fully recover costs and do not include a capacity building element. Recruits onto these studies would add between 138% and 223% to the number of recruits onto commercial studies, depending on the year. However, as data on payments to NHS Trusts for these studies is not available they have been excluded from the analysis. This is expected to result in the total payments to NHS Trusts for delivery of CRN-supported studies being underestimated.

### Approach to estimating the pharmaceutical cost saving to the NHS

As detailed in section 4.1, as well as payments to NHS Trusts for conducting commercial studies, there are other monetary benefits in the form of cost savings through the provision of pharmaceutical products by sponsor companies for clinical research.

These cost savings are applicable for a subset of industry-sponsored interventional studies using drug-products. Specifically, cost savings to the NHS from these studies are realised when sponsor companies trial new pharmaceutical products and, as a result, NHS Trusts do not incur the cost of the standard treatment. This occurs when the study treatment drug replaces the use of the standard treatment drug, identified as Group 3 below.

However, not all industry-sponsored studies result in this type of cost saving. In some cases, the study drug may be used in conjunction with the standard treatment drug so the standard treatment cost is still incurred by the NHS, identified as Group 2 below.

There are also cases where there is no standard treatment identified (as in Group 1) meaning that although there may be a cost saving associated with the trial, where the study treatment drug replaces an existing treatment, we are unable to identify this saving and therefore this group has been excluded from the analysis.

These three groups are mapped out in Figure 20 below.

### Figure 21: Study cost saving groups

- **Group 1**
  - No standard treatment identified.
  - Not possible to identify cost savings.

- **Group 2**
  - Study treatment drug used in conjunction with standard treatment drug.
  - No cost savings as the cost of the standard treatment is still incurred.

- **Group 3**
  - Study treatment drug used instead of standard treatment drug.
  - Cost savings as the cost of the standard treatment is avoided.

Source: KPMG analysis.

The CRN CC provided us with the list of commercial, interventional studies open to recruitment from FY 2016/17 to FY 2018/19, and granted us with access to the Central Portfolio Management System (CPMS). From this we extracted data and information from study protocols for a sample of 661 studies across all specialties, out of a population of 1071 commercial, interventional, drug studies on the Portfolio from 2016. We also carried out a deep dive into the oncology specialty based on the population of 372 commercial, interventional, drug cancer studies on the Portfolio from 2016.

Table 8 below shows the total number of studies in the sample of data available and how these were distributed across the treatment groups presented in Figure 20. Approximately a third of cross-specialty studies sampled, and a third of oncology studies samples were identified as being studies falling under Group 3, and therefore associated with cost savings linked to the provision of free of charge pharmaceutical products in place of standard treatments.
Table 8: Breakdown by sample for those studies resulting in a cost saving to the NHS (Group 3), for all specialties and a deep dive for oncology

<table>
<thead>
<tr>
<th>Sample</th>
<th>Number of studies in the sample</th>
<th>Percentage of sample of studies that fall into each category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group 1 – no standard treatment</td>
</tr>
<tr>
<td>All specialties</td>
<td>661</td>
<td>12%</td>
</tr>
<tr>
<td>Oncology</td>
<td>372</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: KPMG analysis. 2019. Raw data extracted from study protocols from the CPMS database held by the CRN.

For those studies identified as falling under Group 3, we extracted information from the study protocol on the name of the standard treatment drug, the maximum dosage and the duration of treatment. We then used Zenrx, a pricing database for approved pharmaceutical products, to extract information on the price for the standard treatments.

If information on the dosage and duration and treatment was not available from the study protocol this was sourced from the emc database. Further details of the approach and data sources are included in Table 9 below.

Figure 22: Steps taken to identify the NHS cost saving per study

<table>
<thead>
<tr>
<th>Step 1.</th>
<th>Randomly select a sample of drug-based industry-sponsored studies from the Portfolio.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2.</td>
<td>Using the study protocol, assess if the trial treatment replaces the standard treatment. IF NO: No cost saving identified. IF YES: Cost saving. Proceed to Step 3.</td>
</tr>
<tr>
<td>Step 3.</td>
<td>Using the study protocol, extract information on the name and dosage of the standard treatment drug.</td>
</tr>
<tr>
<td>Step 4.</td>
<td>Extract information on the value of the standard treatment drug (using Zenrx database).</td>
</tr>
<tr>
<td>Step 5.</td>
<td>Multiply drug value by dosage and duration of treatment to estimate the NHS cost saving per patient.</td>
</tr>
</tbody>
</table>

Source: KPMG analysis.

Table 9: Sources of information to estimate drug value

<table>
<thead>
<tr>
<th>Databases used for data extraction</th>
<th>Pricing database for approved pharmaceutical products</th>
<th>Prescribing information for licensed medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zenrx database</td>
<td>This database contains pricing information for approved products in a number of countries, including the UK. It is searchable based on compound and active ingredient, brand name or by manufacturer/distributor. It returns information on the quantity, unit and price (in GBP).</td>
<td>This database contains up-to-date information on prescribing information for licensed medicines. It draws on summaries of product characteristics and patient information leaflets. This database is used if the study protocol did not contain information on maximum dosage and/or duration of treatment for the named standard treatment drug.</td>
</tr>
</tbody>
</table>

We used the data extracted for the sample of all specialty studies and the sample of oncology studies to estimate the average cost saving for each.

We used the average cost saving to scale up to estimate the saving for all drug-based commercial interventional studies in the CRN Portfolio expected to have a cost saving.\(^{161}\)

**Limitations of our approach**

The samples of studies were randomly selected from across the CRN Portfolio, however at the end of 2016 the CRN introduced a new database to navigate the studies included on the Portfolio. Due to the transferring of data from the old database to the new one, some studies were not held on the Integrated Research Application System (IRAS, which is part of CPMS, and which contains protocol information). Studies which were not identified on the system were discarded from the sample, which means that any differences between those studies on the system and those not on the system would bias the results either positively or negatively.

In addition, where study data was on the system, the protocol documents contained within IRAS did not consistently record information on the standard treatment name (or dosage and duration of treatment), and whether the trial treatment fully replaced the standard treatment in the trial. In our approach, of the sample of studies identified on the system, we have only captured the cost savings associate with those for which we were able to quantify the saving. This means that our estimates may underestimate the total cost savings, if there are also cost savings associated with studies for which data was incomplete.

In addition, we scaled up the estimated cost savings based on:

- the number of recruits onto commercial interventional studies using drug-products, and
- our estimate of the proportion of these for which cost savings would apply.

However, this did not cover cost savings relating to any drugs provided free of charge for industry-supported IITs, as data on free provision of trial drugs for these studies is not consistently recorded and it would not apply to all IITs. The exclusion of these studies is expected to result in the total estimated costs savings to NHS Trusts being underestimated.
Appendix 3: Stakeholders interviewed

<table>
<thead>
<tr>
<th>Stakeholder type</th>
<th>Organisation/area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsor company</td>
<td>AbbVie</td>
</tr>
<tr>
<td>Sponsor company</td>
<td>Janssen</td>
</tr>
<tr>
<td>Sponsor company</td>
<td>Not disclosed</td>
</tr>
<tr>
<td>Sponsor company</td>
<td>Not disclosed</td>
</tr>
<tr>
<td>Contract Research Organisation</td>
<td>IQVIA</td>
</tr>
<tr>
<td>Contract Research Organisation</td>
<td>Covance</td>
</tr>
<tr>
<td>Charity</td>
<td>Fight for Sight</td>
</tr>
<tr>
<td>Charity</td>
<td>British Heart Foundation</td>
</tr>
<tr>
<td>Charity</td>
<td>Cancer Research UK</td>
</tr>
<tr>
<td>Principal Investigator</td>
<td>South West region</td>
</tr>
<tr>
<td>Principal Investigator</td>
<td>Cannock Chase CCG and Stafford &amp; Surrounds CCG</td>
</tr>
<tr>
<td>Principal Investigator</td>
<td>Keele University</td>
</tr>
</tbody>
</table>
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