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Proactive Approach to Patient Centric Transformation Using Sentiment Analysis to Monitor Healthcare Targets

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Abstract

The healthcare system in the UK both in primary and social care has experienced unprecedented challenges dealing with the COVID-19 pandemic and "stress tested" like many other healthcare systems worldwide. This has resulted in backlog of patient referrals and treatments, ageing population, staff morale and patient dissatisfaction with the UK's National Health Service (NHS) is at a record low, with waiting times for emergency care being one of the biggest challenges. At some of the worst performing NHS trusts, patients are waiting over 12 hours for care despite the target for patients to receive care in under 4 hours. The current UK government is trying to improve the performance of NHS trusts by implementing targets and suggesting dismissal of management at underperforming trusts which are unable to improve. The use of digital innovation and initiatives offers the opportunities to assist in making transformative changes to the healthcare systems by improving efficiency and allowing "Smarter working" using a myriad of digital solutions. The paper outlines an opportunity for NHS trusts to undertake sentiment analysis of social media posts allowing qualitative data to be quantified using social media analytics software tools, allowing patient feedback to be analysed to identify hotspots for improvements or determine if healthcare providers are meeting their targets. Examples provided of how this could be performed using social media analytics software to triangulate with patient feedback and staff perceptions and a series of recommendations are discussed on how healthcare could undertake this as part of a provision of digital transformation initiatives to move to patient centric care.

Keywords

Social Media, Sentiment Analysis, Healthcare Targets, Digital

Transformation, Patient Centric

1. Introduction

One in four people are forced to endure "life or death" delays of over a 12-hour wait in England's worst performing NHS trusts, significantly higher than the 4-hour target and only 57% of patients were treated, discharged or admitted to a bed the previous month at any large NHS trust in November 2024 [1]. In the United Kingdom the NHS is the largest employer, the fifth worldwide after the US Department of Defence [2] and consequently, with a budget of £192 billion for 2025/26 [3], has the resources for economies of scale by reshaping using innovation and initiatives of digital transformation to make changes across the health system and to provide a patient centric model. The growth of social media has dramatically expanded in recent years, with over 5.17 billion users worldwide [4], providing positive and critical comments which could be harnessed to provide solutions in using transformation to make positive changes in performance targets. There are some good examples of digital solutions in the NHS but they are in different regions with moderate coordination or repository of solutions to use "off the shelf" solutions. Utilising "off the shelf" software provides faster benefits than developing a bespoke solution including quicker implementation, reliability, user support, and better scalability reducing the risk of failure [5]. This paper aims to answer the research question: *Can sentiment analysis provide transformational change to improve healthcare targets*? Section 2 discusses the challenges that the National Health Service (NHS) trusts are facing in England around waiting times and the action being taken by the government to increase performance against targets. Examples are provided where trusts are undertaking innovative ways to make improvements. Big Data Analytics and social media are discussed, with examples of how they have been successfully used in healthcare. Section 3 illustrates how social media analytics can be adopted by healthcare trusts to undertake sentiment analysis to identify hotspots. Section 4 discusses the findings of research and proposes a number of recommendations for digital transformation initiatives. Section 5 concludes the paper and proposes future research.

2. Background

Recent surveys have shown that satisfaction with the UK's National Health Service is at a record low. The 2023 Kings Fund survey recorded the lowest levels of public satisfaction since the survey began in 1983 with only 24% of the public being satisfied with the NHS and 13% being satisfied with social care [6]. One of the biggest issues is hospital waiting times. A quarter of patients waiting for accidents and emergencies (A&E) treatment have been left waiting up to 12 hours in the busiest hospitals, with almost 14,000 people dying due to excessively long waiting times [7]. The

Guardian ([8], p. 1) reported that: "dissatisfaction with the service has more than doubled in just two years, from 25% in 2020 to 51% in 2022, a period marked by COVID-19's arrival, the NHS suffering a worsening shortage of staff and growing numbers of patients—now 9 million across the UK—facing long waits for treatment". As of the summer of 2024, the number of people visiting accidents and emergencies was above pre-pandemic patients, and the number of patients waiting over 4 hours for emergency treatment rose consistently between 2015 and 2020 with a new record being set in December 2022 [9]. **Figure 1** shows Public Satisfaction with the NHS between 1983 to 2023 reproduced from The King's Fund [6].

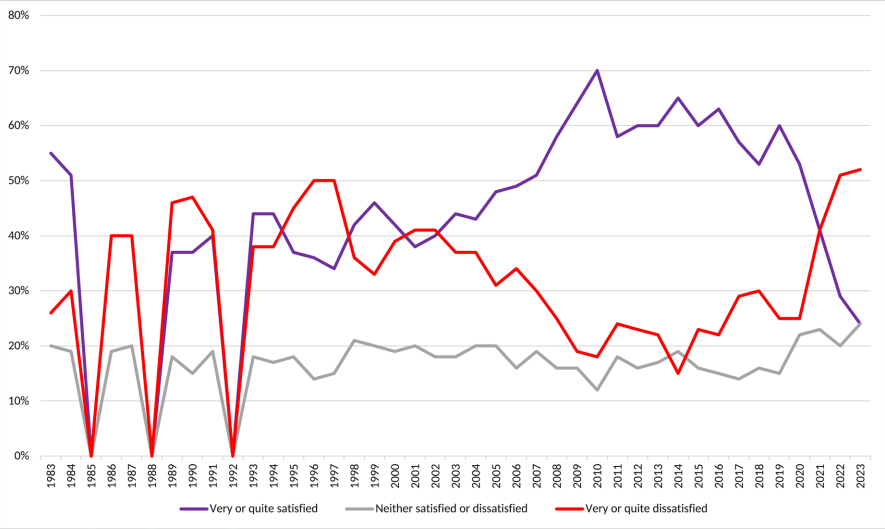

Figure 1. Public satisfaction with the NHS 1983 to 2023 reproduced from The King's Fund (2024).

Lord Darzi was recently commissioned by the UK government to undertake an investigation into the state of the NHS and produced a series of recommendations, one of being investment and utilisation of technology to transform UK healthcare [10]. The cover letter to the report stated: "*Over the past 15 years, many sectors of the economy have been* radically *reshaped by digital technologies. Yet the NHS is in the foothills of digital transformation. The last decade was a missed opportunity to prepare the NHS for the future and to embrace the technologies that would enable a shift in the model from 'diagnose and treat' to 'predict and prevent'—a shift I called for in High Quality Care for All, more than 15 years ago*" ([10], p. 1). Similarly, a report published in 2023 identified a number of reasons why digital transformation in the NHS is challenging including: insufficient digital infrastructure and issues with legacy systems; the lack of integration between the different information systems used; a lack of digital leadership; the lack of specialist digital skills and digital skills in the wider workforce; and the risk of excluding patients from care who cannot or prefer to not use digital services [11]. Another issue faced by the NHS is an ageing population in the UK, with over 900,000 older people being admitted to hospital annually due to the

NHS failing to keep them healthy at home [12]. A number of other reasons why NHS England is failing have been suggested including: healthcare buildings and estates being old and crumbling; population health is worsening; continuing staff burnout and work pressures; continuing lack of access to adult social care; an inadequate workforce plan; lack of access to urgent and emergency care; and continued industrial action [13] [14]. As part of the UK governments plan to reform the NHS, hospital league tables are being introduced to monitor performance and managers at failing hospitals could be dismissed if they are unable to make adequate improvements while top performing hospitals will have more freedom over their spending [15].

2.1. NHS Performance Targets and Healthcare Providers' Performance

NHS England have a number of targets which include 18-week waiting list for hospital treatment, 62 days to treatment after a referral for cancer, various ambulance response time targets based on category and diagnostic tests [9]. The 4-hour Accident and Emergency (A&E) target is one of the NHS's Key Performance indicators which was originally set to treat if necessary, discharge or admit 95% of patients within 4 hours [16]. NHS England reduced this target to 78% of patients seen within 4 hours in the 2024/25 priorities guidance [17]. The King's Fund reports that some of the factors which have impacted the A&E waiting times in recent years are the high levels of bed occupancy, delays transferring patients out of hospital, increased number of patients and staff shortages [18]. **Figure 2** shows how the percentage of patients attending A&E waiting over 4 hours has increased over time in England, Scotland and Wales [19].

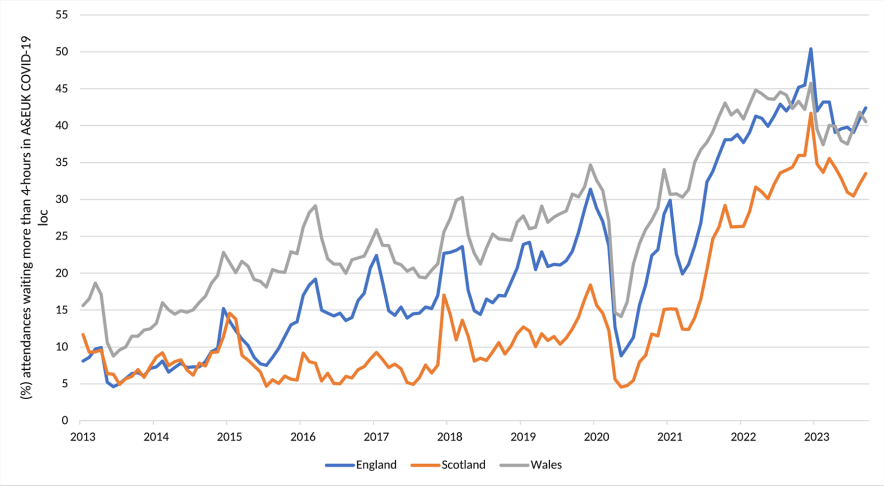

Figure 2. Monthly percentage of Accident and Emergency (A&E) attendances waiting longer than four hours in England, Scotland, and Wales, from January 2013 to September 2023 reproduced from Office for National Statistics (2024).

The Telegraph [20] has developed an NHS Data Tracker to compare NHS trusts

in England based on their performance against targets using data from NHS England and NHS Digital. When the tool was used on 28th October 2024, no NHS trusts met the target of 95% of patients being seen in emergency departments within four hours. Table 1 shows the top 5 and bottom 5 performing NHS trusts against the target of 95% of patients seen in emergency departments within 4 hours. At the time the tool was used, none of the NHS trusts met this target.

Table 1. Top and worst performing NHS Trusts for emergency department performance against target of 95% of patients seen within 4 hours, based on data from The Telegraph's NHS Data Tracker tool [20] on 28th October 2024.

Rank	Top Performing NHS Trusts	% of Patients seen within 4 hours	Lowest Performing NHS Trusts	% of Patients seen within 4 hours
1	Northumbria Healthcare NHS Foundation Trust	89.0%	East Cheshire NHS Trust	51.7%
2	Maidstone and Tunbridge Wells NHS Trust	83.0%	Shrewsbury and Telford Hospital NHS Trust	52.2%
3	Homerton University Hospital NHS Foundation Trust	83.0%	North Bristol NHS Trust	58.2%
4	Bradford Teaching Hospitals NHS Foundation Trust	82.8%	Wirral University Teaching Hospital NHS Foundation Trust	58.7%
5	West Hertfordshire Hospitals NHS Trust	80.7%	University Hospitals of Leicester NHS Trust	58.9%

There are a number of case studies available which outline how NHS Trusts are undertaking improvement programmes to meet the 95% target, including Trusts in Table 1. Patient Perspective [21] outline a number of case studies where NHS Trusts are undertaking innovative Emergency Department improvement programmes. Bradford Teaching Hospitals Foundation Trust [22] have improved ward-based data decision making, leading to earlier discharge for patients and changes to staffing models, reducing the initial assessment time from 32 to 25 minutes. Torbay and South Devon NHS Foundation Trust [23] experienced issues with ambulance handover delays during 2022/23, they identified a patient flow imbalance and improved performance by increasing the number of patient discharges before noon and at weekends. By prioritising these two areas, the Trust saw a reduction in handover delays to 55% over 15 minutes in April 2023, with the 2023/2024 priority being to continue with this work to target no ambulance

handover delays by the end of March 2024. Similarly, Oxford University Hospital NHS Foundation Trust [24] have also focused on increasing the speed of ambulance handovers, improving patient flow and discharges.

Surrey and Sussex Healthcare NHS Trust [25] developed the SASH+ improvement methodology which utilises continuous improvement (Kaizen) to enable their staff to improve the care for patients and their colleagues, assisting the Trust to achieve and maintain the Quality Care Commission Outstanding rating. In 2023/2024 the trust continued to focus on maintaining its emergency department access standard with 76% of patients being seen, admitted or discharged within 4 hours. Some of the improvement programmes undertaken included reconfiguration of inpatient beds to reflect the changing patterns of demand to enable patients to be admitted and receive specialist care promptly [26]. The trust's achievements during 2023/24 included annual 90% of ambulances offloading patients within 30 minutes and emergency department performance reached 68.8%, above the national average of 60.9% of patients being seen within 4 hours [27].

The bottom performing NHS trusts also continue to make improvements or there are contributing factors as to their lower performance. East Cheshire NHS Trust were the Trust with the highest waiting times, however their only hospital with an emergency department was being refurbished, including an extension to the department and adding additional treatment rooms to improve patient flow and experience [28]. Eight hour wait times in ambulances have been reported at Arrowe Park Hospital under the Wirral University Teaching Hospital Trust due to extremely high levels of patients attending the emergency department [29], NHS Bristol NHS Trust has also warned visitors to not attend Southmead Hospital if they have non-emergency conditions as the emergency department is also under "intense pressure" [30]. Shrewsbury and Telford Hospital's Emergency Department was shown on a Channel 4 Dispatches programme which highlights a number of issues related to poor standards of patient care including extremely long waiting times, people in pain cared for in corridors and a patient urinating in a public area due to a lack of private space [31]. A report to NHS Shropshire Telford and Wrekin's Integrated Care Board indicated that the trust must reduce emergency department the waiting times for patients waiting longer than 12 hours from the current level of 18% [32]. The report also outlined that there had been improvement in the emergency department performance metrics including ambulance offload delays and less usage of corridor care, however ongoing workstreams are targeting waiting times [33].

Another challenge facing Healthcare is misinformation through the use of social media. The British Medical Journal determined that 11% of YouTube's most viewed videos regarding the COVID-19 vaccines contradicted information from the World Health Organisation (WHO) or the Centers for Disease Control and Prevention [34]. However, social media has also shown to be an effective way of disseminating vital information to the public. 70% of TikTok's audience are aged between 17 to 34, therefore during the COVID-19 pandemic, TikTok was used by Berkshire Healthcare NHS Foundation Trust to reach these demographics who

are difficult to reach through conventional channels [35]. Additionally, the Trust used the Orlo social media management platform to plan campaigns, post scheduling and monitoring metrics such as shares, likes and comments to provide insightful analysis. The Trust have produced a series of videos including topics such as diabetic emergencies, EpiPen usage and sepsis awareness which have reached hundreds of thousands of viewers and sparked meaningful conversations within their community around these subjects [35]. Therefore, this highlights the importance of how the NHS can effectively use social media.

The influence of social media feedback also has a strong influence on policy making by organisations. For example, Vinted a second hand clothes retailer with over 16 million registered accounts recently abandoned its changes to deliveries due to backlash on social media [36]. This presents an opportunity for NHS trusts to use social media to triangulate with other performance measures to validate whether the increase in performance is reflected in the patient feedback provided via social media.

Social media analytics can be used by healthcare providers internationally to monitor social media relating to their organisations for a variety of purposes including understanding patient satisfaction, areas of concern and also identify misinformation.

2.2. Big Data Analytics and Social Media Analytics

Social media is one of many types of Big Data. Big Data is defined as "*an umbrella term used to describe a wide range of technologies that capture, store, transform and analyse complex data sets which can be of a high volume, generated at a high velocity in a* variety *of formats*" ([37], p. 3034). Volume, velocity and variety are seminal characteristics of Big Data, known as the three Vs, which have been extended to include additional Vs such as Value and Veracity, with the number of Vs utilised by different publications currently reaching 51 [38]. Big Data consists of data stored in structured, unstructured and semi-structured formats [39]. One of the biggest drivers for Big Data are IoT (Internet of Things) and smart devices which include smartphones which are comprised of numerous digital sensors such as camera, audio recorders and GPS locators which all produce Big Data [40] [41]. Three categories of Big Data have been defined: machine-generated data produced sourcing including computer networks, satellites, sensors and streaming data; human-generated data such as social media content and identification data; and business-generated data in the form of transactional, corporate and government agencies' data [42].

Big Data Analytics is the process of extracting insights from Big Data utilising techniques and software tools not achievable using traditional Business Intelligence software because of its inability to analyse unstructured data or the large volumes of Big Data. A widely accepted definition of Big Data Analytics is: "*a new generation of technologies and architectures, designed to economically extract value from very large volumes of a wide variety of data, by enabling high velocity capture, discovery and/or analysis*" ([43], p. 262). Sivarajah *et al.* [44] outline five

categories of Big Data Analytics: descriptive analytics, inquisitive analytics, predictive analytics, prescriptive analytics and pre-emptive analytics. Additional categories of Big Data Analytics include social media analytics, sentiment analysis, audio analytics, text analytics and video analytics [39]. Benefits of adopting Big Data analytics have been widely reported including faster and cheaper development of products [45], dynamic pricing, fraud detection and improved stock control [46], customer demand forecasting, supplier defect tracking and digital decision making [47].

One usage of Big Data Analytics healthcare providers can utilise to measure patient satisfaction is social media analytics. Social media data is publicly available, accessible to anyone with an internet connection. This is highly advantageous for any organisation as they can view posts relating to themselves, their competitors and the industry in which they operate. From a healthcare perspective, providers can view their performance against other providers locally, nationally and worldwide. Social media analytics software enables user to select the social media accounts that they want to monitor and setup triggers for words or phrases, therefore they can see any posts which are publicly available which relate to them. There are many social media analytics or social media management software packages which contain social media analytics functionality. There are also free tools or free tiers of commercial packages are available, however there are limitations with the free software packages available but a healthcare provider is likely to have the budget available to afford a premium version. Table 2 provides a sample of the social media analytics software currently available.

Table 2. Sample of social media analytics software available.

		Awario [48]	**Brand24** [49]	**Hootsuite** [50]	**Mention** [51]	**Sprout Social** [52]	**Talkwalker** [53]
Features	**Description**	Social media suite for posting and analytics across multiple social media networks	AI Social listening tool for analysing social media and web content	Social media suite for posting and analytics across multiple social media networks	Social media suite for posting and analytics across multiple social media networks	Social media suite for posting and analytics across multiple social media networks	Social media analytics suite which can integrate with Hootsuite or available stand alone
	Social media platforms	Facebook X (formerly Twitter) Instagram Reddit YouTube and other platforms	Facebook X (formerly Twitter) Instagram TikTok YouTube and other platforms	Facebook X (formerly Twitter) Instagram LinkedIn YouTube Pinterest TikTok Threads	Facebook X (formerly Twitter) Instagram Pinterest TikTok YouTube	Facebook X (formerly Twitter) LinkedIn Instagram Reddit Tumblr YouTube	30 social networks including: Facebook X (formerly Twitter) Instagram
Training/Support	**Online tutorials, videos or resources**	Yes	Yes	Yes	Yes	Limited	Yes
	Support	Account Manager with Enterprise tier	Chat and email support, Personal Success Manager Available on some tiers	Messages, support tickets and email rep with Enterprise plan	Email support. Account management with Company tier.	Yes	Yes - dedicated support team

Continued

	Training courses	Online videos but support is available	Product training and webinars	Available on Enterprise plan	Live online training	No	Yes
Finance	**Cost**	From £29 per month	From £93 per month	From £89 per month	From £62 per month with sentiment analysis	From £317 per month	Pricing must be requested
	Free trial	Yes	Yes	Yes	Yes	Yes	No
	Free tier	No	No	No	No-Free Brand Grader Tool available	No	Yes - Free Social Media Search

The social media tools analysed provide sentiment analysis functionality. Sentiment analysis is the process of identifying emotional states including sentiment, affect and subjectivity, from online texts [54]. Sentiment analysis analyses the content of social media posts to identify whether they contain positive or negative sentiment. By utilising sentiment analysis, healthcare providers can analyse social media data which is freely available in the public domain for a number of purposes. Sentiment analysis is currently used by healthcare providers. Health Tech World [55] outlines a case study of how NHS Mental Healthcare providers performance were analysed using AI and sentiment analysis on Instagram, TikTok, Twitter, YouTube, Google Reviews, articles, and Reddit to identify service delivery challenges and the biggest areas of importance for patients throughout the mental health care pathway.

Sanius Health [56] utilised sentiment analysis to analyse 50,000 social media posts relating to mental health care provider feedback and produced a Patient Experience trust league table comparing the performance between NHS Mental Health providers. Similarly, Ainley *et al.* [57] thematically analysed 637 UK tweets relating to healthcare experiences posted between January 2018 and October 2020, finding mixed public attitudes towards the shift to remote care during the pandemic. Positive sentiment peaked in the earliest phase of COVID-19 restrictions between March and May 2020 before declining as restrictions eased. One of the key conclusions was the importance of patients retaining a choice between remote and in-person care. Pandey *et al.* [58] outline how they extracted data from the NHS and review webpages and analysed this using WEKA, Python and Excel and rated the performance of General Practitioners (GPs), the paper highlights the availability of tools to analyse healthcare social media data. Sentiment analysis on healthcare social media data has been undertaken globally, Ruiz-Núñez *et al.* [59] analysed Twitter data during the rollout of the COVID-19 vaccines in Spain during March and April in 2021 and discovered that there was a higher volume of negative messages and intensity in Spain during March but this disappeared in April.

Social media can be an effective way of gaining feedback and surveillance of the public to identify health problems such as the outbreak of diseases. Traditional

surveys can take weeks and can be expensive to undertake, whereas social media is inexpensive data collected in real-time which provides up-to-date public perception and has found to be comparable to survey data [60]. This data can be incorporated into Social Media Analytical tools and/or Computer Assisted Qualitative Data Analysis Software (CAQDAS) to allow qualitative data transcripts to be compiled and coded in order to find some word frequencies to support qualitative approach to quantify the data [61] [62]. **Figure 3** provides an example of how social media analytics can be used by healthcare providers.

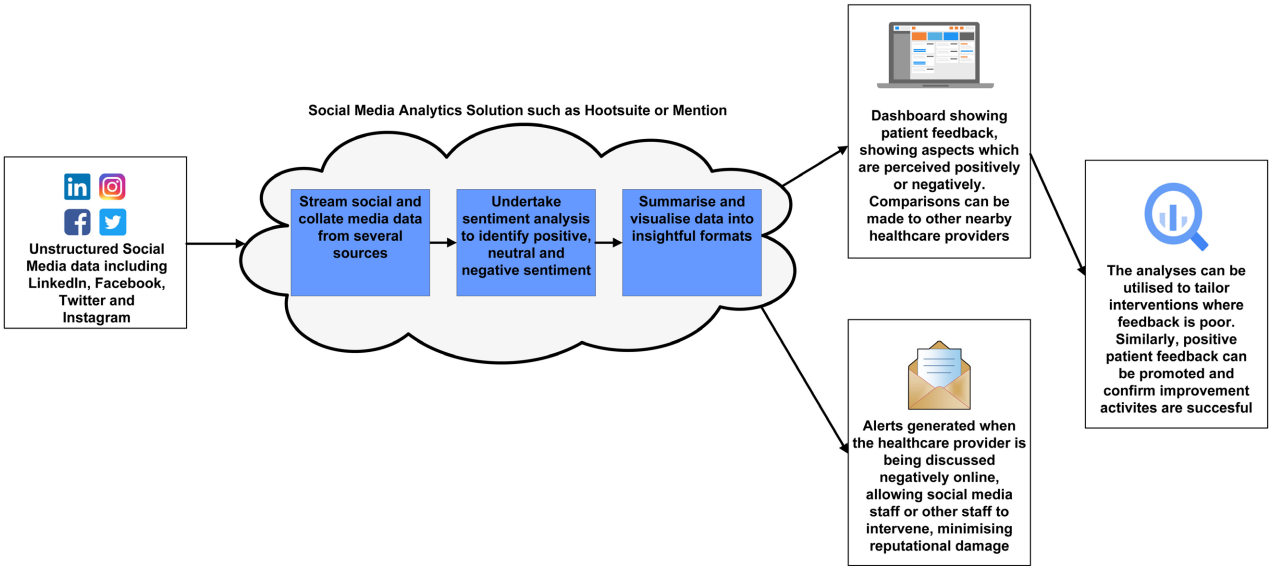

Figure 3. An example of how Social Media Analytics can be used by healthcare providers.

2.3. Digital Transformation

One of the UK government's manifesto's commitments highlighted that digitisation can improve efficiency of information sharing and integration, in addition to creating a National Data Library to bring existing research programmes and deliver data-driven public services [63]. Digital transformation from a healthcare perspective refers to the adoption of new technologies which enable the shift towards secure, high quality care [64]. Some of the benefits include personalised patient care, health equity and increased access, increased productivity and cost-efficiency [65]. The technologies which enable digital transformation in healthcare include Big Data, predictive analytics, e-health, mobile health, participative medical research, e-patient communities and shared decision making in diagnosis of e-therapy [66] [67]. One example is through patient tracking, a solution was proposed using RFID or ZigBee tags attached to patients or objects for the purpose of tracking patients as they travel through a network of sensors and receivers allowing their position of the tags to be tracked in real-time [68]. The system would allow the hospital to track patients' locations, characteristics (e.g. risk of fall, selected diagnosis), their status (such as waiting for an x-ray or ready to be discharged). Other information would be monitored

such as the availability of beds, allowing waiting times to be calculated and cleaning to be scheduled for new admissions, allowing better management of facilities leading to reduced costs and better patient care. Poor patient flow can result in increased costs, require more time and effort from hospital staff and jeopardise safety [69]. In the university sector there are examples of where mobile data is being used to track students regarding class attendance for retainment level and wellbeing [70] [71]. Social media could further enhance patient tracking through monitoring patient feedback and identifying problems to triangulate with patient journey and wait time data. This could stop problems reported in the NHS such as a study undertaken by GS1 and Nursing Times which revealed that nurses in the UK had been wasting time on unproductive activities, with roughly one hour being spent on shifts finding equipment which equates to potentially 40 hours per month each [72].

3. Application

To demonstrate how healthcare providers can analyse social media data to compare their performance against targets, a trial of Brand24 [49] was utilised to perform an analysis of social media data of the NHS Trusts displayed in **Table 1**. A 14-day trial of Brand24 was utilised which commenced on 22nd November 2024. Alerts were configured to monitor posts containing positive or sentiment from the 10 NHS trusts displayed. The software utilised determined the sentiment of posts, however the posts analysed in this study were sense checked. The majority of social media analytics tools reviewed had similar features as shown in **Table 2**. One of the limitations of undertaking a trial is that the software could only analyse the last 30 days of social media data, to analyse data beyond 30 days a full software licence is required. This was found to be similar to Hootsuite [50] which in the trial acquired only allows 7 days of data to be reviewed. This suggested that the limitation would likely apply to other social media analytics tools. Therefore, the examples shown in this paper cover the period 25 October 2024 to 24 November 2024.

For the purpose of this research, alerts were setup on the NHS Trusts displayed in **Table 1** to compare the perception on social media between trusts with quicker waiting times against trusts with higher waiting times. It was expected that patients would be posting on social media their views on the treatment they received, potentially providing insight as to what the trusts are doing well or could be doing better. Brand24 and other social media analytics allow the user to compare themselves against their competitors, in this case other healthcare providers. **Figure 4** shows a comparison between 2 of the NHS Trusts based on a number of metrics such as the number of times mentioned on social media, positive and negative mentions. These metrics will give a healthcare provider an indication of how they are perceived by the public. There are filters which can be applied, such as a date filter to measure social media performance over a time period. There is a rounding error in the software as Bradford Teaching Hospitals shows 78 positive of 125 social-media mentions = 63% (62.4%); 9 negative of 125 = 8% (7.2%).

Overview

↓ Export to CSV

	Shrewsbury and Telford Hospital NHS Trust	Bradford Teaching Hospitals NHS Foundation Trus
Total mentions	**136** ★	125
Social media mentions	**132** ★	125
Non-Social media mentions	**4** ★	0
Positive mentions	36% (48)	**63% (78)** ★
Negative mentions	15% (20)	**8% (9)** ★
Social media reach	313K	**316K** ★
Non-Social media reach	**1733** ★	0
Presence score	**10/100** ★	5/100
AVE	$24K	**$29K** ★

Figure 4. Comparison between two healthcare providers social media performance (online data in the public domain).

Brand24 and other social media analytics packages allow users to view more in-depth analytics such as positive and negative sentiment over time as shown in Figure 5.

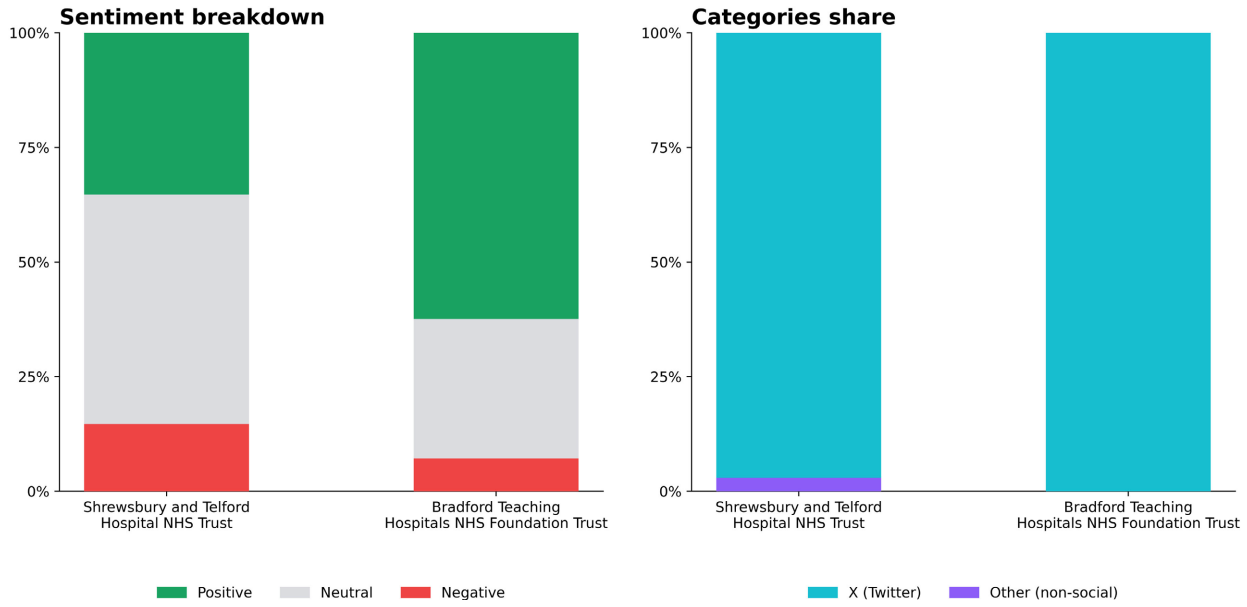

Figure 5. Summary of positive and negative sentiment in social media posts (online data in the public domain).

Social media analytics software have the ability to identify common keywords in social media analytics posts based on the sentiment. For example, posts thanking NHS staff often contain words such as “thank”, “great”, “fantastic” or “support”. By clicking on the words, the user can view all of the posts where these words are mentioned. This would be helpful for a healthcare provider to view what their patients believe they are doing well. Similarly, they can look at where other healthcare providers are performing well and drill down into the specific social

media posts for more insight. This also works with negative sentiment, for example words such as “negligence”, “death” and “fatal” were identified as negative in the research undertaken across multiple NHS Trusts. By analysing the posts which contain these words, healthcare providers can get an understanding of what patients are unhappy about. Figure 6 shows keywords identified in social media posts displayed in a word cloud format, with posts with positive sentiment in green, negative sentiment in red and neutral sentiment in grey. Similarly, the larger the size of the word, the higher frequency it appears. The social media analytics package and/ or integrated Computer Assisted Qualitative Data Analysis Software (CAQDAS) allows qualitative user feedback to be quantified, allowing trends to be monitored. For example the number of times a positive or negative word appears allowing hotspots, which need to be addressed, to be identified.

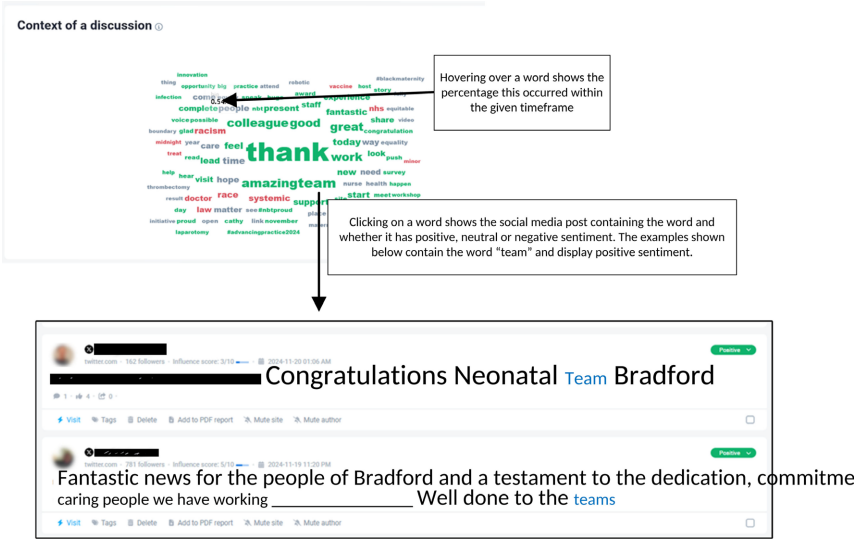

Figure 6. Example of a Word Cloud of key words found on social media and the sentiment.

Figure 7 shows a sample of two posts with positive sentiment. Both posts appear to be praising the healthcare trusts. The second post is from a family member praising the care their father received, specifically praising the speed of care. Multiple posts praising specific services could allow healthcare providers to understand where they are performing well.

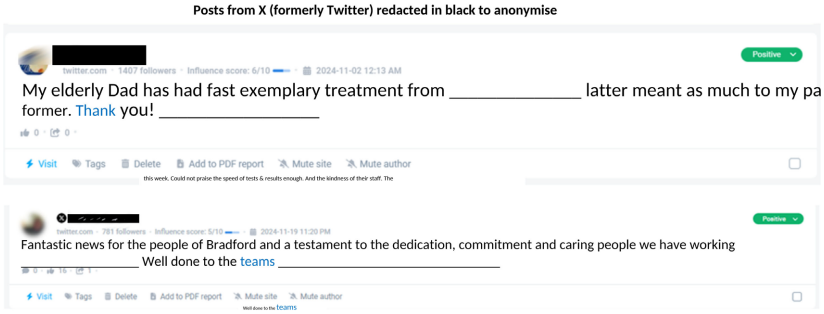

Figure 7. Posts with positive sentiment on X.

Figure 8 shows a sample of three posts showing negative sentiment. The first post (formerly referred to as Tweets) appears to be a general comment that patients are going to hospital as they are unable to see their GP. The second post provides a specific example of long waiting times in the accident and emergencies department, which the NHS trust could investigate or respond to explain the waiting time. The third post is a more general post around NHS abandonment and negligence.

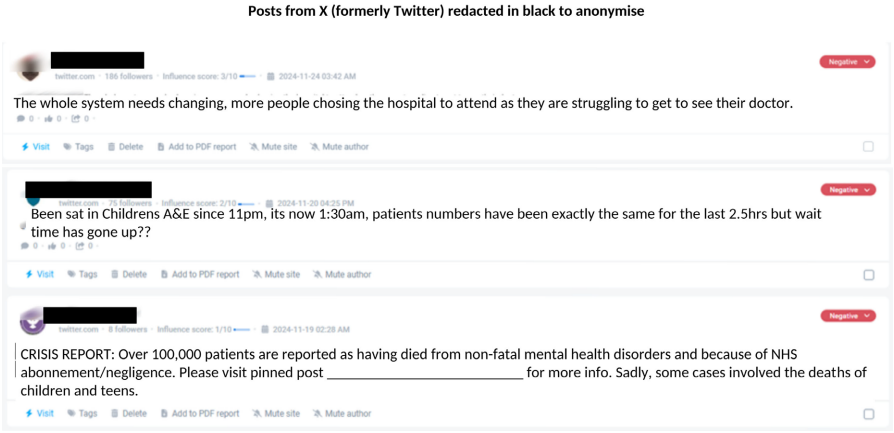

Figure 8. Posts with negative sentiment on X.

4. Discussion

A common trend in the social media posts analysed during this study is that many of the posts do not give specific information. They appear to be generalised posts which do not give sufficient information to investigate as identified in Figure 8. It would be helpful if the posters provided suggestions how the problems they identified could be rectified. Similarly, whilst many of the posts provided examples where NHS trusts had provided excellent care, there were also posts which did not provide helpful information to analyse (absurd comments).

There is an opportunity for healthcare providers to learn from other providers who are performing well. For example, in England there is the Care Quality Commission (CQC) [73] who are a national body to regulate and inspect health and social care providers. They use a rating that works on a scale from one to four: inadequate, requires improvement, good and outstanding. Leaders and subject matter experts from healthcare providers who are achieving the Outstanding rating could be utilised to provide advice and guidance to trusts who are struggling. A catalogue of accredited off the shelf products and services could be developed from tried and tested solutions by healthcare providers who are exceeding their targets. This would allow other providers to replicate what is being undertaken elsewhere, but specialists from the outstanding healthcare providers could lead the implementation and tailor them to the healthcare provider where they are being implemented as it is likely that they will have requirements unique to their organisation. Change management would also need to be considered as staff

would need to be trained or upskilled, therefore key personnel would be required to oversee the transition. This would also speed up the implementation of these systems. The Public Accounts Committee [74] highlighted repeated failures in NHS digital transformation, noting that the Department's previous decade-long attempt at IT reform had been 'both expensive and largely unsuccessful', and citing the NHS COVID-19 contact-tracing app. An estimated £11 million had already been spent on a delayed first phase and this is a further example of poor financial transparency and accountability. Therefore, seconding experts into advisory roles to spearhead and help other healthcare providers adopt best practice could increase the success rate of digital transformation projects.

Additionally, healthcare providers could share best practice through a Community of Practice (CoP). A CoP is defined as: "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" ([75], p. 1). Key personnel from outstanding rated healthcare providers could join community of practices to share ideas about what they have implemented successfully and how they overcame challenges with other healthcare providers. Regular meetings would allow new developments to be shared between providers and shared solutions to new problems to be created. Similarly, they can discuss the cost of digital transformation vs the value for money in terms of efficiency and patient experience.

NHS trusts could offer incentives for the public/stakeholders to suggest ideas to problems. This could identify innovations which other NHS trusts and healthcare providers could adopt if they are successful. The NHS launched the Change NHS online portal on 21 October 2024 to allow the public to share their views, experiences and ideas [76] [77]. Whilst there are no rewards for the public to share their views, the success of this scheme could further justify why healthcare providers could setup a system for encouraging the public to suggest ideas to solve problems. Therefore, there is an opportunity for healthcare providers to develop a web portal to allow patients, staff and stakeholders to document the challenges they have encountered and suggest their solutions. Social media data could be streamed into the web portal and social media analytics could be used to identify trends, utilising techniques such as sentiment analysis. Healthcare providers could respond to the public. A reward and incentive system could be implemented to encourage suggestions, which could help healthcare providers to improve the quality of their care and potentially reduce costs. Given the increased pressure on healthcare providers with penalties such as management "being sacked" for poor performance, implementing these improvements could help them to move up the league tables [15]. Patient feedback could also be recorded at the time they are discharged, as this may provide a higher response rate than surveys and may also provide more timely feedback. This could be compared against social media feedback identifying problems to triangulate with patient journey and wait time.

Implementing the recommendations outlined above could enable healthcare providers to move to a Patient Centric (PC) model of healthcare delivery. Patient

centric care is defined: "as Putting the patient first in an open and sustained engagement of the patient to respectfully and compassionately achieve the best experience and outcome for that person and their family" ([78], p. 1). Providers who have adopted a patient centric care approach have achieved benefits including greater patient satisfaction with care received, increased job satisfaction for staff, increased quality of care and safety of care, greater quality of life and well-being of patients [79].

One of the limitations of the study is the limited access to social media analytics tools. Whilst there are many social media analytics tools publicly available, the trials available from the software reviewed appear to be limited both in terms of the number of days the software can be used and how far back in time social media posts can be analysed. Future studies will require a full licence to a product such as Hootsuite or Brand24 to undertake a detailed analysis of social media posts over a time period of a year or greater.

5. Conclusion

This paper has provided a literature review of the causes of public dissatisfaction with the health and social care provided by the NHS which is evidenced by surveys undertaken. Patient waiting times for emergency care is one of the key targets of the NHS which most healthcare providers have struggled to meet. Examples have been provided of healthcare trusts who have made improvements through the use of innovation and digital transformation. An approach to monitoring patient feedback and the performance of other healthcare providers has been outlined through the use of social media analytics. It is a relatively low-cost solution for healthcare providers, for monitoring patient feedback and identifying problems to triangulate with patient journey and staff perceptions which if used effectively could allow healthcare providers to be proactive in finding the cause of problems and could implement innovative solutions. A number of recommendations have been provided which could allow healthcare trusts to move to a patient centric model of care including implementing rewards and incentives for patients, staff and stakeholders, implementing a community of practice and for the development of a catalogue of off the shelf solutions which could be easily adopted by healthcare providers from a central repository and will be investigated in future research.

Author Contributions

Conceptualization, M.W. and A.S.A.; methodology, M.W. and A.S.A.; software, M.W. and A.S.A.; validation, M.W. and A.S.A.; formal analysis, M.W. and A.S.A.; investigation, M.W. and A.S.A.; resources, M.W. and A.S.A.; data curation, M.W. and A.S.A.; writing—original draft preparation, M.W. and A.S.A.; writing—review and editing, M.W. and A.S.A.; visualization, M.W. and A.S.A.; supervision, A.S.A.; project administration, M.W. and A.S.A. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] *The Times* (2024) The UK Hospitals Where 1 in 4 Patients Wait for over 12 Hours in A&E. https://www.thetimes.com/uk/healthcare/article/nhs-hospital-patients-wait-12-hours-accident-emergency-times-health-commission-0xnnh753f

[2] 16 Fascinating Facts about Our NHS (2024). https://business.itn.co.uk/16-fascinating-facts-about-our-nhs/

[3] Health Business (2026) Where Is the Health and Social Care Budget Going? https://www.healthbusinessuk.net/features/where-health-and-social-care-budget-going-0

[4] Backlinko (2024) Social Network Usage & Growth Statistics. https://backlinko.com/social-media-users

[5] Schwittek, W. and Eicker, S. (2012) Decision Support for Off-the-Shelf Software Selection in Web Development Projects. In: Grossniklaus, M. and Wimmer, M., Eds., *Current Trends in Web Engineering*, Springer, 238-243. https://doi.org/10.1007/978-3-642-35623-0_26

[6] Kings Fund (2024) Public Satisfaction with the NHS and Social Care in 2023. BSA|The King's Fund. https://www.kingsfund.org.uk/insight-and-analysis/reports/public-satisfaction-nhs-social-care-2023

[7] Metro (2024) Map Shows the Hospitals with the Longest A&E Wait Times in the UK. https://metro.co.uk/2024/04/01/map-reveals-a-e-wait-times-local-hospital-bad-20566946/

[8] The Guardian (2023) Satisfaction with the NHS Plummets to Lowest Level in 40 Years. https://www.theguardian.com/society/2023/mar/29/satisfaction-with-the-nhs-plummets-to-lowest-level-in-40-years

[9] House of Commons (2024) NHS Key Statistics: England. https://researchbriefings.files.parliament.uk/documents/CBP-7281/CBP-7281.pdf

[10] Department of Health & Social Care (2024) Summary Letter from Lord Darzi to the Secretary of State for Health and Social Care. https://www.gov.uk/government/publications/independent-investigation-of-the-nhs-in-england/summary-letter-from-lord-darzi-to-the-secretary-of-state-for-health-and-social-care

[11] House of Commons Health and Social Care and Committee (2023) Digital Transformation in the NHS Eighth Report of Session 2022-23 Report, Together with Formal Minutes Relating to the Report. https://publications.parliament.uk/pa/cm5803/cmselect/cmhealth/223/report.html

[12] The Guardian (2023) Lack of NHS Home Care "Forces 855,000 Older People into English Hospitals Each Year". https://www.theguardian.com/society/2023/jul/11/900000-older-people-ae-lack-of-nhs-care-at-home

[13] Edge Hill University (2023) Why NHS England Is Struggling—Despite More Staff and Money. https://www.edgehill.ac.uk/news/2023/11/why-nhs-england-is-struggling-despite-more-staff-and-money/

[14] Pagel, C. (2022) The NHS Is Failing Us, But We Are Failing It Too. *BMJ*, **379**, o3060. https://doi.org/10.1136/bmj.o3060

[15] BBC News (2024) NHS Managers to Be Sacked in Failing Hospitals. https://www.bbc.co.uk/news/articles/c1kn092rvn3o

[16] Health Service Navigator (2021) What Is the 4 Hour Accident and Emergency (A&E) Target? https://www.myhsn.co.uk/top-tip/what-is-the-4-hour-accident-and-emergency-ae-target/

[17] NHS England (2024) 2024/25 Priorities and Operational Planning Guidance.

[18] The King's Fund (2024) What's Going on with A&E Waiting Times? https://www.kingsfund.org.uk/insight-and-analysis/long-reads/whats-going-on-with-ae-waiting-times

[19] Office for National Statistics (2024) Accident and Emergency Wait Times across the UK: 2024. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthcaresystem/articles/accidentandemergencywaittimesacrosstheuk/2024-02-28

[20] The Telegraph (2026) NHS Tracker: The Best and Worst Hospitals in the Country. https://www.telegraph.co.uk/news/2025/01/28/nhs-tracker-best-worst-hospitals-england/

[21] Patient Perspective (2023) Service Improvement Case Study: Urgent & Emergency Care Department. https://patientperspective.org/wp-content/uploads/2024/02/Urgent-and-Emergency-Care-National-Survey-Case-Study-FINAL-December-2023.pdf

[22] Bradford Teaching Hospitals NHS Foundation Trust (2023) Annual Report and Accounts 2022/23. https://www.bradfordhospitals.nhs.uk/wp-content/uploads/2023/09/Annual-Report-and-Accounts-2022-23-FINAL.pdf

[23] Torbay and South Devon NHS Foundation Trust (2023) Annual Report and Accounts 2022-23. https://www.torbayandsouthdevon.nhs.uk/uploads/annual-report-and-accounts-2022-2023.pdf

[24] Oxford University Hospitals and NHS Foundation Trust (2023) Quality Account 2022-2023. https://www.ouh.nhs.uk/media/gt0pt31j/quality-account-2022-2023.pdf

[25] Surrey and Sussex Healthcare NHS Trust (2024) SASH+ and the KPO Team. https://web.archive.org/web/20260201112637/https://www.surreyandsussex.nhs.uk/about-us/sash-and-kpo-team

[26] Surrey and Sussex Healthcare NHS Trust (2024) Quality Account 2023/24. https://www.surreyandsussex.nhs.uk/application/files/4217/1990/7141/Quality_Account_2024.pdf

[27] NHS England (2024) A&E Attendances and Emergency Admissions March 2024 Statistical Commentary. https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2024/04/Statistical-commentary-March-2024-b64fcb.pdf

[28] Macclesfield Express (2024) Longer Waits for Patients at A&E Trust among Country's Bottom 10. https://www.pressreader.com/uk/macclesfield-express/20240117/281835763555775?srsltid=AfmBOopsKhp_LefuOE8HIGOqMHSReupU8QS5WXBO_BG0pGb3k1o9JS2I

[29] Wirral Globe (2024) Concerns over Eight Hour Wait in Ambulances at Arrowe Park. https://www.wirralglobe.co.uk/news/24602126.concerns-eight-hour-wait-ambulances-arrowe-park/

[30] Bristol Live (2024) Bristol NHS Issues Warning as Southmead A&E under "Intense Pressure". https://www.bristolpost.co.uk/news/bristol-news/bristol-nhs-issues-warning-southmead-9429615

[31] The Royal College of Emergency Medicine (2024) Channel Four Dispatches Covert Footage Shocking but Not Isolated. https://rcem.ac.uk/press-release/channel-four-dispatches-covert-footage-shocking-but-not-isolated/

[32] BBC News (2024) Shropshire A&Es Make Progress but Waits Are Too Long—Report. https://www.bbc.co.uk/news/articles/cd6qgz93dzdo

[33] Shropshire Star (2024) Waiting Times Still "Longer than Acceptable" at Shrewsbury and Telford A&Es despite Progress Made. https://www.shropshirestar.com/news/health/2024/09/30/waiting-times-still-longer-than-acceptable-at-shrewsbury-and-telford-aes-despite-progress-made/#viafoura-comments-container

[34] Li, H.O., Pastukhova, E., Brandts-Longtin, O., Tan, M.G. and Kirchhof, M.G. (2022) YouTube as a Source of Misinformation on COVID-19 Vaccination: A Systematic Analysis. *BMJ Global Health*, **7**, e008334. https://doi.org/10.1136/bmjgh-2021-008334

[35] Practice Business (2024) Read Again: TikTok Making Waves for the NHS. https://practicebusiness.co.uk/read-again-tiktok-making-waves-for-the-nhs

[36] BBC News (2024) Vinted U-Turns on Delivery Changes after Backlash. BBC News. https://www.bbc.co.uk/news/articles/cgedy443ldqo

[37] Willetts, M., Atkins, A.S. and Stanier, C. (2020) A Strategic Big Data Analytics Framework to Provide Opportunities for SMEs. *INTED Proceedings*, **1**, 3033-3042. https://doi.org/10.21125/inted.2020.0893

[38] Willetts, M., Atkins, A.S. and Stanier, C. (2022) Big Data, Big Data Analytics Application to Smart Home Technologies and Services for Geriatric Rehabilitation. In: Choukou, A. and Syed-Abdul, S., Eds., *Smart Home Technologies and Services for Geriatric Rehabilitation*, Elsevier, 205-230. https://doi.org/10.1016/b978-0-323-85173-2.00001-1

[39] Gandomi, A. and Haider, M. (2015) Beyond the Hype: Big Data Concepts, Methods, and Analytics. *International Journal of Information Management*, **35**, 137-144. https://doi.org/10.1016/j.ijinfomgt.2014.10.007

[40] De Mauro, A., Greco, M. and Grimaldi, M. (2016) A Formal Definition of Big Data Based on Its Essential Features. *Library Review*, **65**, 122-135. https://doi.org/10.1108/lr-06-2015-0061

[41] Bianchini, M. and Michalkova, V. (2019) Data Analytics in SMEs: Trends and Policies. OECD SME and Entrepreneurship Papers, No. 15. OECD Publishing.

[42] Saggi, M.K. and Jain, S. (2018) A Survey Towards an Integration of Big Data Analytics to Big Insights for Value-Creation. *Information Processing & Management*, **54**, 758-790. https://doi.org/10.1016/j.ipm.2018.01.010

[43] Mikalef, P., Boura, M., Lekakos, G. and Krogstie, J. (2019) Big Data Analytics and Firm Performance: Findings from a Mixed-Method Approach. *Journal of Business Research*, **98**, 261-276. https://doi.org/10.1016/j.jbusres.2019.01.044

[44] Sivarajah, U., Kamal, M.M., Irani, Z. and Weerakkody, V. (2017) Critical Analysis of Big Data Challenges and Analytical Methods. *Journal of Business Research*, **70**, 263-286. https://doi.org/10.1016/j.jbusres.2016.08.001

[45] Tan, K.H. and Zhan, Y. (2017) Improving New Product Development Using Big Data: A Case Study of an Electronics Company. *R&D Management*, **47**, 570-582. https://doi.org/10.1111/radm.12242

[46] Danziger, C. (2019) How Amazon Used Big Data to Rule E-Commerce. insideBigData. https://web.archive.org/web/20250819165019/http://insideainews.com/2019/11/30/how-amazon-used-big-data-to-rule-e-commerce/

[47] Song, J., Xia, S., Vrontis, D., Sukumar, A., Liao, B., Li, Q., *et al.* (2022) The Source of SMEs' Competitive Performance in COVID-19: Matching Big Data Analytics Capability to Business Models. *Information Systems Frontiers*, **24**, 1167-1187. https://doi.org/10.1007/s10796-022-10287-0

[48] Awario (2026) Brand Monitoring Tool to Analyze All Brand Mentions on the Web. https://awario.com/

[49] Brand24 (2024) Brand24—#1 AI Social Listening Tool. https://brand24.com/

[50] Hootsuite (2024). https://www.hootsuite.com/

[51] Mention (2024) Social Listening & Media Monitoring Tool. https://mention.com/en/

[52] Sprout Social (2024) Sprout Social: Social Media Management Solutions. https://sproutsocial.com/

[53] Talkwalker (2024) Talkwalker—Leading Consumer Intelligence Platform. https://www.talkwalker.com/

[54] Chen, H., Chiang, R.H.L. and Storey, V.C. (2012) Business Intelligence and Analytics: From Big Data to Big Impact. *MIS Quarterly*, **36**, 1165-1188. https://doi.org/10.2307/41703503

[55] Health Tech World (2024) Novel Approaches to Understanding Real-World Patient Experience across NHS and Mental Health Care Pathways. https://htworld.co.uk/insight/nhs-mental-health-ai-sle-positive-and-negative-patient-experience-provider-data-san24/

[56] Sanius Health (2024) Sanius Health: An Acute NHS Provider Patient Experience Trust League Table|Unpublished, AI-Captured Social Media Listening Care Experiences Data. https://saniushealth.com/2024/07/sanius-health-an-acute-nhs-provider-patient-experience-trust-league-table-unpublished-ai-captured-social-media-listening-care-experiences-data/

[57] Ainley, E., Witwicki, C., Tallett, A. and Graham, C. (2021) Using Twitter Comments to Understand People's Experiences of UK Health Care during the COVID-19 Pandemic: Thematic and Sentiment Analysis. *Journal of Medical Internet Research*, **23**, e31101. https://doi.org/10.2196/31101

[58] Pandey, A.R., Seify, M., Okonta, U. and Hosseinian-Far, A. (2023) Advanced Sentiment Analysis for Managing and Improving Patient Experience: Application for General Practitioner (GP) Classification in Northamptonshire. *International Journal of Environmental Research and Public Health*, **20**, Article No. 6119. https://doi.org/10.3390/ijerph20126119

[59] Ruiz-Núñez, C., Herrera-Peco, I., Campos-Soler, S.M., Carmona-Pestaña, Á., Benítez de Gracia, E., Peña Deudero, J.J., *et al.* (2023) Sentiment Analysis on Twitter: Role of

Healthcare Professionals in the Global Conversation during the Astrazeneca Vaccine Suspension. *International Journal of Environmental Research and Public Health*, **20**, Article No. 2225. https://doi.org/10.3390/ijerph20032225

[60] Chen, J. and Wang, Y. (2021) Social Media Use for Health Purposes: Systematic Review. *Journal of Medical Internet Research*, **23**, e17917. https://doi.org/10.2196/17917

[61] Welsh, E. (2002) Dealing with Data: Using NVivo in the Qualitative Data Analysis Process. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, **3**, Article No. 26.

[62] Saillard, E.K. (2011) Systematic versus Interpretive Analysis with Two CAQDAS Packages: NVivo and MAXQDA. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, **12**, Article No. 34.

[63] *Government Transformation Magazine* (2024) Labour's Vision for Government Transformation. https://www.government-transformation.com/transformation/labours-vision-for-government-transformation

[64] Haggerty, E. (2017) Healthcare and Digital Transformation. *Network Security*, **2017**, 7-11. https://doi.org/10.1016/s1353-4858(17)30081-8

[65] Northeastern University D'Amore-McKim School of Business (2024) What Is Digital Transformation in Healthcare and Why Is It Important? https://online.northeastern.edu/resources/what-is-digital-transformation-in-healthcare/

[66] Belliger, A. and Krieger, D.J. (2018) The Digital Transformation of Healthcare. In: North, K., Maier, R. and Haas, O., Eds., *Knowledge Management in Digital Change*, Springer International Publishing, 311-326. https://doi.org/10.1007/978-3-319-73546-7_19

[67] Dal Mas, F., Massaro, M., Rippa, P. and Secundo, G. (2023) The Challenges of Digital Transformation in Healthcare: An Interdisciplinary Literature Review, Framework, and Future Research Agenda. *Technovation*, **123**, Article ID: 102716. https://doi.org/10.1016/j.technovation.2023.102716

[68] Al Yami, A.A., Atkins, A.S. and Campion, R. (2016) Performance Improvement in Hospital Management Using RFID and ZigBee Technologies for Tracking and Monitoring Patients and Assets in Saudi Arabia. *International Journal of Management and Applied Science*, **2**, 66-69.

[69] Ham, C., Berwick, D. and Dixon, J. (2016) Improving Quality in the English NHS. A Strategy for Action. https://assets.kingsfund.org.uk/f/256914/x/ae9501a18c/improving_quality_in_english_nhs_2016.pdf

[70] Willetts, M. and Atkins, A.S. (2023) Application of Data Mining to Support Facilities Management in Smart Buildings. In: Marques, G., *et al.*, Eds., *IoT Enabled Computer-Aided Systems for Smart Buildings*, Springer International Publishing, 121-143. https://doi.org/10.1007/978-3-031-26685-0_6

[71] University of Staffordshire (2024) Attendance and Engagement Procedure. https://www.staffs.ac.uk/students/course-administration/academic-policies-and-regulations/attendance-and-engagement-policy-home-students

[72] *Nursing Times* (2009) Nurses Waste "an Hour a Shift" Finding Equipment. https://www.nursingtimes.net/archive/nurses-waste-an-hour-a-shift-finding-equipment-10-02-2009/

[73] Care Quality Commission (2024). https://www.cqc.org.uk/

[74] Public Accounts Committee (2020) Digital Transformation in the NHS. https://publications.parliament.uk/pa/cm5801/cmselect/cmpubacc/680/68005.htm

[75] Wenger, E. and Trayner-Wenger, B. (2015) Communities of Practice: A Brief Introduction. *Communities of Practice*, **15**, 1-8. https://www.wenger-trayner.com/introduction-to-communities-of-practice/

[76] NHS (2024) Change NHS.

[77] Department of Health & Social Care (2024) Change NHS: Help Build a Health Service fit for the Future. https://www.gov.uk/government/publications/change-nhs-help-build-a-health-service-fit-for-the-future/change-nhs-help-build-a-health-service-fit-for-the-future

[78] Patient Engagement for Medicines Development (2017) Patient Centricity—A Collaborative Definition. https://patientfocusedmedicine.org/patient-centricity-collaborative-definition/

[79] Kuipers, S.J., Cramm, J.M. and Nieboer, A.P. (2019) The Importance of Patient-Centered Care and Co-Creation of Care for Satisfaction with Care and Physical and Social Well-Being of Patients with Multi-Morbidity in the Primary Care Setting. *BMC Health Services Research*, **19**, Article No. 13. https://doi.org/10.1186/s12913-018-3818-y