UK ONCOLOGY SECONDARY CARE MARKET ASSESSMENT AT TRUST LEVEL

Based on National Health
Service Data

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Contents

Abstract

Today a pressing matter for leaders of pharmaceutical companies is to ensure rewarding customer engagement with quick and efficient decision making in every department. Leadership heavily depends upon data and analytics to take an informed and effective decision. But in this era of digital transformation, data is gold and database companies provide expensive subscriptions for the datasets. Analytics applied on these customized datasets makes it costlier.

This paper is an attempt to unlock the potential of an open data source. National Health Service (NHS) of UK provide great number of datasets which can answer various complex business questions and can be helpful in understanding the complete UK pharmaceutical ecosystem. NHS is government funded and a very reliable institute in the UK. NHS collects data from various sources. We used one of its open data to understand the oncology market of UK at the trust level. NHS data can contribute immensely in sales force effectiveness and provide a leading edge over the competitors in the market.

Many pharma companies are already utilizing this data by using big data analytics. Purpose of this paper is to establish a strategic framework for leaders of pharma companies to improve the decision-making using analytics on various open datasets provided by NHS, keeping the data governance model intact.

Oncology is one of the therapeutic areas where pharma companies are investing heavily. In this paper, we try to understand the oncology market of UK using the open source NHS data.

Introduction

Overview of Oncology and NHS Data

Oncology is the study of cancer which includes diagnosis, treatment and prevention of cancer. Cancer is uncontrolled cell growth in the body and can occur in any part of the human body. Broadly, cancer can be divided into two major types:

- **Solid tumors:** Cancers which are related to human organs like lung cancer, breast cancer, head and neck cancer, etc.
- **Hematological Cancers:** Cancers which are related to blood like myeloma, leukemia, lymphoma, etc.

Since massive investments are made on treating and curing cancer, it becomes critical for companies to invest in drugs that can improve quality of life for cancer patients around the globe.

Before exploring the oncology market landscape of United Kingdom at a trust level, we will first understand how the healthcare facilities are setup in UK. Below is a flow chart explaining how NHS is being setup and how it controls entire UK healthcare ecosystem.

National Health Service in UK
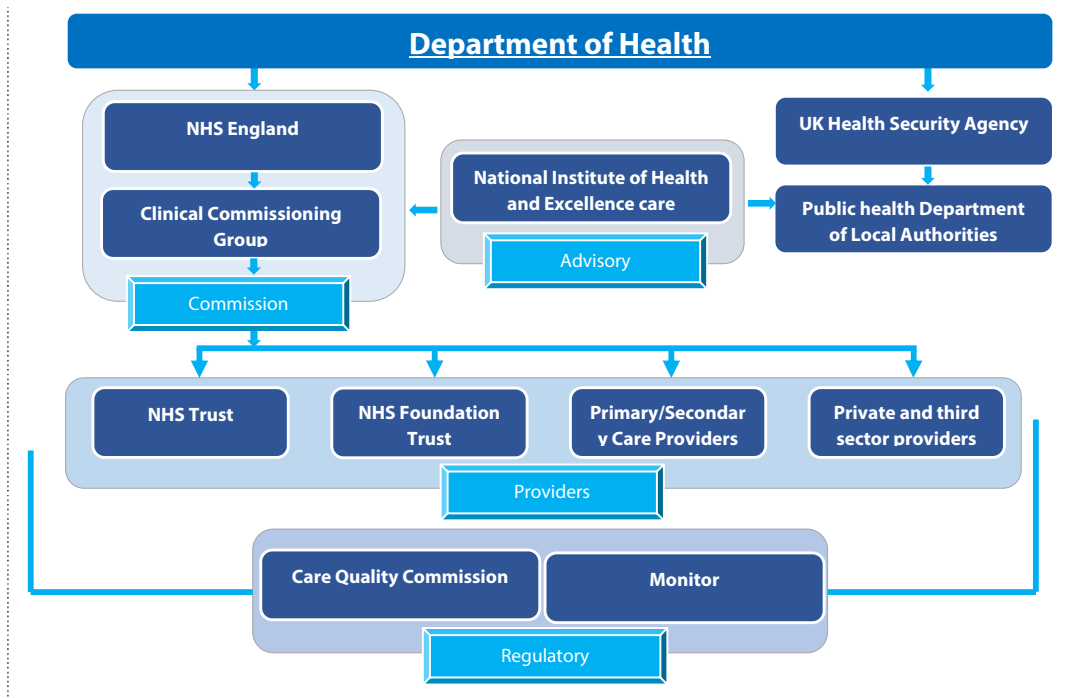
Health coverage in England has been universal since the creation of the NHS. (10) The NHS was set up under the National Health Service Act of 1946. (2)

The configuration of NHS England is as follows:

- The Department for Health is the government department responsible for financing and providing healthcare related policies.

- The National Institute for Health and Care Excellence is responsible for providing analysis and action points to keep healthcare system updated.

- UK Health Security Agency is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents, and other health threats.

- Sustainability and Transformation Partnerships (STPs) were introduced in 2016. They bring together NHS providers, commissioners, local authorities and other partners.

- Clinical Commissioning Groups (CCGs) are a group of hospitals and services in the UK. They're responsible for commissioning most NHS services.

- NHS England ensures that there is an effective system of CCGs and provide support for commissioning.

- NHS Trust is a healthcare provider, set up to deliver hospital and community services, and other aspects of patient care. There are 227 trusts in England.

- NHS Foundation Trusts provide care to the CCGs commission.

- Primary Care is delivered by general practitioners who often work holistically, thinking of a patient in their entirety.

- Secondary Care is provided to patients by specialists and healthcare professionals to whom patients are often referred through a GP.

- The Care Quality Commission is an independent monitoring agency, which examines the overall quality of healthcare. (3)

- Monitor is responsible for setting prices for NHS-funded services and helping commissioners make sure that essential local services for patients continue even if providers get into serious difficulty.

In this paper, we will understand the oncology market from the trust level. A trust takes care of couple of hospitals. Basically, a trust is a group of hospitals. In the UK, there are around 227 trusts. (4) A comprehensive list of the NHS trusts is available in the appendix section.

NHS Data Offerings

Overview of Oncology and NHS Data

NHS collects healthcare data at various points to improve overall healthcare system. NHS data can provide deep insights for any market of UK, it can be helpful in creating Market landscape, Market Insights and Market Intelligence reports.

Apart from providing Secondary Care Medicine Data (SCMD) and Prescribing data, NHS digital provides the following datasets in their official website. [11]

Critical Care Data
- All components of critical care support are captured from all UK hospitals.

Diagnostic Imaging Data
- All radiology data are collected and collated in this dataset.

Emergency Care Data
- National data for urgent care support patients.

Female Genital Mutilation Datasets
- Provides all information on FGM.

Improving Access to Psychological Therapies Data Set
- Collects data for Psychological therapies.

Maternity Services Data
- All pregnant women data are collected at every stage of pregnancy.

Mental Health Services Data
- Data of mental health service providers across UK.

Neonatal Critical Care Minimum Data
- Complete journey of patient while in NICU is captured in this dataset.

Pediatric Critical Care Minimum Data
- Complete journey of patient while in PICU is captured in this dataset.

Illustrative Data Analysis

Data Sources

In this paper, we have touched upon the Secondary Care Medicine Data and tried to understand the Market Landscape of Oncology in UK.

Secondary care medicines data (SCMD) contains volume sales data of each trust, and it is updated monthly.
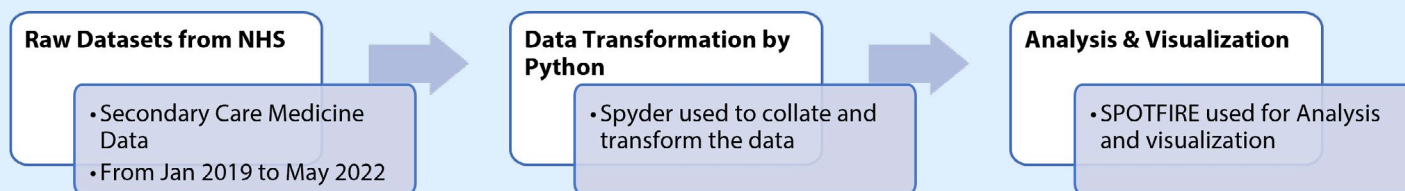
Scope of Analysis

- All analysis is done on volume sales and not on value sales of drugs.
- Study period is from Jan 2019 to May 2022.
- Oncology drug considered for market creation is in appendix. Drugs mentioned in the list are considered under oncology market.

Methodology

The raw data is available in CSV format monthly. For every month-on-month, we get a CSV file with volume sales of drugs. A monthly file on an average contains around 300 thousand rows of data. Spyder and Python code were used to collate all data.

Collated data is above 10 million rows, we used Spotfire as preferred tool for data analysis and visualization.

Below is a flow diagram for the same.

Raw Datasets from NHS
- Secondary Care Medicine Data
- From Jan 2019 to May 2022

Data Transformation by Python
- Spyder used to collate and transform the data

Analysis & Visualization
- SPOTFIRE used for Analysis and visualization

Analysis and Findings

Data Study and Inferences

NHS provides a detailed data of volume sales. Here is a snippet of all the fields under Secondary Care Medicine Data provided by NHS.

YEAR MONTH	ODS CODE	VMP SNOMED CODE	VMP PRODUCT NAME	UNIT OF MEASURE IDENTIFIER	UNIT OF MEASURE NAME	TOTAL QUANITY IN VMP UNIT
202205	RQ3	5175111000001100	Lactose powder	258682000	GRAM	500
202205	RPY	35923911000001100	Simple linctus	258773002	ML	3200
202205	RPY	7527211000001100	Toiletries gel	258773002	ML	1400
202205	RPY	14608811000001100	Calamine lotion	258773002	ML	200
202205	RQ3	14608811000001100	Calamine lotion	258773002	ML	999
202205	RQ3	3465911000001100	Glucose tablets	428673006	TABLET	280
202205	RQ3	4217811000001100	Glycerol liquid	258682000	GRAM	250
2019-01	R1A	413382007	Abacavir 600mg / Lamivudine 300mg tablets	428673006	tablet	540
2019-01	R1A	34155711000001100	Abiraterone 500mg tablets	428673006	tablet	14

Fields	Definitions
YEAR MONTH	Defines data for specific month
ODS CODE	Points to specific data Facility Code, helps in determining the trust
VMP SNOMED CODE	Provides vocabulary and segregation for medicines and devices
VMP PRODUCT NAME	Product name with its strength
UNIT OF MEASURE IDENTIFIER	Provides specific identifier to each measurement scale of drugs
UNIT OF MEASURE NAME	Unit in which drug is measured
TOTAL QUANITY IN VMP UNIT	Total quantity issued against specific ODS code

We have analyzed the sales volume data from Jan 2019 to May 2022. Interesting facts were unearthed during our analysis.

Mid and South Essex NHS Foundation Trust has the highest volume sales of oncology drugs. Hospitals which come under this trust are:

- Southend Hospital
- Brentwood Community Hospital
- Mid Essex Broomfield Hospital
- Braintree Community Hospital
- Marlborough House (Meht)
- Chelmsford & Essex Hospital

Data below exhibits the **top 5 trusts** that handled most number of cancer patients and thus have the **highest volume sales** in 41 months (Jan 2019 to May 2022).

Rank	Trust
1	Mid and South Essex NHS Foundation Trust
2	Norfolk and Suffolk NHS Foundation Trust
3	South London Healthcare NHS Trust
4	Chesterfield Royal Hospital NHS Foundation Trust
5	Salisbury NHS Foundation Trust

Let's deep dive a little and understand the volume sales of top oncology molecules as per **route of administration**.

When we compare capsule volume sales in 41 months (Jan 2019 to May 2022) vs 12 months (April 2021-May 2022) in table 3.1, it's evident that Kinase inhibitors is the popular choice. Lenalidomide which is prescribed for hematological cancer is continuously growing and its patented brand Revlimid is a top selling oncology brand developed by Celgene. [6]

Table 3.1

Rank	Highest selling Capsules (41 months)	Highest selling Capsules (12 months)
1	Enzalutamide	Lenalidomide
2	Nilotinib	Nilotinib
3	Lenalidomide	Acalabrutinib
4	Ibrutinib	Alectinib
5	Alectinib	Encorafenib

Investigation of Tablets form.

Table 3.2

Rank	Highest selling Tablets (41 months)	Highest selling Tablets (12 months)
1	Dexamethasone	Dexamethasone
2	Capecitabine	Capecitabine
3	Enzalutamide	Enzalutamide
4	Letrozole	Letrozole
5	Mercaptopurine	Mercaptopurine

In case of tablets, the picture does not change. Dexamethasone and Capecitabine are leading in volume sales as per table 3.2.

It is observed that Enzalutamide is available in both capsule and tablet form under 40 mg strength. It is used for advanced prostate cancer. According to revenue, Pfizer's Xtandi is among the top 10 oncology brands.

Table 3.3

Rank	Highest selling Powder (41 months)	Highest selling Powder (12 months)
1	Cyclophosphamide	Cyclophosphamide
2	Trastuzumab	Azacitidine
3	Azacitidine	Trastuzumab
4	Oxaliplatin	Romiplostim
5	Pembrolizumab	Rasburicase

As we see from table 3.3, in the past year, Romiplostim and Rasburicase have performed well.

Romiplostim is a platelet stimulating agent and in year 2021, 79K vials of Romiplostim were sold. The highest sales were in Barts Health NHS trust.

Injectables in vials are commonly used for treating cancer patients. In table 3.4, sales of injectables are compared over a period of 41 months.

Table 3.4

Rank	Highest selling Injectables (41 months)	Highest selling Injectables (12 months)
1	Carboplatin	Carboplatin
2	Paclitaxel	Paclitaxel
3	Dexamethasone	Oxaliplatin
4	Rituximab	Dexamethasone
5	Cisplatin	Rituximab

Table 3.4 shows no major change in the past year. Oxaliplatin based regimens are preferred than Cisplatin. In gastric cancer, Oxaliplatin has been shown to be at least as effective as Cisplatin, but with less toxicity and a better tolerability profile, especially for older patients. [8]

Above we discussed the top oncology molecules as per volume sales. Now we will identify the top oncology blockbuster drugs. [6]

Table 3.5 exhibits the top oncology brands.

Table 3.5

Rank	Brand	Generic Name	Company	Indications
1	Revlimid	Lenalidomide	Celgene	Multiple Myeloma; Myelodysplastic Syndromes; Mantle Cell Lymphoma
2	Opdivo	Nivolumab	Bristol-Myers Squibb; Ono Pharmaceutical	Non-Small Cell Lung Cancer; Metastatic Melanoma; Renal Cell Carcinoma; Classical Hodgkin Lymphoma
3	Imbruvica	Ibrutinib	Abbvie (Pharmacyclics); Johnson & Johnson	Chronic Lymphocytic Leukemia; Mantle Cell Lymphoma; Waldenström Macroglobulinemia
4	Keytruda	Pembrolizumab	Merck & Co.	Advanced Melanoma; Non-Small Cell Lung Cancer; Head and Neck Squamous Cell Cancer
5	Ibrance	Palbociclib	Pfizer	Metastatic Breast Cancer
6	Tecentriq	Atezolizumab	Roche	Urothelial Carcinoma; Non-Small Cell Lung Cancer
7	Darzalex	Daratumumab	Johnson & Johnson	Multiple Myeloma
8	Perjeta	Pertuzumab	Roche	Her2-Positive Breast Cancer
9	Xtandi	Enzalutamide	Astellas Pharma; Pfizer	Prostate Cancer
10	Avastin	Bevacizumab	Roche	Colorectal Cancer; Non-Small Cell Lung Cancer; Ovarian Cancer; Cervical Cancer; Renal Cell Carcinoma; Glioblastoma

As of December 2021, Revlimid (Lenalidomide) has had annual sales of $2.3 billion according to IQVIA data. [7]

The volume sales of Lenalidomide 10mg strength capsules are highest in demand followed by the sales of Lenalidomide 25mg and 15 mg capsules.

Revlimid (Lenalidomide) is prescribed in cases of Myelodysplastic Syndrome, Multiple Myeloma & Mantle Cell Lymphoma. The drug is not prescribed for any solid tumor but still has turned out to be the top oncology drug. The patent of Revlimid (Lenalidomide) will be till 30th Jan 2026. For the last three years, the drug sales has been reaching new heights, as seen in the chart below.
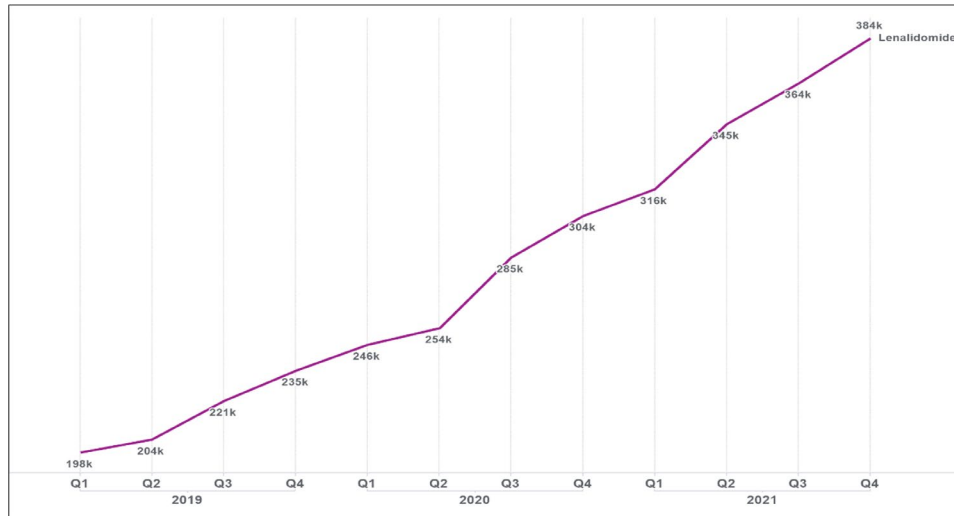
South London Health Care Trust has the highest volume sales of Lenalidomide followed by Western Norfolk and Suffolk NHS Foundation Trust.

Enzalutamide, Lenalidomide, Ibrutinib and Pembrolizumab are few of the drugs which are blockbusters as a molecule and as well as a brand.

Inference

Key Pointers

- The volume sales of oncology drugs clearly show that NHS trusts are handling large number of cancer patients. The oncology market is open for new drugs. In last 12 months, molecules like Encorafenib, Romiplostim and Rasburicase have entered the market and are now high-volume selling drugs.

- Platin based therapies and drugs like Nilotinib, Dexamethasone and Capecitabine are heavily used and have been ruling the market for the last 5 years.

- Lenalidomide is the molecule that has had high sales in terms of both volume and value, though most of its 12 patents have expired or are about expire in 2026. The crystal polymorph form of the drug expires in 2026. Companies like NATCO are already manufacturing capsules under brand name of "Lenalid".

- NHS data is sufficient to provide deeper analytics and understand various therapeutic segments. It can provide sales as well as prescription analysis. COVID NHS played a crucial role in measuring safety and effectiveness of COVID-19 vaccine. (12) It helped clinicians and pharma companies in making quick and efficient decisions. It can be helpful in identifying potential risk factor for patients and can initiate early intervention by the doctor to stop disease progression.

Unlocking Organization Potential through NHS Data

NHS provide numerous datasets which can be rightly used for better patient outcomes. NHS data can be useful in commercial decision making through the leadership of pharma companies but utilizing the extensive data and coming out with actionable insight is a challenge.

Infosys Consulting (IC) has its expertise in Technology and Advance Analytics. Applying IC acumen on NHS data will answer some serious business questions and will help pharma houses to take informed decisions. NHS data can help understand:

• Supply demand of any drug

• Prescribing habits of clinicians

• Market landscape of any therapeutic segment or specific molecule

• In-patient and out-patient flow

• Market assessment

• Sales and marketing insights

• Sales force analytics

Above listed are just examples. NHS provides data in regular intervals, mostly monthly, and reporting tools on these data sets can help sales, marketing and procurement departments of pharmaceutical houses immensely.

Useful Links

Appendix
• Drugs considered for creating Cancer Market
• List of NHS trust considered for the analysis

References

1. What Is Cancer? - NCI
2. England | Commonwealth Fund
3. Structure of The NHS - The Medic Portal
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5. Secondary Care Medicines Data (SCMD) - Datasets - Open Data Portal BETA (nhsbsa.net)
6. The top 15 best-selling cancer drugs in 2022 | Fierce Pharma
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9. Cancer Drugs - NCI
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11. Data sets - NHS Digital
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About the Authors

Himanshu Rao

- Himanshu has 9+ years of experience in the healthcare domain with expertise in commercial analytics, market intelligence and strategic consulting.
- Experience in providing automated analytical solutions to pharma stakeholders.
- Proficient in stakeholder management and experienced as Scrum Master/Project Manager.

Reviewer

Harsh Jain

- Harsh Jain brings profound knowledge on leveraging power of data and analysis within Life Sciences and Healthcare space having worked across UK, Europe, Asia-Pacific and Canada regions and counts MSD, NHS UK, GSK, AZ, Allergan among his key customer experiences.
- He leads data and analytics area for IC HLC Europe and is currently based out of London, UK.

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