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Barriers and facilitators to analytics use for strategic health and care decision-making: a qualitative study of senior health and care leaders' perspectives

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Barriers and facilitators to analytics use for strategic health and care decision-making: a qualitative study of senior health and care leaders' perspectives

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Abstract

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3 **Objective:** This study investigated barriers and facilitators senior leaders' experience when using knowledge
4 generated from the analysis of administrative health or care records ('analytics') to inform strategic health and
5 care decision-making.
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9 **Setting:** One London-based Sustainability and Transformation Partnership (STP) in England, as it was on the
10 cusp of forming an Integrated Care System (ICS).
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13 **Participants:** 20 senior leaders including health and social care commissioners, public health leads, and health
14 providers. Participants were eligible for inclusion if they were a senior leader of a constituent organisation of the
15 STP and involved in using analytics to make decisions for their own organisations or health and care systems.
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19 **Design:** Semi-structured interviews conducted between January and March 2020 and analysed using the
20 Framework Method to generate common themes.
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23 **Results:** Organisational fragmentation hindered analytics use by creating siloed data systems, barriers to data
24 sharing, and different organisational priorities. Where trusted and collaborative relationships existed between
25 leaders and analysts, organisational barriers were circumvented and access to and support for analytics
26 facilitated. Trusted and collaborative relationships between individual leaders of different organisations also
27 aided cross-organisational priority setting, which was key to facilitating strategic health and care decision-
28 making and analytics use. Data linked across health and care settings was viewed as an enabler of analytics use
29 for decision-making, whilst concerns around data quality often halted decision-making, with participants relying
30 more so on expert opinion or intuition.
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36 **Conclusions:** The UK Governments 2021 White Paper set out aspirations for data to transform care. Whilst
37 necessary, policy changes to facilitate data sharing across organisations will be insufficient to realise this aim.
38 Better integration of organisations with aligned priorities could support and sustain cross-organisational
39 relationships between leaders and analysts, and leaders of different organisations, to facilitate analytics use in
40 decision-making.
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52 **Strengths and limitations of this study**

- 53 • A key strength of this work is that we conducted interviews with senior leaders to investigate barriers
54 and facilitators of analytics use for strategic decision-making at a time when areas were on the cusp of
55 transitioning from local models of integration in England (Sustainability and Transformation
56 Partnerships) to national statutory organisations (Integrated Care Systems).
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- Another strength is that we recruited from a digitally engaged and innovative site that expressed interest in understanding barriers and opportunities to enhance senior leaders' use of analytics, and informed our research questions, study materials and study procedures.
- A limitation is that we recruited from one London-based Sustainability and Transformation Partnership and, whilst we believe most findings are transferable to other settings, all findings may not be transferable to settings that are perhaps less digitally engaged or have different priorities.
- We recruited participants from a wide range of roles and constituent organisations of the Sustainability and Transformation Partnership, offering a breadth of perspectives.
- We interviewed participants during January and March 2020 before the onset of the COVID-19 pandemic, which may have changed leaders' use of analytics for strategic health and care decision-making as well as the barriers and facilitators senior leaders' face when using analytics in this context.

Introduction

Over the past 10 years, health and care reforms in England have been moving towards greater integration between different organisations concerned with the provision, commissioning and planning of health and care¹⁻⁴. As part of reforms, all areas in England were statutorily required to form integrated care systems (ICSs) by April 2021, replacing pre-existing Sustainability and Transformation Partnerships (STPs). STPs and ICSs are place-based partnerships between local national health service (NHS) organisations, local authorities and other strategic partners with the intention of pooling resources to coordinate health and care services.

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3 As we move towards greater integration, senior health and care leaders are increasingly required to make decisions
4 about the structure and delivery of services (strategic decisions) that can have implications across organisational
5 and sectoral boundaries. In England, the use of knowledge generated from the analysis of administrative data
6 ('analytics') is seen as central to integrated decision-making, with a recent government White Paper stating that
7 "integrating care... relies on the power of digital and data to join up care and uses that power to drive
8 transformation of care"⁴. There are many ways in which care may be integrated. Analytics may contribute most
9 to the elements of organisational integration (the integration of formal organisational structures) and functional
10 integration (the integration of back-office functions), as described in Mowlam and Fulop's framework⁵. To this
11 end, analytics can aid assessments of local need to support development of new, more integrated services, or used
12 to monitor the effectiveness, efficiency and quality of existing services^{4,6-9}.

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19 Operational barriers to generating high-quality analytics have been well described¹⁰⁻¹³. However, less focus has
20 been paid to senior leaders' readiness to use analytics, with findings suggesting leaders do not always value and
21 use analytics for decision-making^{6,9,10}. Furthermore, no previous studies have examined barriers and facilitators
22 of analytics use for strategic decision-making that has implications across health and care organisational and
23 sectoral boundaries (hereafter 'strategic health and care decision-making'). Elucidating this understanding is
24 important to help realise the White Papers' aims for data to transform care.

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29 This study investigated the barriers and facilitators that senior leaders' experience when using analytics for
30 strategic health and care decision-making. A single STP was chosen as a case study to give nuanced, empirically-
31 rich and context-specific findings.

32 33 34 35 36 37 38 39 40 41 **Methods**

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43 We conducted a case study of one STP in London, England, prior to its formation of an ICS¹⁴. This STP expressed
44 interest in understanding barriers and opportunities to enhance senior leaders' use of analytics and was a site
45 actively pursuing linkage of health and local authority records. It included participants from CCGs, local
46 authorities, hospitals, and other service providers. Figure 1 presents an overview of stakeholders in this study.
47 This manuscript was prepared following the SRQR Checklist¹⁵.

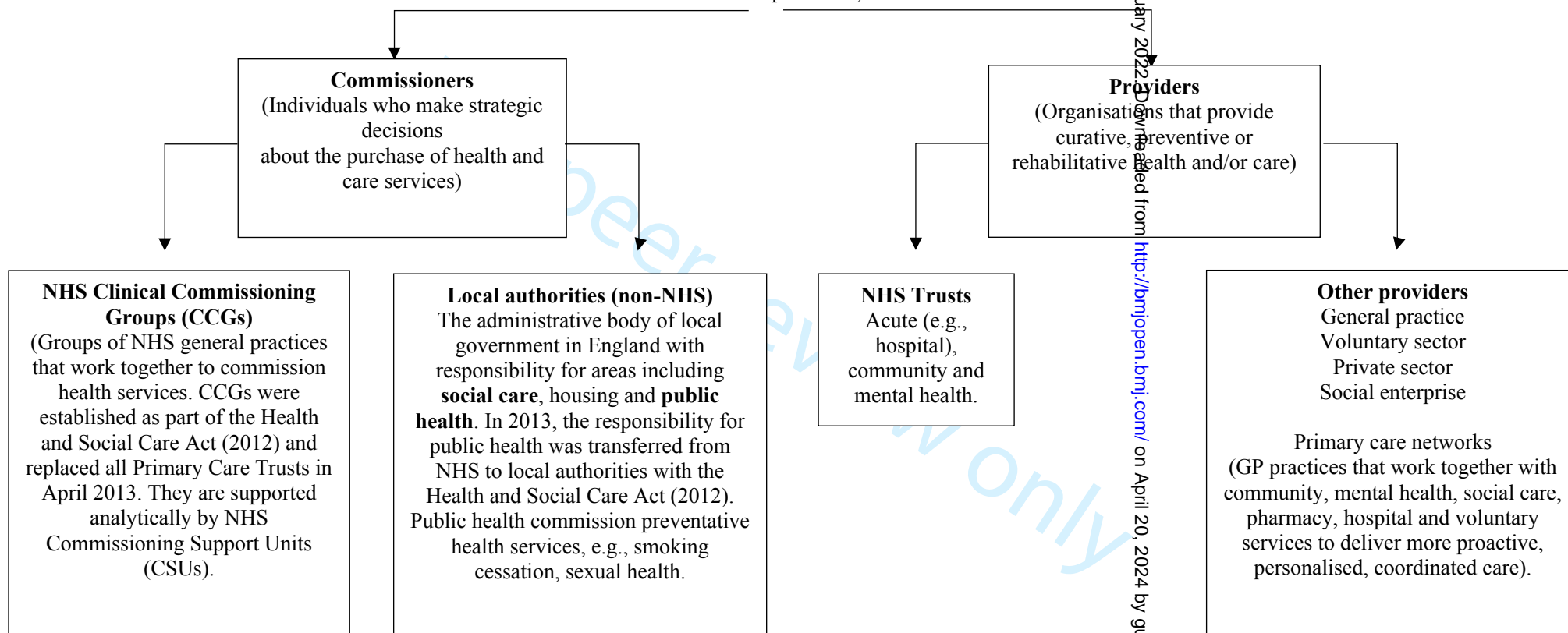
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Figure 1: An overview of partners within a typical (NHS) Integrated Care System in England.

Sustainability and Transformation Partnership (STP) / Integrated Care System (ICS)

(Partnerships between NHS organisations, local authorities and other strategic partners that coordinate services to meet health needs across a defined geographical area. First established in 2015, STPs covered 44 geographically defined areas in England. ICSs, established as part of the NHS Long Term Plan (2019), replaced all STPs in April 2021.)



Recruitment

Participants were recruited from constituent organisations of the STP and eligible if responsible for strategic decision-making for their own organisation or local health and care system. Eligible participants were first identified and contacted by key STP leaders and then by the study team. Participants were asked to recommend further eligible colleagues¹⁷. Recruitment ended when we reached data saturation.

Data collection

We conducted 20 semi-structured individual interviews between January and March 2020. Interviews followed a topic guide developed using guidance for conducting interviews in medical research¹⁸. Participants were asked to describe their use of analytics as part of a strategic health and care decision they had made, and things that had facilitated or hindered their use. The guide was developed to reflect the STP's priorities and adapted to probe underexplored topics as the study progressed. Audio recordings of interviews were transcribed and deidentified by an external transcription agency and subsequently checked for accuracy. Once transcribed, recordings were deleted. Ethical approval was obtained from UCL's Research Ethics Committee.

Transcripts were analysed using the Framework Method, the most suitable form of thematic analysis for interview data where candidate themes have been identified before the data are analysed¹⁹. EI conducted the analysis by iteratively following steps from Braun and Clarke²⁰. Codes were first generated deductively based on operational barriers to high-quality analytics previously identified in the literature¹⁰⁻¹². Salient phrases were then coded inductively and subsequently compared to research questions. Codes were grouped to form categories and categories refined to represent a robust theme across participants. A reflexive journal was kept during interviews and referred to during analysis and write-up. A subset of transcripts were double coded by SC and SB, and the coding frame checked before being applied across the dataset¹⁹.

Research questions, the topic guide and study procedures were informed by a pilot study and refined prior to the full study.

Participant engagement and involvement

The idea for this study was borne out of an expressed STP need to understand analytics use for strategic decision-making from the perspective of senior leaders. Key staff at the STP reviewed the study protocol, topic guide, participant information and consent sheets. These materials reflected their priorities. Study materials were tested with a neighbouring STP site. We worked collaboratively with the STP throughout the research process and emergent themes were discussed during analysis and write-up. Our collaborators will choose how to disseminate study findings.

Results

Interviews were conducted with senior leaders in health and/or care commissioning, provider and public health roles (see Table 1).

Table 1: Participant characteristics (N=20)

Characteristic	N (%)
Gender: Male	12 (60)
Geography:	
Inner London Borough	8 (40)
Outer London Borough	4 (20)
Inner and Outer London Boroughs*	8 (40)
Generic Organisation and Role:	
Health – Provider	6 (30)
Health – Commissioner	4 (20)
Local Authority - Social Care Commissioner	4 (20)
Local Authority - Public Health Consultant	2 (10)
Health and Local Authority – Health and Social Care Commissioner	4 (20)
*Split role across inner and outer boroughs. Includes STP leads.	

Participants described the process of attempting to obtain data and/or analytics for strategic health and care decision-making as uncoordinated, “*ad-hoc*” or “*random*”. We found that factors related to three areas - individuals’ **working environments (Theme 1)**, **relationships (Theme 2)** and the **quality of data sought (Theme 3)** - greatly influenced this process. These factors were *barriers or facilitators* to analytics use depending on circumstances and contexts. They influenced if and how analytics were obtained and its utility for informing decision-making.

The purpose of analytics use for decision-making varied across the three themes. In most cases, analytics were used to monitor the quality or efficiency of existing services to improve care provision or justify investing or disinvesting in services. In other cases, analytics were used to better understand local needs to support the development of new services.

Theme 1: Working environments

Factors relating to individuals’ working environments, described as barriers to analytics access and use, were grouped into two subthemes: organisational fragmentation (subtheme 1) and competing priorities (subtheme 2).

Subtheme 1: Organisational fragmentation

Participants worked across separate, fragmented health and care departments and organisations such as CCGs and local authorities. Those who recounted facing challenges when they had attempted to use analytics described how divisions between, and within, organisations created siloed data systems, which meant residents’ records could be stored in different data systems if they contacted more than one service. At times, this made it difficult for leaders to access data as they had to actively request data and/or analytics from individuals in other departments or organisations. Divisions in systems across organisations meant senior leaders did not always know who held certain data, whether the data they held would be relevant to inform decision-making or how to contact key individuals. These barriers were aptly described by one participant who had tried to access analytics to better understand and plan for social care accommodation needs:

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“[RES]: We need housing data, we need social care data, we need some health data, but it’s proving difficult to get those data sources... there’s issues around [asking] “where does the data sit?”. So, I had a meeting with XXX asking for some data. They’re like, “But this sits here, this doesn’t sit with us”. It’s unclear who owns certain pieces of data and how best to extract it.

[INT]: Is that the reason that you had issues accessing it in the first place?

[RES]: Definitely. So, housing data, in particular, where it sits [is] in a completely different department, a different team. We have no right to access any of that data, so it will take quite a lot of time to get it.” (ID023, Social Care Commissioner)

For some, information governance requirements contributed to these barriers to data sharing across departmental and organisational boundaries.

Overcoming barriers to data sharing often involved a time-consuming process, where participants had to identify who to request data from and justify their need. The participant continued:

“Having to explain the rationale as to why we need data is always the start of it and can always be a bit of a challenge [in] trying to make them understand why I need access to this data and what it will be used for....But I think the biggest thing is, everyone’s busy.... it’s never a priority when someone else comes saying, “Do you have this data source? I need it for XXX”, because I think, “I’ve got twenty other things on my plate”. (ID023, Social Care Commissioner)

This time-consuming process requiring continuous justification was, therefore, described as an additional organisational barrier to data sharing, analytics access and analytics use - with other priorities and work often taking precedence. When participants could not access data held on siloed systems, some made decisions without all the “necessary information” (ID022, Health and Social Care Commissioner), whilst others relied more on expert opinion (such as the opinion of single practitioners) or halted their analytics use.

Subtheme 2: Competing priorities

Many participants described how fragmentation across their health and care system, at times, led to different or competing organisational priorities. In more extreme circumstances, this hindered collective priority setting for health and care decisions, despite organisations being encouraged to align priorities locally to facilitate collaboration. For instance, one participant expressed little motivation to engage in health and care decision-making and promote data sharing due to conflicting financial drivers:

“If we have a patient who we see in the hospital we get paid £70 or something for a follow-up. If we work out a new model of care where this patient can be seen in the community or virtually, we would get paid £10 or £15. What on earth would we want to do that for?... If you’re saying let’s [in a] wholesale [manner] move half of our patients into the community, let’s lose all of that revenue, then suddenly the fixed costs that we have in this building and others become overwhelming.” (ID011, Health Provider)

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3 Indeed, several participants described how reservations around sharing data often stemmed from conflicting
4 priorities. In addition, some participants stated they were more likely to share their data if they trusted that
5 recipients had priorities aligned to their own and, as such, would use their data as they had specified. This was
6 particularly relevant for data sharing between commissioners and providers, where providers were hesitant to
7 share data in case commissioners used it to justify disinvestment in their services.
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11 Interviewees also observed they were often competing for analysts' time against the extensive mandatory
12 requirements they faced from external public bodies such as NHS England:
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16 *"The structures that sit across us, there are data requirements placed upon us which are often at short*
17 *notice and unexpected or slightly different or very similar to one that we did previously. The time and*
18 *energy and resources that it takes for [analysts] to keep changing that information and updating it and*
19 *translating it into the latest format is time consuming, it's energy sapping... So, yeah it's not [the*
20 *analysts'] priority to respond to our [analytics] requests immediately."* (ID022, Health and Social Care
21 Commissioner)
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26 Externally mandated requirements that occurred frequently, unexpectedly and at short notice were, therefore,
27 described as creating "time consuming, energy sapping" work that needed to be prioritised over requests from
28 leaders for analytics support. This was described as a barrier to analytics access, which hindered leaders' analytics
29 use.
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32 33 **Theme 2: Individual relationships**

34 Individual relationships between people involved in the process and decision – leaders and analysts (subtheme 1),
35 and leaders and leaders (subtheme 2) - were viewed as crucial. Participants described relationships as helping
36 them overcome barriers stemming from organisational fragmentation.
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40 *Subtheme 1: Leader-analyst relationships*

41 Participants suggested that the uncoordinated way in which leaders obtained analytics meant relationships
42 between leaders and analysts greatly influenced analytics access and use. Some leaders who experienced advanced
43 analytics use regularly collaborated with trusted analysts to obtain suitable analytics support. They described
44 having a "good dialogue" with analysts, which facilitated data access, and enabled leaders to iteratively and
45 successfully review and use analytics to inform decisions. In explaining how a collaborative relationship with an
46 analyst worked, one participant said:
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52 *"We kind of described the scope of the strategy, and what we'd intended it to do, and then [the analyst]*
53 *went off and led [the work]. We had a couple of meetings to check in every so often...[the analyst] and I*
54 *have worked together on and off for years...I just inherently trust [the analyst] to know what [they're]*
55 *doing."* (ID020, Health Commissioner)
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3 The benefits of having “good” working relationships with analysts appeared so crucial that leaders “attach[ed]
4 themselves to good analysts”, even if external to their organisation:
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8 *“There's a better analyst in XXX. [And so,] I would nick [them] sometimes. I would trust [their]
9 judgement around [how the analysis should be conducted].” (ID021, Health and Social Care
10 Commissioner)*
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13 Participants who faced barriers when trying to make analytics-informed decisions typically stated that, while they
14 wanted collaborative working relationships with analysts, these were not currently available. In some cases, some
15 of these participants could not access data as they did not know who to contact. Those who could access data, but
16 were reluctant to use analytics, described a struggle to develop questions that could be addressed without analysts’
17 input. This led to “insufficient” outputs which: did not address questions they required answering, lacked extra
18 detail around how to interpret and use the output, or recommended unfeasible actions.
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23 Organisational fragmentation was also described as creating physical disconnect between leaders and analysts,
24 meaning that good, cross-organisational relationships were even more salient. For instance, one provider faced
25 difficulties working with external analysts as outputs did not contain details necessary for their decision-making.
26 They felt this was because analysts were not “part of the team” and, therefore “didn’t know what [the leaders
27 were] talking about and leading on” with respect to a decision (ID012, Health Provider). This participant
28 eventually hired an internal analyst to produce better suited analytical support. Several participants believed they
29 had a better understanding of how services operated than analysts because analysts were not co-located in
30 decision-making teams. This drove their choice to request raw data and conduct their own analyses to support
31 decision-making, independent of analysts’ input.
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38 *Subtheme 2: Leader-leader relationships*

39 Building trust and relationships between individual leaders of the organisations was also vital for some
40 participants when making strategic decisions across organisational boundaries. More regular and confident users
41 of analytics had established relationships and aligned strategic priorities with other, trusted leaders. Conversely,
42 those who faced barriers to obtaining and using analytics from external organisations typically faced difficulties
43 forming relationships with other leaders and aligning strategic priorities:
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48 *“We've got a new Director [of the partner organisation] come in, who very much sees that they've got
49 to sort out this little corner XXX as a separate project, rather than doing it all at once. Which has delayed
50 the togetherness of the project.We were talking 18 months ago, we'd got the model ready, and yet
51 we're still sitting here now, talking about it.” (ID016, Health Provider)*
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55 High turnover of senior leaders, in general, was also described as a barrier to developing and sustaining leader
56 relationships, stalling project delivery and analytics use.
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59 **Theme 3: Data quality**

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3 A third theme centres on data quality, which, when perceived as poor, was described as hindering senior
4 leaders' use of analytics for strategic health and care decision-making. The term signified two issues: data
5 availability and accuracy (subtheme 1) and data linkage (subtheme 2).
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9 *Subtheme 1: Data availability and accuracy*

10 Several participants described circumstances where data they required for a decision did not exist because certain
11 groups had little or sporadic contact with services or recording of certain information was not mandatory. This
12 hindered their ability to make decisions for these populations. For example, when discussing service provision for
13 residents with autism, one commissioner stated they *"simply don't know how many children have autism, because*
14 *there are whole cohorts not recorded. If you're at a private school, it's not recorded. If you don't have an*
15 *educational health and care plan, it's not recorded"*. This made accurate service planning difficult, as they *"felt*
16 *like how on earth could [they] possibly do accurate service planning because [they] will never know the [number*
17 *of children with autism]"* (ID022, Health and Social Care Commissioner). Attempting to overcome this issue,
18 they retrospectively collected data, which was a resource-intensive and *"frustrating"* task. They also relied on
19 *"professional judgement"*, *"gut feeling"* and academic studies *"carried out a long time ago"* more so than
20 analytics. This approach was common amongst participants who experienced data availability as a barrier.
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27 Six participants described how concerns around data accuracy sometimes led to considerable resources being used
28 to determine the *"correct"* data, which stopped more advanced analytical work. In some cases, participants halted
29 decision-making due to perceived data inaccuracies, and again relied more on expert opinion. More regular and
30 confident analytics users rarely communicated data availability and accuracy as barriers to analytics use.
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35 *Subtheme 2: Data linkage*

36 Participants describing concerns around data quality and difficulties they had faced accessing data because of
37 siloed data systems or poor working relationships also reflected how projects that link patient records stored across
38 data systems could help overcome these barriers. Without linkage, data was seen as being often disconnected and
39 stored across siloed data systems that *"don't talk to each other"*. For example, one commissioner described
40 linking NHS and publicly available data to inform their decision-making:
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45 *"We looked at primary care data, [and] prevalence [of various health conditions]. Then we looked at*
46 *some acute data, and we managed to link the acute and primary care data through the pseudonymised*
47 *NHS number. But because we had all this [geographical] mapping in our data, we said, actually, well*
48 *we can link to [area-level deprivation data].... We then looked at it, and what we ended up with was six*
49 *very different projects, so not this blanket one size fits all....* (ID013, Health Commissioner)
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53 They described how this linked data enabled them to see the *"fuller picture"* of service use for residents who
54 accessed care across organisational boundaries. As a result, they felt more able to holistically understand health
55 needs and more efficiently make strategic health and care decisions. However, they felt unable to make decisions
56 that considered residents' individual social circumstances or social care use, as local authority records (containing
57 such information) did not contain NHS numbers. NHS numbers were seen as necessary enablers of data linkage:
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“*[With] our local authority data, unfortunately, they didn’t use NHS number at all. So normally where you might get say a 65% to 70% match, or even a 50%/60%.... we had nothing...the local authority data could have added value.*” (ID013, Health Commissioner)

This participant was fairly exceptional as they conducted their own linkage, and other participants did not currently have access to data linked across services. Most participants expressed a positive view of the potential for data linkage to help them understand needs and inform strategic health and care decision-making. Without linked data, participants made decisions with incomplete data that were “*heavily caveated*” and evaluated, or again sought alternative information. A handful of participants were setting up data systems that linked records across health and care organisations to enable leaders’ access to linked data.

Discussion

In this qualitative study we found that senior leaders’ use of analytics for strategic health and care decision-making was influenced by the degree and nature of connectedness between organisations, individuals, and data.

Improving organisational integration and strengthening relationships between leaders and analysts should enable leaders to better utilise data to transform care

At the time of interviews, constituent STP organisations were structurally independent. This hindered analytics access and use by creating siloed data systems, which consistently create barriers to UK health and care integration^{21,22}. As a result, most participants could not follow patient or resident journeys across services, nor plan services effectively using data that might be linked across this journey.

In March 2020, sharing of certain data across organisational boundaries was mandated to support the UK coronavirus response. This demonstrated that improved data sharing across health and care is possible and important for care delivery, with the governments’ 2021 White Paper legislating reforms aiming to continue increased data sharing⁴. Linking data across organisational boundaries is also viewed as a potential enabler of more integrated care^{2,7,12}. However, the White Paper did not discuss data linkage, instead generally committing to improving data availability and quality⁴. Our findings suggest that programmes linking administrative data across health and care are welcomed and, if successful, could help improve care delivery^{2,23}. We found that, when data were linked across primary and acute care, one participant felt better able to understand needs and tailor commissioned services. However, they faced difficulties understanding wider determinants of health that would require local authority data. It is unclear how upcoming reforms propose to improve data sharing with local government²⁴. It is crucial that the national government’s forthcoming Data Strategy for Health and Care considers how to improve data sharing with local government, which could facilitate health and care integration and help realise aims to tackle health inequalities²⁵.

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3 Our findings suggest that, whilst necessary, these data-related policy changes alone will be insufficient to realise
4 the White Paper's aspiration for data to drive the transformation of care⁴. When these reforms come into force in
5 2022, leaders may continue to struggle accessing and using data and/or analytics if they do not know where
6 different data are held, who to contact to request certain data or believe analysts do not understand decision-
7 making contexts. Leaders may also continue to distrust the quality of data, which has been identified as a concern
8 in previous literature^{11,22,26}. We found that leaders with working relationships with trusted analysts were able to
9 overcome these barriers and work collaboratively to obtain analytical support. Efforts to develop and sustain
10 relationships between leaders and analysts across organisations are therefore crucial. These could include analyst
11 secondments that provide analysts' greater proximity to decision-makers and foster shared understanding of
12 values and decision-making contexts.

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19 Whilst the 2021 White Paper reforms include changes aiming to facilitate shared priority setting across
20 organisational boundaries, separate financial budgets will remain for NHS and local government⁴. This is
21 concerning as we found that financial structures continue to disincentivise cross-sectoral working, particularly in
22 hospital settings where investments in system-wide priorities can conflict with the priorities of individual
23 organisations^{27,28}. Fundamental changes in financial incentives are needed to ensure alignment of strategic
24 priorities across health and care, particularly if shared priority setting is viewed as a cornerstone of integration⁴.
25 We found that good working relationships between leaders of different organisations circumvented organisational
26 barriers by facilitating shared priority setting. However, intense resources were required to develop and sustain
27 these relationships, with high staff turnover stalling the progress and delivery of cross-organisational programmes
28 of work, as seen previously^{7,21,29}. Where these relationships were absent, strategic priorities were misaligned and
29 at times conflicting, which significantly hindered health and care decision-making. These findings align with
30 previous literature, which reports leader-leader relationships as one of the most important predictors of successful
31 and sustainable partnership working in health and care^{7,11,21,30,31}.

32 33 34 35 36 37 38 39 **Strengths and limitations of this study**

40 There is little peer-reviewed literature on the use of analytics by senior leaders for joint decision-making. Whilst
41 we have identified familiar factors that continue to facilitate and hinder integration, this study offers novel and
42 rich insights into the complexity of barriers and facilitators of analytics use for strategic decision-making when
43 areas were on the cusp of transitioning from local models of integration (STPs) to statutory organisations (ICSs).
44 Furthermore, we show how these experiences can impact decision-making. Participants were from a wide range
45 of roles and organisations, offering a breadth of perspectives.

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50 We recruited from one London-based STP with digitally engaged leadership that, during recruitment, were
51 actively pursuing a data linkage programme to facilitate formation of an ICS. Therefore, all of our findings may
52 not be transferable to other settings³². Despite the STPs' overall relative digital innovation, we still identified
53 extensive barriers to analytics use and there remained considerable variation in interest in data across the STP. It
54 is likely these barriers, plus others, are more impactful in less digitally engaged ICSs. In addition, sharing of
55 certain data across organisations was mandated as part of the UK Covid-19 response. Barriers related to data
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3 sharing may, therefore, not be relevant in times of crisis, but remain important for future partnership working and
4 provide insight into possible strategies that could facilitate analytics use.
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7 **Implications for policy and practice**

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9 To realise the White Paper's aspiration for data as a driving force for health and care integration, more is needed
10 to better integrate organisations, align organisational priorities, and build and sustain cross-organisational
11 relationships between leaders and analysts, and leaders of different organisations. Whilst policy changes to
12 facilitate data sharing across organisations are necessary, they will be insufficient without strategies to address
13 these further key barriers to analytics use for strategic health and care decision-making.
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Contributors: EI, HM, MG, SH and JS conceptualised the study, devised the research questions and methods. EI applied for the ethical approval and conducted all interviews. EI and SB analysed interview data with the support of SC, KK, and JS. EI drafted the manuscript. All authors commented on drafts of the manuscript and agreed the decision to submit for publication.

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26 **Figure captions:**

27 Figure 1: The relationship between constituent organisations in Integrated Care Systems (ICSs), formerly called
28 sustainability and transformation partnership (STPs) adapted from The King’s Fund explainer: ‘The NHS: how
29 providers are regulated and commissioned’¹⁶.
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Standards for Reporting Qualitative Research (SRQR)*

<http://www.equator-network.org/reporting-guidelines/srqr/>

Page/line no(s).

Title and abstract

<p>Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended</p>	1
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	2

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	4
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	4

Methods

<p>Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**</p>	5
<p>Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability</p>	5
<p>Context - Setting/site and salient contextual factors; rationale**</p>	5
<p>Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**</p>	6
<p>Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues</p>	6
<p>Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**</p>	6

1 2 3 4 5	Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	6
6 7 8	Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	6
9 10 11 12	Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6
13 14 15 16	Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	6
17 18 19 20	Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	6

Results/findings

23 24 25 26	Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	7-12
27 28 29	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	7-12

Discussion

32 33 34 35 36 37	Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	13-14
38 39	Limitations - Trustworthiness and limitations of findings	14

Other

42 43 44	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	1
45 46	Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	1

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

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Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388

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Barriers and facilitators of use of analytics for strategic health and care decision-making: a qualitative study of senior health and care leaders' perspectives

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Abstract

Objective: This study investigated the barriers and facilitators that senior leaders' experience when using knowledge generated from the analysis of administrative health or care records ('analytics') to inform strategic health and care decision-making.

Setting: One London-based Sustainability and Transformation Partnership (STP) in England, as it was on the cusp of forming an Integrated Care System (ICS).

Participants: 20 senior leaders including health and social care commissioners, public health leads, and health providers. Participants were eligible for inclusion if they were a senior leader of a constituent organisation of the STP and involved in using analytics to make decisions for their own organisations or health and care systems.

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4 1 **Design:** Semi-structured interviews conducted between January and March 2020 and analysed using
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6 2 the Framework Method to generate common themes.
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10 4 **Results:** Organisational fragmentation hindered use of analytics by creating siloed data systems,
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12 5 barriers to data sharing, and different organisational priorities. Where trusted and collaborative
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14 6 relationships existed between leaders and analysts, organisational barriers were circumvented and
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16 7 access to and support for analytics facilitated. Trusted and collaborative relationships between
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18 8 individual leaders of different organisations also aided cross-organisational priority setting, which was
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20 9 a key facilitator of strategic health and care decision-making and use of analytics. Data linked across
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22 10 health and care settings was viewed as an enabler of use of analytics for decision-making, whilst
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24 11 concerns around data quality often stopped analytics use as part of decision-making, with participants
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26 12 relying more so on expert opinion or intuition.
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32 14 **Conclusions:** The UK Governments 2021 White Paper set out aspirations for data to transform care.
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34 15 Whilst necessary, policy changes to facilitate data sharing across organisations will be insufficient to
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36 16 realise this aim. Better integration of organisations with aligned priorities could support and sustain
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57 25 **Strengths and limitations of this study**

- 58 26 • A key strength of this work is that we have illustrated how leaders experience complex and
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60 27 wide-ranging barriers and facilitators of use of analytics for strategic decision-making at a

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3 1 time when areas were on the cusp of transitioning from local models of integration in England
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5 2 (Sustainability and Transformation Partnerships) to national statutory organisations
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7 3 (Integrated Care Systems). Our findings are timely as the use of data and analytics are
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10 4 viewed as central to the integration of services and integrated decision-making.

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12 5 • Another strength is that we worked collaboratively and in partnership with a digitally engaged
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14 6 and innovative site to inform the study design, research questions, study materials and study
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16 7 procedures.
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18 8 • We recruited participants from a wide range of roles and constituent organisations of the study
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20 9 site, offering a breadth of perspectives.
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23 10 • A limitation is that we recruited from one London-based Sustainability and Transformation
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25 11 Partnership (now Integrated Care System) and, whilst we believe most findings are
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27 12 transferable to other settings, all findings may not be transferable to settings that are perhaps
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29 13 less digitally engaged or have different priorities.
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32 14 • We interviewed participants during January and March 2020 before the onset of the COVID-
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34 15 19 pandemic, which may have changed leaders' use of analytics for strategic health and care
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36 16 decision-making as well as the barriers and facilitators senior leaders' face when using
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38 17 analytics in this context.
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Introduction

Over the past 10 years, health and care reforms in England have been moving towards greater integration between different organisations concerned with the provision, commissioning and planning of health and care¹⁻⁴. In England, care services include social care which provides support to those with illness and/or disability with their activities of daily life. As part of reforms, all areas in England were statutorily required to form integrated care systems (ICSs) by April 2021, replacing pre-existing Sustainability and Transformation Partnerships (STPs). STPs and ICSs are place-based partnerships between local national health service (NHS) organisations, local authorities and other strategic partners with the intention of pooling resources to coordinate health and care services.

As health and care organisations move towards greater integration, senior leaders are increasingly required to make decisions about the structure and delivery of services (strategic decisions) that can have implications across organisational and sectoral boundaries. In England, the use of knowledge generated from the analysis of administrative data ('analytics') is seen as central to integrated decision-making and viewed as an opportunity to address health inequalities and the rising challenge of multiple long-term conditions. For example, a recent government White Paper states that "integrating care... relies on the power of digital and data to join up care and uses that power to drive transformation of

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3 1 care⁴. Whilst there are many ways in which care may be integrated, analytics may best contribute to
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5 2 elements of organisational integration (the integration of formal organisational structures) and functional
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7 3 integration (the integration of back-office functions), as described in Mowlam and Fulop's framework⁵.
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10 4 To this end, analytics can aid assessments of local need to support development of new, more
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12 5 integrated services, or used to monitor the effectiveness, efficiency and quality of existing services^{4,6-9}.
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16 7 Operational barriers to generating high-quality analytics have been well described, as have barriers to
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18 8 evidence-based decision-making in the NHS and for public health⁹⁻¹⁷. Barriers to evidence-based
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20 9 decision-making in these contexts include lack collaborative working relationships between leaders of
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22 10 different organisations, poor relationships between evidence producers and users, and competing or
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24 11 different organisational priorities^{9,11,17}. However, less focus has been paid to the relational aspects of
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26 12 accessing and using analytics for strategic decision-making and little attention has been paid to senior
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28 13 leaders' readiness to use analytics, with findings suggesting leaders do not always value and use
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30 14 analytics for decision-making^{6,9,14}. Furthermore, no previous studies have examined barriers and
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32 15 facilitators of use of analytics for strategic decision-making that has implications across health and care
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34 16 organisational and sectoral boundaries (hereafter 'strategic health and care decision-making').
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36 17 Elucidating this understanding is important to help realise the White Papers' aims for data to transform
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38 18 care. This study investigated the barriers and facilitators that senior leaders' experience when using
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40 19 analytics for strategic health and care decision-making. A single STP was chosen as a case study to
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42 20 give nuanced, empirically rich and context-specific findings.
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51 22 **Methods**

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54 23 We conducted a case study of one STP in London, England, prior to its formation of an ICS¹⁸. This STP
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56 24 expressed interest in understanding barriers and opportunities to enhance senior leaders' use of
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58 25 analytics and was a site actively pursuing linkage of health and local authority records. It included
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1 participants from CCGs, local authorities, hospitals, and other service providers. Figure 1 presents an
2 overview of stakeholders in this case study. This manuscript was prepared following the SRQR
3 Checklist¹⁹.

4
5 FIGURE 1 ABOUT HERE
6

7 **Recruitment**

8 Participants were recruited from constituent organisations of the STP and eligible if responsible for
9 strategic decision-making for their own organisation or local health and care system. Eligible
10 participants were first identified and contacted by key STP leaders and then by the study team.
11 Participants were asked to recommend further eligible colleagues²⁰. Recruitment ended when we
12 reached data saturation.

14 **Data collection**

15 We conducted 20 semi-structured individual interviews between January and March 2020. Interviews
16 followed a topic guide developed using guidance for conducting interviews in healthcare settings²¹.
17 Participants were asked to describe their use of analytics as part of a strategic health and care decision
18 they had made, and things that had facilitated or hindered their use. The guide was developed to reflect
19 the STP's priorities and adapted to probe underexplored topics as the study progressed. Audio
20 recordings of interviews were transcribed and anonymised by an external transcription agency and
21 subsequently checked for accuracy. Once transcribed, recordings were deleted. Ethical approval was
22 obtained from UCL's Research Ethics Committee.

23
24 Transcripts were analysed using the Framework Method. This form of thematic analysis is suitable for
25 multi-disciplinary teams where members vary in their experience of using qualitative analysis methods
26 and want to use both inductive and deductive coding approaches to give a descriptive and holistic
27 overview of the semi-structured interview data²². EI conducted the analysis by iteratively following steps

1 from Braun and Clarke²³. Codes were first generated deductively based on operational barriers to high-
 2 quality analytics previously identified in the literature^{13–15}. Salient phrases were then coded inductively
 3 and subsequently compared to research questions. Codes were grouped to form categories and
 4 categories refined to represent a robust theme across participants. A reflexive journal was kept during
 5 interviews and referred to during analysis and write-up. A subset of transcripts were double coded by
 6 SC and SB, and the coding frame checked before being applied across the dataset²².

7
 8 Research questions, the topic guide and study procedures were informed by a pilot study and refined
 9 prior to the full study.

11 Patient and public involvement

12 The idea for this study was borne out of an expressed STP need to understand use of analytics for
 13 strategic decision-making from the perspective of senior leaders. Key staff at the STP reviewed the
 14 study protocol, topic guide, participant information and consent sheets. These materials reflected their
 15 priorities. Study materials were tested with a neighbouring STP site. We worked collaboratively with the
 16 STP throughout the research process and emergent themes were discussed during analysis and write-
 17 up. Our collaborators will choose how to disseminate study findings.

19 Results

20
 21 Interviews were conducted with senior leaders in health and/or care commissioning, provider and public
 22 health roles (see Table 1).

24 **Table 1: Participant characteristics (N=20)**

Characteristic	N (%)
Gender: Male	12 (60)

Geography:		
	Inner London Borough	8 (40)
	Outer London Borough	4 (20)
	Inner and Outer London Boroughs*	8 (40)
Generic Organisation and Role:		
	Health – Provider	6 (30)
	Health – Commissioner	4 (20)
	Local Authority - Social Care Commissioner	4 (20)
	Local Authority - Public Health Consultant	2 (10)
	Health and Local Authority – Health and Social Care Commissioner	4 (20)
*Split role across inner and outer boroughs. Includes STP leads.		

Participants described the process of attempting to obtain data and/or analytics for strategic health and care decision-making as uncoordinated, “*ad-hoc*” or “*random*”. We found that factors related to three areas - individuals’ **working environments (Theme 1)**, **relationships (Theme 2)** and the **quality of data sought (Theme 3)** - greatly influenced this process. These factors were *barriers or facilitators* of use of analytics depending on circumstances and contexts. They influenced if and how analytics were obtained and its utility for informing decision-making.

The purpose of analytics use for decision-making varied across the three themes. In most cases, analytics were used to monitor the quality or efficiency of existing services to improve care provision or justify investing or disinvesting in services. In other cases, analytics were used to better understand local needs to support the development of new services.

Theme 1: Working environments

Factors relating to individuals’ working environments included organisational fragmentation and competing priorities and were described as barriers to analytics access and use.

Organisational fragmentation

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3 1 Participants worked across separate, fragmented health and care departments and organisations such
4
5 2 as CCGs and local authorities. Those who recounted facing challenges when they had attempted to
6
7 3 use analytics described how divisions between, and within, organisations created siloed data systems,
8
9 4 which meant residents' records could be stored in different data systems if they contacted more than
10
11 5 one service. At times, this made it difficult for leaders to access data as they had to actively request
12
13 6 data and/or analytics from individuals in other departments or organisations. Divisions in systems
14
15 7 across organisations meant senior leaders did not always know who held certain data, whether the data
16
17 8 they held would be relevant to inform decision-making or how to contact key individuals. These barriers
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19 9 were aptly described by one participant who had tried to access analytics to better understand and plan
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21 10 for social care accommodation needs:
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27 12 *"[RES]: We need housing data, we need social care data, we need some health data, but it's*
28
29 13 *proving difficult to get those data sources... there's issues around [asking] "where does the*
30
31 14 *data sit?". So, I had a meeting with [an internal team] asking for some data. They're like, "But*
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33 15 *this sits here, this doesn't sit with us". It's unclear who owns certain pieces of data and how*
34
35 16 *best to extract it.*
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38 17 *[INT]: Is that the reason that you had issues accessing it in the first place?*
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40 18 *[RES]: Definitely. So, housing data, in particular, where it sits [is] in a completely different*
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42 19 *department, a different team. We have no right to access any of that data, so it will take quite*
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44 20 *a lot of time to get it." (ID023, Social Care Commissioner)*
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49 22 For some, information governance requirements contributed to these barriers to data sharing across
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51 23 departmental and organisational boundaries. For example, General Data Protection Regulation
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53 24 (GDPR), which is a legal framework for the collection and processing of personal data introduced in the
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55 25 UK in 2018, was described by one participant as follows:
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3 1 *"GDPR was supposed to make [sharing data safely] better or easier but I think that's caused a*
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5 2 *lot of complications as well...I think the trust [for me] is, [once I've shared my data with you] are*
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7 3 *you going to ensure that you're following the rules, so if there's a breach, I don't have to pay*
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9 4 *ten percent of my revenue". (ID015, Health Commissioner)*
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14 6 Overcoming barriers to data sharing often involved a time-consuming process, where participants had
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16 7 to identify who to request data from and justify their need. The participant continued:
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20 9 *"Having to explain the rationale as to why we need data is always the start of it and can always*
21
22 10 *be a bit of a challenge [in] trying to make them understand why I need access to this data and*
23
24 11 *what it will be used for....But I think the biggest thing is, everyone's busy.... it's never a priority*
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26 12 *when someone else comes saying, "Do you have this data source? I need it for X", because I*
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28 13 *think, "I've got twenty other things on my plate". (ID023, Social Care Commissioner)*
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34 15 This time-consuming process requiring continuous justification was, therefore, described as an
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36 16 additional organisational barrier to data sharing, analytics access and use of analytics - with other
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38 17 priorities and work often taking precedence. When participants could not access data held on siloed
39
40 18 systems, some made decisions without all the *"necessary information"* (ID022, Health and Social Care
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42 19 *Commissioner*), whilst others relied more on expert opinion (such as the opinion of single practitioners)
43
44 20 or stopped their use of analytics.
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47 22 *Competing priorities*

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51 23 Many participants described how fragmentation across their health and care system, at times, led to
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53 24 different or competing organisational priorities. In more extreme circumstances, this hindered collective
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55 25 priority setting for health and care decisions, despite organisations being encouraged to align priorities
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57 26 locally to facilitate collaboration. For instance, one participant expressed little motivation to engage in
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59 27 health and care decision-making and promote data sharing due to conflicting financial drivers:
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6 2 *"If we have a patient who we see in the hospital we get paid £70 or something for a follow-up.*
7
8 3 *If we work out a new model of care where this patient can be seen in the community or virtually,*
9
10 4 *we would get paid £10 or £15. What on earth would we want to do that for?... If you're saying*
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12 5 *let's [in a] wholesale [manner] move half of our patients into the community, let's lose all of that*
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14 6 *revenue, then suddenly the fixed costs that we have in this building and others become*
15
16 7 *overwhelming."* (ID011, Health Provider)
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21 9 Indeed, several participants described how reservations around sharing data often stemmed from
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23 10 conflicting priorities. In addition, some participants stated they were more likely to share their data if
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25 11 they trusted that recipients had priorities aligned to their own and, as such, would use their data as they
26
27 12 had specified. This was particularly relevant for data sharing between commissioners and providers,
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29 13 where providers were hesitant to share data in case commissioners used it to justify disinvestment in
30
31 14 their services.
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36 16 Interviewees also observed they were often competing for analysts' time against the extensive
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38 17 mandatory requirements they faced from external public bodies such as NHS England:
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43 19 *"The structures that sit across us, there are data requirements placed upon us which are often*
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45 20 *at short notice and unexpected or slightly different or very similar to one that we did previously.*
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47 21 *The time and energy and resources that it takes for [analysts] to keep changing that information*
48
49 22 *and updating it and translating it into the latest format is time consuming, it's energy sapping...*
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51 23 *So, yeah it's not [the analysts'] priority to respond to our [analytics] requests immediately."*
52
53 24 *(ID022, Health and Social Care Commissioner)*
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58 26 Externally mandated requirements that occurred frequently, unexpectedly and at short notice were,
59
60 27 therefore, described as creating *"time consuming, energy sapping"* work that needed to be prioritised

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3 1 over requests from leaders for analytics support. This was described as a barrier to analytics access,
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5 2 which hindered leaders' use of analytics.
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10 4 **Theme 2: Individual relationships**

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12 5 Individual relationships between people involved in the process and decision – leaders and analysts,
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14 6 and leaders and leaders - were viewed as crucial. Participants described relationships as helping them
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16 7 overcome barriers stemming from organisational fragmentation.
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20 9 *Leader-analyst relationships*

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23 10 Participants suggested that the uncoordinated way in which leaders obtained analytics meant
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25 11 relationships between leaders and analysts greatly influenced analytics access and use. Some leaders
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27 12 who experienced advanced use of analytics regularly collaborated with trusted analysts to obtain
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29 13 suitable analytics support. They described having a “good dialogue” with analysts, which facilitated data
30
31 14 access, and enabled leaders to iteratively and successfully review and use analytics to inform decisions.
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34 15 In explaining how a collaborative relationship with an analyst worked, one participant said:
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38 17 *“We kind of described the scope of the strategy, and what we'd intended it to do, and then [the*
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40 18 *analyst] went off and led [the work]. We had a couple of meetings to check in every so*
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42 19 *often...[the analyst] and I have worked together on and off for years...I just inherently trust [the*
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44 20 *analyst] to know what [they're] doing.” (ID020, Health Commissioner)*
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49 22 The benefits of having “good” working relationships with analysts appeared so crucial that leaders
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51 23 “attach[ed] themselves to good analysts”, even if external to their organisation:
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4 1 *"There's a better analyst in [an external organisation]. [And so,] I would nick [them] sometimes.*
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6 2 *I would trust [their] judgement around [how the analysis should be conducted]."* (ID021, Health
7
8 3 *and Social Care Commissioner)*
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12 5 Participants who faced barriers when trying to make analytics-informed decisions typically stated that,
13
14 6 while they wanted collaborative working relationships with analysts, these were not currently available.
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16 7 In some cases, some of these participants could not access data as they did not know who to contact.
17
18 8 Those who could access data, but were reluctant to use analytics, described a struggle to develop
19
20 9 questions that could be addressed without analysts' input. This led to *"insufficient"* outputs which: did
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22 10 not address questions they required answering, lacked extra detail around how to interpret and use the
23
24 11 output, or recommended unfeasible actions.
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29 13 Organisational fragmentation was also described as creating physical disconnect between leaders and
30
31 14 analysts, meaning that good, cross-organisational relationships were even more salient. For instance,
32
33 15 one provider faced difficulties working with external analysts as outputs did not contain details
34
35 16 necessary for their decision-making. They felt this was because analysts were not *"part of the team"*
36
37 17 and, therefore *"didn't know what [the leaders were] talking about and leading on"* with respect to a
38
39 18 decision (ID012, Health Provider). This participant eventually hired an internal analyst to produce better
40
41 19 suited analytical support. Several participants believed they had a better understanding of how services
42
43 20 operated than analysts because analysts were not co-located in decision-making teams. This drove
44
45 21 their choice to request raw data and conduct their own analyses to support decision-making,
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47 22 independent of analysts' input.
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51 23 52 53 24 *Leader-leader relationships*

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55 25 Building trust and relationships between individual leaders of the organisations was also vital for some
56
57 26 participants when making strategic decisions across organisational boundaries. More regular and
58
59 27 confident users of analytics had established relationships and aligned strategic priorities with other,
60

1 trusted leaders. Conversely, those who faced barriers to obtaining and using analytics from external
2 organisations typically faced difficulties forming relationships with other leaders and aligning strategic
3 priorities:

4
5 *“We’ve got a new Director [of the partner organisation] come in, who very much sees that*
6 *they’ve got to sort out this little corner [of the decision] as a separate project, rather than doing*
7 *it all at once. Which has delayed the togetherness of the project.We were talking 18 months*
8 *ago, we’d got the model ready, and yet we’re still sitting here now, talking about it.” (ID016,*
9 *Health Provider)*

10

11 High turnover of senior leaders, in general, was also described as a barrier to developing and sustaining
12 leader relationships, stalling project delivery and use of analytics.

13

14 **Theme 3: Data quality**

15 A third theme centres on data quality, which, when perceived as poor, was described as hindering
16 senior leaders’ use of analytics for strategic health and care decision-making. The term signified two
17 issues: data availability and accuracy and data linkage.

18

19 *Data availability and accuracy*

20 Several participants described circumstances where data they required for a decision did not exist
21 because certain groups had little or sporadic contact with services or recording of certain information
22 was not mandatory. This hindered their ability to make decisions for these populations. For example,
23 when discussing service provision for residents with autism, one commissioner stated they *“simply don’t*
24 *know how many children have autism, because there are whole cohorts not recorded” (ID022, Health*
25 *and Social Care Commissioner)*. They went on to describe how this made it difficult to accurately plan
26 services, as they could not determine how many children had autism in the borough. Attempting to

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2
3 1 overcome this issue, they retrospectively collected data, which was a resource-intensive and
4
5 2 “frustrating” task. They also relied on “professional judgement”, “gut feeling” and academic studies
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7 3 “carried out a long time ago” more so than analytics. This approach was common amongst participants
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9
10 4 who experienced data availability as a barrier.

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12 5
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14 6 Six participants described how concerns around data accuracy sometimes led to considerable
15
16 7 resources being used to determine the “correct” data, which stopped more advanced analytical work.
17
18 8 In some cases, participants stopped their use of analytics as part of decision-making due to perceived
19
20 9 data inaccuracies, and again relied more on expert opinion. More regular and confident analytics users
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22
23 10 rarely communicated data availability and accuracy as barriers to use of analytics.

24 25 11 26 27 12 *Data linkage*

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29 13 Participants describing concerns around data quality and difficulties they had faced accessing data
30
31 14 because of siloed data systems or poor working relationships also reflected how projects that link patient
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33 15 records stored across data systems could help overcome these barriers. Without linkage, data was
34
35 16 seen as being often disconnected and stored across siloed data systems that “don’t talk to each other”.
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37 17 For example, one commissioner described linking NHS and publicly available data on area-level
38
39 18 deprivation to inform their decision-making in this example, prompting them to tailor services to different
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41 19 population groups:

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46 21 *“We looked at primary care data... then we looked at some acute data, and we managed to*
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48 22 *link the acute and primary care data. [After linking with publicly available deprivation data] what*
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50 23 *we ended up with was six very different projects, so not this blanket one size fits all.” (ID013,*
51
52 24 *Health Commissioner)*

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57 26 They described how this linked data enabled them to see the “fuller picture” of service use for residents
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59 27 who accessed care across organisational boundaries. As a result, they felt more able to holistically

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3 1 understand health needs and more efficiently make strategic health and care decisions. However, they
4
5 2 felt unable to make decisions that considered residents' individual social circumstances or social care
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7
8 3 use, as local authority records (containing such information) did not contain NHS numbers. NHS
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10 4 numbers were seen as necessary enablers of data linkage:
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12 5

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14 6 *"[With] our local authority data, unfortunately, they didn't use NHS number at all. So normally*
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16 7 *where you might get say a 65% to 70% match, or even a 50%/60%.... we had nothing...the*
17
18 8 *local authority data could have added value."* (ID013, Health Commissioner)
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23 10 This participant was fairly exceptional as they conducted their own linkage, and other participants did
24
25 11 not currently have access to data linked across services. Most participants expressed a positive view
26
27 12 of the potential for data linkage to help them understand needs and inform strategic health and care
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29 13 decision-making. Without linked data, participants made decisions with incomplete data that were
30
31 14 *"heavily caveated"* and evaluated, or again sought alternative information. A handful of participants
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34 15 were setting up data systems that linked records across health and care organisations to enable
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36 16 leaders' access to linked data.
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43 19 Discussion

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49 21 In this qualitative study we found that senior leaders' use of analytics for strategic health and care
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51 22 decision-making was influenced by the degree and nature of connectedness between organisations,
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53 23 individuals, and data.
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58 25 **Improving organisational integration and strengthening relationships between leaders and analysts**
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60 26 **should enable leaders to better utilise data to transform care**

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3 1 At the time of interviews, constituent STP organisations were structurally independent. This hindered
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5 2 analytics access and use by creating siloed data systems, which consistently create barriers to health
6
7 3 and care integration in the UK^{24,25}. As a result, most participants could not follow patient or resident
8
9 4 journeys across services, nor plan services effectively using data that might be linked across this
10
11 5 journey. Our findings support Mowlan and Fulop's framework by suggesting that greater use of analytics
12
13 6 for decision-making may help achieve increased organisational and functional integration. Our findings
14
15 7 also suggest that increased integration at organisational and functional levels through joined up data
16
17 8 systems could facilitate the use of analytics for informing strategic health and care decision-making⁵.
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23 10 In March 2020, sharing of certain data across organisational boundaries was mandated to support the
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25 11 UK coronavirus response. This demonstrated that improved data sharing across health and care is
26
27 12 possible and important for care delivery, with the governments' 2021 White Paper legislating reforms
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29 13 aiming to continue increased data sharing⁴. Linking data across organisational boundaries is also
30
31 14 viewed as a potential enabler of more integrated care^{2,7,13}. However, the White Paper did not discuss
32
33 15 data linkage, instead generally committing to improving data availability and quality⁴. Our findings
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35 16 suggest that programmes linking administrative data across health and care are welcomed and, if
36
37 17 successful, could help improve care delivery^{2,26}. We found that, when data were linked across primary
38
39 18 and acute care, one participant felt better able to understand needs and tailor commissioned services.
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41 19 However, they faced difficulties understanding wider determinants of health that would require local
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43 20 authority data. It is unclear how upcoming reforms propose to improve data sharing with local
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45 21 government²⁷. It is crucial that the national government's forthcoming Data Strategy for Health and Care
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47 22 considers how to improve data sharing with local government, which could facilitate health and care
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49 23 integration and help realise aims to tackle health inequalities²⁸.
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25 Our findings suggest that, whilst necessary, these data-related policy changes alone will be insufficient
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27 to realise the White Paper's aspiration for data to drive the transformation of care⁴. When these reforms
come into force, leaders may continue to struggle accessing and using data and/or analytics if they do

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3 1 not know where different data are held, who to contact to request certain data or believe analysts do
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5 2 not understand decision-making contexts. This aligns with previous literature highlighting how NHS
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7 3 leaders with different professional backgrounds can differ in their use of evidence for decision-making
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9 4 and literature emphasising how relationships between evidence producers and users can influence
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11 5 evidence use in UK public health decision-making^{9,10}. Following reforms, leaders may also continue to
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13 6 distrust the quality of data, which has also been identified as a concern in previous literature^{15,25,29}. We
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15 7 found that leaders with working relationships with trusted analysts were able to overcome these barriers
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17 8 and work collaboratively to obtain analytical support. Efforts to develop and sustain relationships
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19 9 between leaders and analysts across organisations are therefore crucial. These could include analyst
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21 10 secondments that provide analysts' greater proximity to decision-makers and foster shared
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23 11 understanding of values and decision-making contexts.
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30 13 Whilst the 2021 White Paper reforms include changes aiming to facilitate shared priority setting across
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32 14 organisational boundaries, separate financial budgets will remain for NHS and local government⁴. This
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34 15 is concerning as we found that financial structures continue to disincentivise cross-sectoral working,
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36 16 particularly in hospital settings where investments in system-wide priorities can conflict with the priorities
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38 17 of individual organisations^{30,31}. Fundamental changes in financial incentives are needed to ensure
39
40 18 alignment of strategic priorities across health and care, particularly if shared priority setting is viewed
41
42 19 as a cornerstone of integration⁴. We found that good working relationships between leaders of different
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44 20 organisations circumvented organisational barriers by facilitating shared priority setting. However,
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46 21 intense resources were required to develop and sustain these relationships, with high staff turnover
47
48 22 stalling the progress and delivery of cross-organisational programmes of work, as seen previously^{7,24,32}.
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50 23 Where these relationships were absent, strategic priorities were misaligned and at times conflicting,
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52 24 which significantly hindered health and care decision-making. These findings align with previous
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54 25 literature, which reports leader-leader relationships as one of the most important predictors of
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56 26 successful and sustainable partnership working in health and care, as well as a key determinant of
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58 27 evidence-use in NHS and public health decision-making^{7,9,11,12,15,17,24,33,34}.

1

2 **Strengths and limitations of this study**

3 There is little peer-reviewed literature on the use of analytics by senior leaders for joint decision-making.

4 Whilst we have identified familiar factors that continue to facilitate and hinder integration, this study
5 offers novel and rich insights into the complexity of barriers and facilitators of use of analytics for
6 strategic decision-making when areas were on the cusp of transitioning from local models of integration
7 (STPs) to statutory organisations (ICSs). Furthermore, we show how these experiences can impact
8 decision-making. Participants were from a wide range of roles and organisations, offering a breadth of
9 perspectives.

10

11 We recruited from one London-based STP with digitally engaged leadership that, during recruitment,
12 were actively pursuing a data linkage programme to facilitate formation of an ICS. Therefore, all of our
13 findings may not be transferable to other settings³⁵. Despite the STPs' overall relative digital innovation,
14 we still identified extensive barriers to use of analytics and there remained considerable variation in
15 interest in data across the STP. It is likely these barriers, plus others, are more impactful in less digitally
16 engaged ICSs. In addition, sharing of certain data across organisations was mandated as part of the
17 UK Covid-19 response. Barriers related to data sharing may, therefore, not be relevant in times of crisis,
18 but remain important for future partnership working and provide insight into possible strategies that
19 could facilitate use of analytics.

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21 **Implications for policy and practice**

22 To realise the White Paper's aspiration for data as a driving force for health and care integration, more
23 is needed to better integrate organisations, align organisational priorities, and build and sustain cross-
24 organisational relationships between leaders and analysts, and leaders of different organisations.
25 Whilst policy changes to facilitate data sharing across organisations are necessary, they will be
26 insufficient without strategies to address these further key barriers to use of analytics for strategic health
27 and care decision-making.

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23 12 **Competing interests:** The authors declare no competing interests. SH is employed by and JS is
24 13 seconded for part of her time in one of the organisations within the STP case study site.
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27 15 **Contributors:** EI, HM, MG, SH and JS conceptualised the study, devised the research questions and
28 16 methods. EI applied for the ethical approval and conducted all interviews. EI and SB analysed
29 17 interview data with the support of SC, KK, and JS. EI drafted the manuscript. All authors commented
30 18 on drafts of the manuscript and agreed the decision to submit for publication.
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34 20 **Ethics:** This study received ethical approval from University College London's Research Ethics
35 21 Committee (reference number: 15847/001). All those participating in the study gave their informed
36 22 consent before taking part.
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40 24 **Data sharing statement:** No additional data are available.
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25 **Figure captions:**

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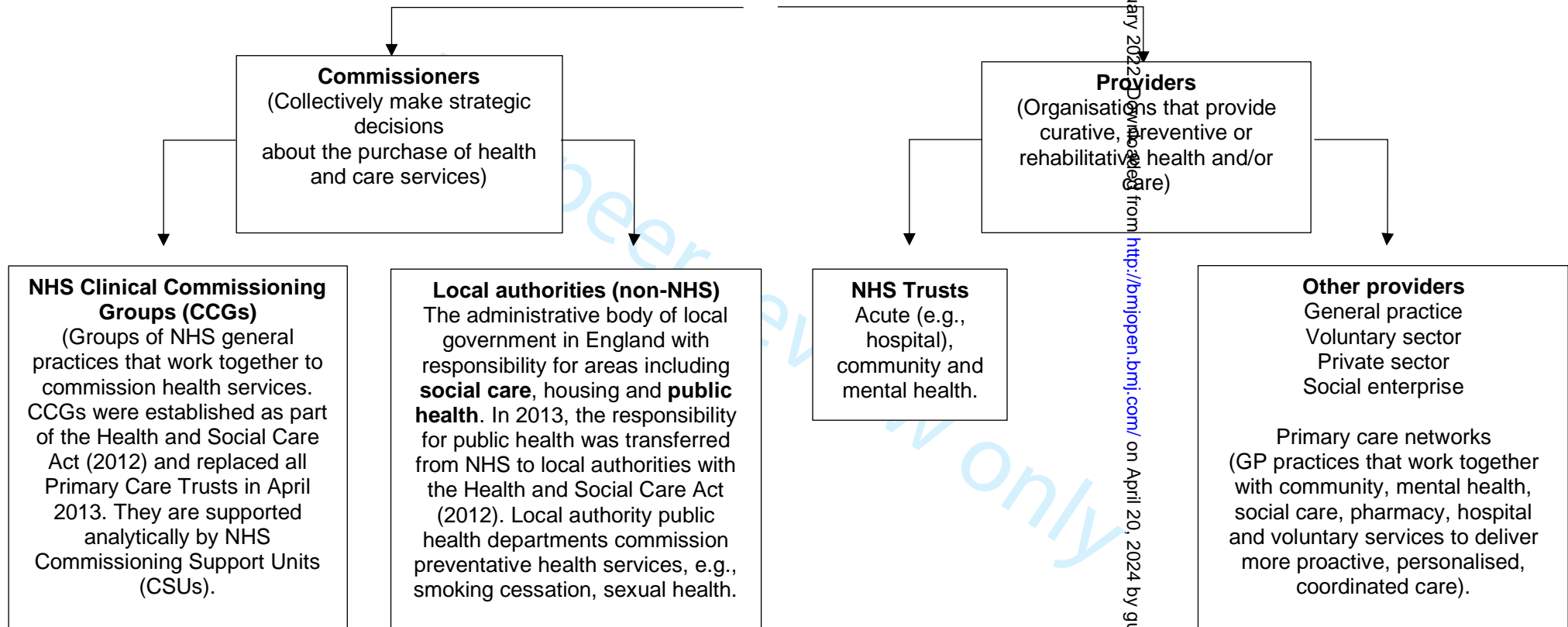
1 Figure 1: The relationship between constituent organisations in the Integrated Care System (ICS)
2 interviewed this study, formerly called a sustainability and transformation partnership (STP). Figure
3 adapted from The King’s Fund explainer: ‘The NHS: how providers are regulated and commissioned’³⁶.
4

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Figure 1: An overview of partners within our case study site (a single NHS Integrated Care System in London, England) at the time of interviews.

Sustainability and Transformation Partnership (STP) / Integrated Care System (ICS)

(A partnership between NHS organisations, local authorities and other strategic partners that coordinate services to meet health needs across a defined geographical area. First established in 2015, STPs covered 44 geographically defined areas in England. ICSs, established as part of the NHS Long Term Plan (2019), replaced all STPs in April 2021.)



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Standards for Reporting Qualitative Research (SRQR)*

<http://www.equator-network.org/reporting-guidelines/srqr/>

Page/line no(s).

Title and abstract

<p>Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended</p>	1
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	2

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	4
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	4

Methods

<p>Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**</p>	5
<p>Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability</p>	5
<p>Context - Setting/site and salient contextual factors; rationale**</p>	5
<p>Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**</p>	6
<p>Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues</p>	6
<p>Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**</p>	6

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	6
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	6
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	6
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	6

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	7-12
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	7-12

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	13-14
Limitations - Trustworthiness and limitations of findings	14

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	1
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	1

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

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**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388

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