

BMJ Open

Determining data sharing and number of publications coming from research databases that have been given a favourable opinion by UK research ethics committees

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-039756.R1
Article Type:	Original research
Date Submitted by the Author:	29-Jul-2020
Complete List of Authors:	Trace, Samantha; University of Portsmouth, School of Healthcare Professions Bracher, Mike; University of Southampton, Health Sciences Kolstoe, Simon; University of Portsmouth, School of Healthcare Professions
Primary Subject Heading:	Ethics
Secondary Subject Heading:	Research methods
Keywords:	QUALITATIVE RESEARCH, ETHICS (see Medical Ethics), AUDIT, Information management < BIOTECHNOLOGY & BIOINFORMATICS, STATISTICS & RESEARCH METHODS

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Determining data sharing and number of publications coming from research databases that have been given a favourable opinion by UK research ethics committees

Samantha Trace¹, Mike Bracher² and Simon Kolstoe^{1,3}

¹ School of Health Care Professions, University of Portsmouth, PO1 2UP, UK

² School of Health Sciences, University of Southampton, SO17 1EN, UK

³ Correspondence to: Dr Simon Kolstoe; simon.kolstoe@port.ac.uk

Abstract

Objective To determine data sharing and number of publications coming from research databases that have been given a favourable opinion by UK NHS research ethics committees.

Design Cohort study

Inclusion Criteria & Setting All research databases listed on the UK Health Research Authority's Assessment Review Portal (HARP) that had received a favourable ethics opinion as of January 2018.

Main Outcome Measures Publications and data access requests either listed on HARP or notified through subsequent email correspondence.

Results Out of 354 eligible databases, 34% had granted access requests and 40% had produced at least one peer reviewed paper or conference abstract/talk. We could not establish contact with 9% of databases, and 19% reported no access requests or publications. Only 9% of databases were up to date with all annual reports. Email responses from database owners showed a range of attitudes towards data sharing.

Conclusion Less than half of Research Databases that have received a favourable opinion from NHS research ethics committees share their data and produce publications. There is also considerable variability in the operation of Research Databases and understanding of the purpose of Research Databases. This work was hampered by incomplete records due to researchers not submitting annual reports.

Key words

Research Database; Research Ethics; Data Sharing; Publication;

Word Count:

3,861

Article Summary

Strengths and limitations of this study

- By using the UK Health Research Authority's "HARP" database we were able to identify all research databases using National Health Service (NHS) data that were registered as of January 2018
- We were able to identify both publications and access requests from the majority of databases
- We identified numerous incomplete records in the HARP database
- Research teams were not consistent in their definition of a research database, and it is likely that many relevant databases may not be registered with the HRA

Introduction

As data analysis processes continue to evolve, research databases represent increasingly important resources within healthcare research, yet there is evidence that they are currently under-utilised[1]. In the UK a research database is defined as:

"...a structured collection of individual-level personal information, which is stored for potential research purposes beyond the life of a specific research project with defined endpoints. Research purposes in this context refers to analysis of data to answer research questions in multiple projects."[2]

The Health Research Authority (HRA) is the administrative body that convenes and organises research ethics committees (RECs) authorised to review studies involving human participants that take place within the National Health Service (NHS), as well as falling under certain legislation[3]. Although most of the HRA's functions applies to research undertaken in England, its role coordinating policy, and managing the Integrated Research Application System (IRAS), gives it close links to the other devolved UK nations (Scotland, Wales and Northern Ireland) including access to records for audit and service improvement purposes. Through IRAS, the HRA flags research database applications, and provides a specific question set for researchers wishing to have their arrangements for collection, storage and use of data reviewed (including arrangements for release of non-identifiable data for analysis by external researchers). This requirement is outlined in the UK wide GAFREC (Governance Arrangements for Research Ethics Committees) policy whereby the:

"...collection of personal information from past or present users of health or social care services, or use of previously collected information from which individual users of these services could be identified, either directly from that information or from its combination with other information in, or likely to come into, the possession of someone to whom the information is made available"

always requires an ethics review, however the review of more generalised database projects by ethics committees:

... may have benefits by facilitating programmes of research using information on human subjects without a need for specific project-based applications. Applicants

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may seek generic ethical approval extending to specific projects undertaken using the data, subject to conditions agreed with the REC.”[4]

Consequently, in the UK, research databases differ from other types of research projects in that they are normally intended to be used multiple times, over a longer period of time, and perhaps by different research teams wishing to test a variety of hypotheses. When reviewing research databases RECs therefore consider the access arrangements being made available to researchers wishing to interrogate the database, including arrangements for subsequent publication of research results. Indeed, this means there is an implicit assumption that research databases will be used to generate many more publications than a normal research project.

In order to test this assumption, and to benchmark UK performance with other national studies[1], the HRA invited us to audit UK research database applications made through the IRAS system. This request formed part of the wider “Transparency Agenda” being pursued as a statutory duty by the HRA, but further encouraged by organisations such as the AllTrials campaign[5] and the REWARD Alliance[6]. A previous audit by the HRA showed that only one third of regular projects reviewed by RECs publish their results[7], raising a subsequent concern that research database projects may also be underperforming in terms of publishing outputs.

Methods

The initial inclusion criteria for this audit was projects flagged as Research Databases on the HRA Assessment Review Portal (HARP) as of 1st January 2018. The number of eligible databases were then reduced using the following criteria:

- Favourable Ethics opinion
- Not a duplicate record or renewal request
- Not a Welsh application

A Microsoft Access database was created with an entry for each research database and information contained on HARP along with any uploaded annual or final reports were used to populate the database fields listed in Table 1 of the supplementary information. Following creation of the Access Database, primary contacts for all research databases were emailed (using the text in table 2 of the supplementary information) and asked to disclose the number of access requests and publications. Responses to this initial email were used to complete or update fields in the Access Database. Second emails were sent 5 weeks later to those who had not responded to the first email. A third and final email was sent a further 6 weeks later (11 weeks after the initial email) to those who had not responded to the first two emails. Emails were loaded into NVivo[8] and a content analysis conducted by two investigators who subsequently discussed and agreed on consensus categories.

Where conflicting information on a Research Database was noted from annual reports and subsequent email responses, the information from the email response was considered more up to date. The annual report template form was modified in 2011 adding a number of new fields, although some researchers continued using the older version of the form after this

1 date. Reports on the old form did not contain all the information required for this audit
2 leading to missing categories for some research database records.
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5 **Results**

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7 453 Research Databases were initially identified, but then reduced to 354 eligible databases
8 after excluding four duplicates, Welsh databases (because only titles and reference numbers
9 were included in HARP with no point of contact), and 90 HARP entries that were renewals of
10 previous applications. These latter entries were difficult to initially identify as the titles and
11 chief investigators were often not identical with the original studies. Indeed many of these
12 duplicates/renewals were only identified following email contact with researchers who
13 complained they had received two emails for the same database. Once identified, all
14 duplicate applications were combined, and renewal applications were combined with their
15 parent (initial) application, but the start date of the initial application retained. The final list
16 of 354 unique Research Databases had initial application dates ranging from May 2002
17 (when the first electronic records were compiled) to December 2017. The combination of
18 data obtained from HARP and information obtained from annual and final reports was
19 sufficient to fully populate the Access Database fields in 60 (17%) cases. Even following the
20 three email contacts complete records were only obtained for 223 (63%) of the Research
21 Databases. 44 (12%) invalid email addresses were identified following the first email to
22 primary contacts, and when the second contact was subsequently used only 11 further
23 responses were received. This left 33 (9%) databases that we were unable to contact. A few
24 responses were received from individuals no longer involved with the Research Databases
25 who provided updated contact details due to personnel changes.
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36 **Annual and Final Reports**

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38 The HRA stipulates that approved Research Databases submit annual reports for the
39 duration that the database is collecting data and a final report if the database is closed[4].
40 Figure 1 shows a summary of annual reports that had been uploaded to HARP prior to
41 contacting researchers by email. 54 (15%) Research Databases were less than a year old
42 (meaning no annual report was yet due), and 108 (31%) had all or at least one annual
43 report(s) on file. This left 192 (54%) of Research Databases with no annual report on file
44 despite these being due (none filed 39% + received not filed 15%). 13 Research Databases
45 dated prior to 2012 had no information on whether any reports had been received or
46 requested. HARP did contain evidence (in the form of reminder letters held on file) that
47 annual reports had on occasion been asked for, but such chasing emails/letters had not
48 been sent or recorded in a systematic manner. Similarly there were 54 Research Databases
49 where an annual report was noted as "Received Not Filed". Here it seemed that although a
50 letter was filed on HARP acknowledging receipt of an annual report, no electronic report
51 was present, although such reports may have been reviewed by the REC in hard copy but
52 then not subsequently scanned and added to HARP. Of the 108 Research Databases with
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1 annual reports, only 32 (9% of all Research Databases in this study) were up to date with all
2 reports.
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5 Most Research Databases did not have completion dates and thus were open ended. Final
6 reports were present for 16 (5%) Research Databases and, following email contact, a further
7 4 (1%) of Research Databases stated they had closed. It is impossible to determine how
8 many of the 33 Research Databases without valid contact details were now closed and thus
9 due a final report.
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13 **Amendments**

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15 Amendments are different from annual reports as they can be submitted at any time and
16 normally notify changes of methodology or notification of significant event(s). 110 (31%) of
17 Research Databases had at least one amendment recorded on HARP. Changes to database
18 paperwork (such as version numbers, additional posters or advertising materials, changes of
19 job title etc.) were the most common reason for an amendment with modifications of
20 inclusion criteria, adding additional data linkages or including new participant groups, the
21 next most common. Other less frequent amendments included changes in personnel,
22 changes in process (different data capture methods or procedures), changes to location of
23 the database and addition of new sites. No Research Databases reported any serious data
24 breach.
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31 **Data Access Requests**

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33 The number of data access requests were known for 245 (69%) of the Research Databases.
34 123 of these (35% of total) reported no access requests, leaving all the access requests
35 coming from only 122 (34% of total). Although the mean number of requests from these
36 were 7.9, this was skewed by two outliers with 237 and 142 respectively. Of the 1948 total
37 number of access requests, 1818 (93% of access requests) were granted. There were 52
38 requests noted as 'pending consideration' and two 'withdrawn'. As over 90% of access
39 requests were granted overall, we considered the 'pending consideration' requests as
40 granted, and the 'withdrawn' as not granted. Data summarising access requests and
41 requests granted is presented in Figure 2.
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48 **Publications Resulting from Research Databases**

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50 The publication status was determined for 230 (65%) of the Research Databases.
51 'Publication' was defined to include presentations, conference abstracts and articles
52 submitted for publication in professional journals. 88 (25%) reported no publication, with
53 142 (40%) declaring the 1868 publications. This gave a mean number of publications for all
54 Research Databases with known publication status of 8.1, but this average is skewed by one
55 major outlier with 315 publications, and a further two with over 80 publications. 31 (9% of
56 total) Research Databases had only one publication. A distribution of the number of
57 publications coming from the research databases is shown in figure 3.
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Age of Research Databases

Previous research looking at publication rates of projects reviewed by HRA RECs indicated that most projects take at least four years before a resulting publication in a peer reviewed journal is produced [7]. It might also be expected that the older a Research Database is the more likely it will be for other researchers to know about it and thus make a data access request. Here, the number of Research Databases approved per year is shown in figure 4, although it should be noted that some databases may have been in operation prior to the HRA application date. The mean age of all the Research Databases was 4.7 years, while the mean age of Research Databases with at least one publication was 5.8 years. Interestingly this compares to the mean age of a Research Database with at least one access request being 6.5 years. Figure 5 shows the total numbers of publications and access requests granted by the age of database.

Relationship between response to the Audit, data access, publication and age

MedCalc[9] was used to calculate odds ratios. There was a strong negative relationship between registration prior to 2012 and responding to the Audit (OR=0.52 p=0.005 CI 0.32-0.82). There was no significant relationship between age and publication status (OR 1.27, p = 0.27, CI 0.82-1.97). As previous evidence suggests publication becomes more likely after 4 years[7,10], we looked to see if a similar pattern emerged here by splitting the data into research databases younger and older than four years, but did not find any significant relationship (OR 1.28, p=0.26, CI 0.83-1.99). However, research databases with at least one data access request granted were significantly more likely to report at least one publication (OR 13.77, p<0.0001, CI 7.75-24.45). Out of the 354 Research Databases, 18 made some mention of patient or participant involvement (PPI) in their annual reports. This was strongly associated with having at least one publication or data request or both (OR 18.7, p<0.005, CI 2.46-142.12).

Observations from correspondence with Investigators

95 replies were received in response to our first email, 56 from the second, and a further 77 from the third. Responses often included comments explaining or further clarifying answers to the three questions we asked. A representative sample of responses are summarised in the supplementary information. Following coding, responses were grouped into two main categories: "Database access and sharing" and "Database management" as outlined in table 3 of the supplementary information.

Discussion

The HRA Assessment Review Portal (HARP) is the authoritative database of all studies reviewed and given a favourable opinion by UK RECs. However, one important finding from this study was that the data contained in HARP was incomplete and in some cases inaccurate. The main reason for this was failure by researchers to send in required reports.

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There was also evidence that reports had been received in hard copy, perhaps viewed by the REC, but then not subsequently scanned and filed on HARP. While it must be acknowledged that the HRA can only populate HARP with the information it is given by researchers, this study seems to provide evidence to support the argument that more could be done by the HRA to ensure their records are complete and accurate. Information about data access requests received, granted, and publications relating to the database, could only be obtained for 60 (17%) of Research Databases based purely on the information in HARP, rising to 226 (64%) following email contact with the research teams. Concerningly we did not have valid contact details for 33 (almost 10%) of Research Databases, and although we gave up after three attempts, the HRA may need to follow these up further with the research sponsor. It was interesting, although perhaps to be expected, that the older databases were statistically less likely to reply to emails. Combining the 226 where we were able to obtain the necessary data items with the 33 that couldn't be contacted, we were still left with 95 (27%) databases where even following email contact not all the data we required was gathered.

As the concept of a Research Database includes storing and making data available for longer periods of time, it was not surprising that only a small number had provided final reports (indicating that the database was closed or closing). The email responses that we received indicated a number of reasons for closing databases including lack of funding, failure to gather the intended information, or changes in policies/legislation/clinical practice making the Research Database no longer relevant. However, while there are legal restrictions on the storage of identifiable patient information (through legislation such as the European General Data Protection Regulation), concerns regarding reproducibility and the importance of "Open data"[11] mean that archiving of anonymised datasets either by sponsors or perhaps through other national or international arrangements is increasingly becoming expected. Further guidance from the HRA on what to do with "closed" Research Databases could be useful.

Despite Research Databases existing to store and share data, 67 (19% of total) reported that they had neither a publication nor allowed data access to other researchers. Of the rest 116 (33%) had granted access requests and (a mostly overlapping) 142 (40%) had produced publications (the discrepancy from 100% is due to having no information for 30%, and a smaller number with only partial information). The mean numbers of data access requests (7.9) and publications (8.1) per database (where these figures were known) could be viewed as indicating that the 30% or so of Research Databases that share data or publish are doing very well, however, these averages are distorted by a small number of very successful databases such as the *I-DSD (International Disorders of Sex Development) Research Database* with 237 granted access requests and 14 publications[12]. Similarly the *Searchable Online Database for MRC UK Brain Banks Network* reported 142 granted access requests and 315 publications. Another large research database, the *South London and Maudsley NHS Foundation Trust Biomedical Research Centre Case Register (SLaM BRC)* [13] had 104 access requests granted, and although they named only a few publications, they did advise that an online search would undoubtedly find more. This suggests that for the larger databases the number of publications recorded here could be an underestimate. Interestingly, the features of these more successful Research Databases included long

1 running support from large institutions and research councils, coupled with charity and
2 institutional funding. They also seemed to show evidence of collaborative working with
3 many contributing sites and participant involvement initiatives.
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6 Calculating odds ratios did not demonstrate a link between age and data access or
7 publications, but an increase in publications compared to access requests for databases
8 aged between four and eight years (figure 5) support observations made from other types
9 of studies [7,10,14] that it takes researchers about four or so years to obtain and analyse
10 results, and then produce their first publication. However, there were fewer Research
11 Database applications in the 2013 to 2015 period (figure 4), perhaps distorting our results.
12 Odds ratios did, however, demonstrate a strong correlation between the granting of at least
13 one access request and producing at least one publication (OR 13.77, $p < 0.0001$, CI 7.75-
14 24.45). Interestingly the average age of a database with one publication was 5.8 years, while
15 the average for at least one granted access request was 6.5 years, indicating that many
16 publications came from the database owners themselves. This may reflect the time taken to
17 set up the database in the first place whereupon following the first publication other
18 researchers become aware of the database and subsequently request access.
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24 This fact that only 34% of research databases reported granting access requests, and 40%
25 reported publications, is concerning ethically especially from the perspective of research
26 participants who may have initially given consent for their data to be included in a research
27 database with the belief that their data would be shared widely and thus be of use to
28 multiple projects. Although the email responses from researchers did provide some valid
29 reasons for not sharing data or publishing papers (for instance the research database being
30 designed as part of a feasibility study, as prospective participant registry, or concerns
31 around the possibility of re-identifying participants if the data was combined with other
32 information held by third party researchers), more could be done to encourage researchers
33 to at least acknowledge the database in their other work or publications[15], and thus
34 remain accountable to the participants who contributed.
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39 Analysis of the email responses also indicated a certain level of confusion over what
40 constitutes a research database. In one case the researchers admitted that they had flagged
41 their work as a research database in error, in another case an application was not renewed
42 when the research team realised an ongoing favourable ethics opinion was not required for
43 their specific type of study, and in other cases applications that had previously been flagged
44 as another type of study were subsequently re-flagged as Research Databases or vice versa.
45 One database reported they only chose to register as a Research Database to enable them
46 to share information with a funder, and others admitted that they found it easier to apply as
47 a Research Database rather than as a specific project so that they could share their data
48 with collaborators and also use it for many different projects that they had not yet designed.
49 Here the implication was that by calling their work a Research Database it would allow them
50 more flexibility to use their own data.
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55 Along with incorrect flagging, other reasons given for not sharing or publishing data
56 included a lack of resources in terms of staffing or the funding required to promote the
57 database as a resource. Here it was interesting to note that some of the Research
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1 Databases with the most access requests granted did charge to cover costs, and advertised
2 these costs along with their access arrangements via their websites [12].
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5 A number of studies justified the lack of access or publications by the amount of time
6 required to gather enough data to make analysis worthwhile. Though this might be
7 expected for databases within the first few years since application, some much older studies
8 also used this excuse. This echoes evidence from elsewhere regarding no standard definition
9 of what a reasonable time to prepare for data-sharing might be [16–18], although it may
10 also be a consequence of some extremely long-running cohort studies being included in our
11 sample.
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15 One promising finding from this study was the high percentage of data access requests that
16 were granted (93%). Here it was interesting to note that some databases reported screening
17 requests or working with people wanting to make potential requests to ensure that the
18 requests were suitable. Others reported lengthy application processes or publicising very
19 specific approval criteria to try and reduce the number of rejected requests.
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22 **Study Limitations**

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24 The major limitation of this study was the incomplete records on the HARP database along
25 with the absence of annual reports. Furthermore a pragmatic decision was made to limit the
26 questions sent to researchers in our subsequent emails rather than send a more extensive
27 survey or questionnaire. This resulted in often ambiguous replies from researchers making it
28 difficult to complete all the fields in our Access database. An improvement to our
29 methodology would therefore have involved sending a formal questionnaire or data entry
30 form, perhaps similar to the templates produced by the HRA for final and annual reports.
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34 We also only looked at studies that had been prospectively labelled as databases. It would
35 be interesting to determine how many other types of studies subsequently decided to
36 establish databases as part of their open access/data sharing arrangements. This would not
37 be a trivial task as it would involve writing to all chief investigators registered on HARP, but
38 would potentially identify further relevant databases.
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42 We also accepted a wide definition of the term “publication” to include peer reviewed
43 publications, conference abstracts, posters and presentations. This was a potentially
44 contentious decision as although peer reviewed research papers are the “gold standard” of
45 scientific publication, there are a variety of other dissemination methods that are
46 appropriate depending upon the situation[19]. For instance, the recent emphasis on
47 “Patient and Public Involvement” (PPI) has tried to encourage researchers to produce
48 bulletins and research summaries that are lay friendly and accessible[20]. While this should
49 not be the only way research is disseminated, it is entirely valid for the purpose of
50 maintaining accountability with research participants. It would perhaps therefore be a
51 valuable future piece of work to determine what “appropriate” or “sufficient”
52 publication/dissemination may look like for a Research Database. Interestingly the
53 databases in our study that produced newsletters and bulletins as part of their PPI work
54 were more likely to report publications and share their data with other researchers.
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59 **Acknowledgements**

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1 We thank Dr Janet Messer for support during this research and feedback on our initial
2 report to the HRA.
3

4 **Funding Statement**

5 This work was funded by the Health Research Authority (#15182) in the form of tuition fees
6 and a small stipend for ST to complete a MRes under the supervision of SEK.
7

8 **Competing Interests**

9 SEK is chair of the Hampshire A HRA research ethics committee, the MOD research ethics
10 committee, and a member of the HRA's Confidentiality Advisory Group (CAG). He is also an
11 academic and the ethics advisor at the University of Portsmouth. ST is a lay member of the
12 Hampshire B HRA research ethics committee. MB has no competing interests.
13

14 **Author Contributions**

15 SEK devised the project, arranged for funding and supervised ST. ST conducted the research
16 and drafted the manuscript. MB supervised the qualitative elements of the research and
17 coded the email responses in addition to ST. All authors contributed to the final manuscript.
18

19 **Reporting Checklist**

20 The SRQR (Standards for Reporting Qualitative Research) checklist was used to ensure
21 accurate reporting.
22

23 **Data Sharing**

24 This study analysed data held in confidence by the UK Health Research Authority (HRA).
25 Permission to access the original data can be requested by contacting the authors or the
26 HRA.
27

28 **Patient and Public Involvement**

29 As a government body the HRA involves patients and the public through their public
30 involvement network. This research/audit was conducted as part of the HRA's transparency
31 agenda to provide better information for patients and the public.
32

33 **Approvals**

34 As an audit of existing records (secondary data) held by a regulator this work did not require
35 an ethics review. Both SEK and ST have regular access to HARP records as part of their roles
36 on HRA research ethics committees.
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Figure Captions:

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26 Figure 1: Annual reports contained on HARP

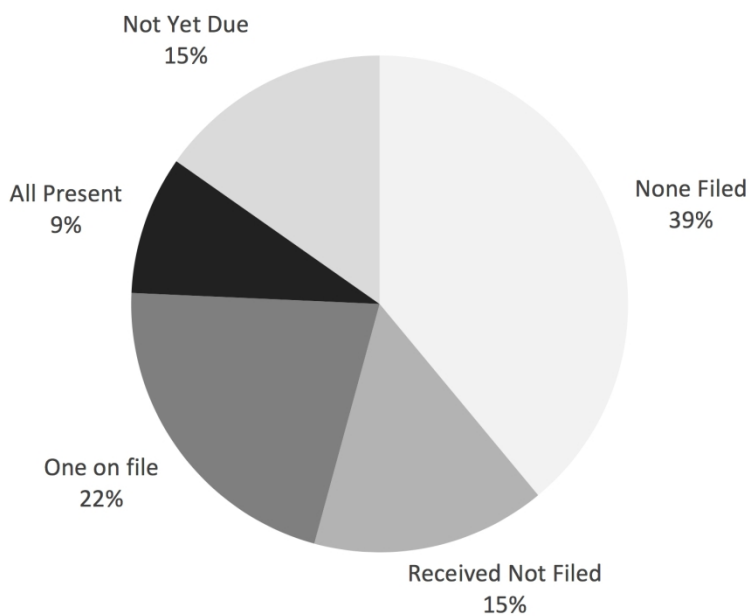
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28 Figure 2: Data access requests received and granted grouped by frequency. NB, the “access
29 requests granted” columns are sometimes higher than the “access requests received”
30 columns because databases receiving multiple access requests did not always grant all of
31 them.
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33 Figure 3: Distribution of publications coming from the research databases.

34 Figure 4: Number and year of Research Database Applications.

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36 Figure 5: Cumulative numbers of publications (grey line) and access requests (black line)
37 granted for all databases by age of databases (e.g. at 5 years there are 641 access requests
38 and 828 publications for all databases 5 years old and younger).
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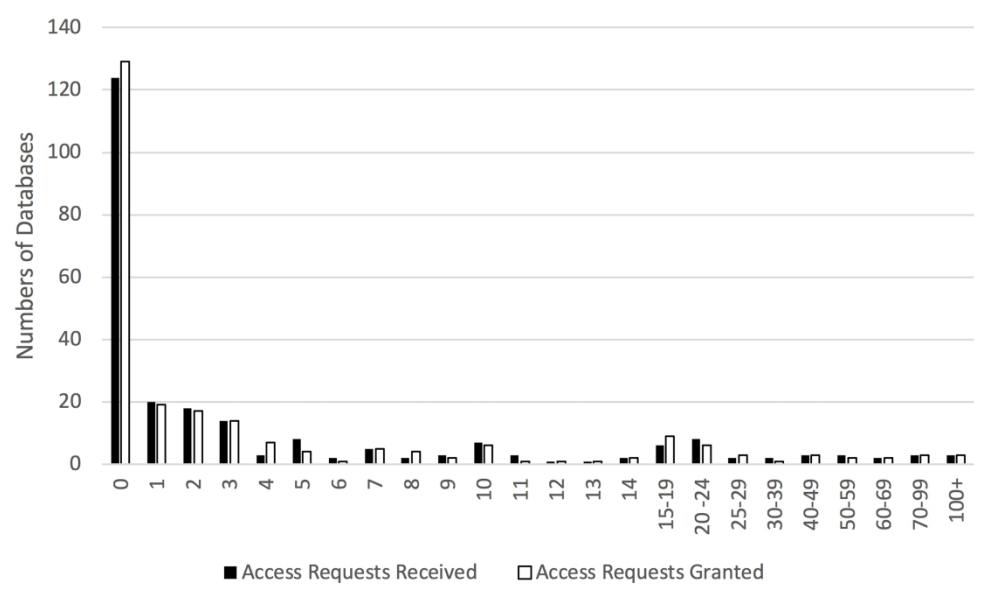
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Annual reports contained on HARP

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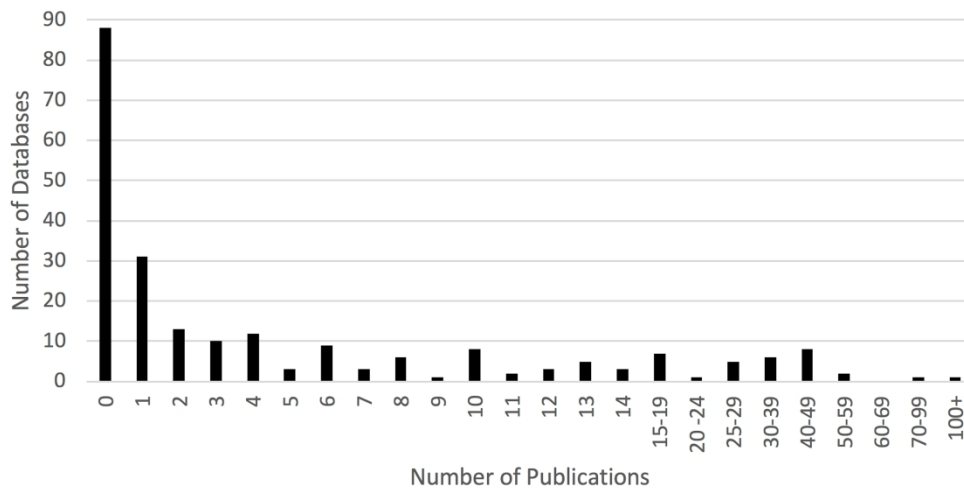
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Data access requests received and granted grouped by frequency. NB, the "access requests granted" columns are sometimes higher than the "access requests received" columns because databases receiving multiple access requests did not always grant all of them.

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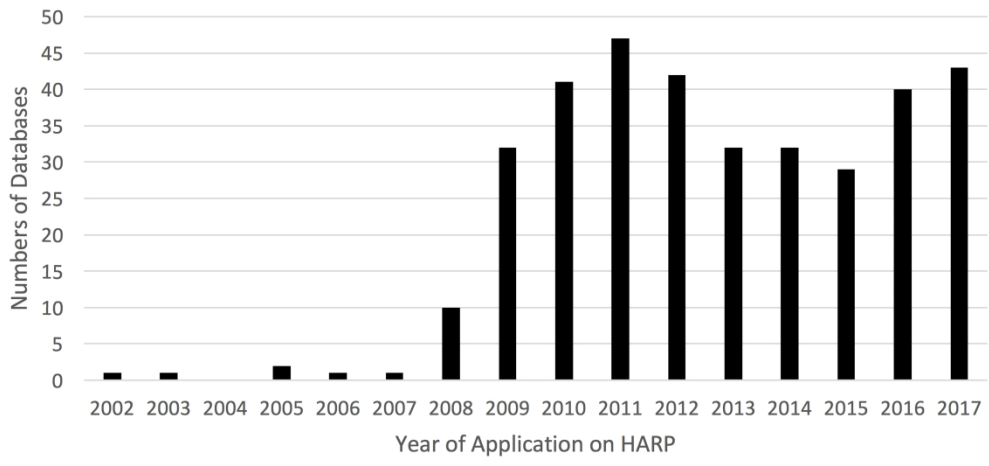
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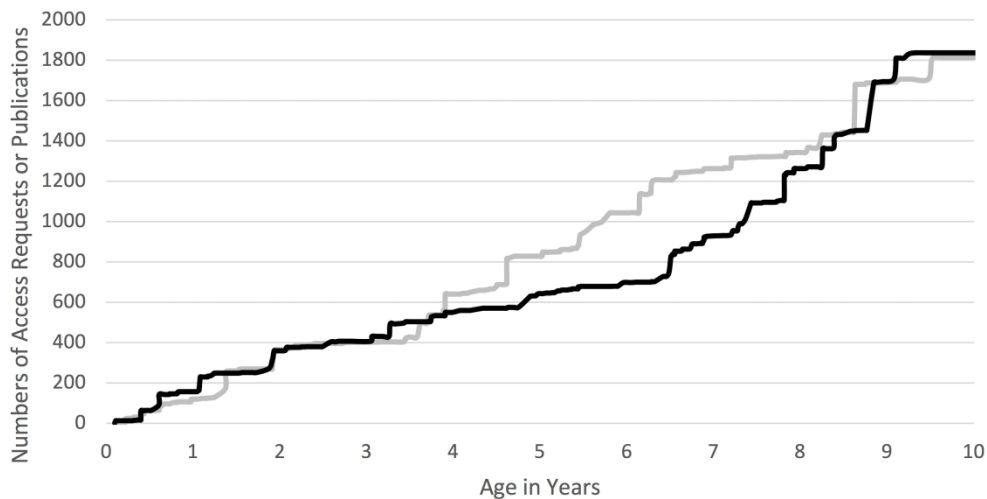
Distribution of publications coming from the research databases.

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Number and year of Research Database Applications.
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Cumulative numbers of publications (grey line) and access requests (black line) granted for all databases by age of databases (e.g. at 5 years there are 641 access requests and 828 publications for all databases 5 years old and younger).

472x241mm (300 x 300 DPI)

Audit of data sharing and publications coming from research databases given a favourable opinion by UK research ethics committees

Samantha Trace, Mike Bracher and Simon Erik Kolstoe

Supplementary Information

1. Date Database Registered	9. Number of access requests granted
2. Database Title	10. Number of access requests received
3. Reviewing REC	11. Number of publications
4. Lead Applicant Name	12. Number of amendments
5. 1 st contact email address	13. Public Engagement Details
6. 2 nd contact email address	14. Response to email contact
7. Database Aims	15. Final report received (Y/N)
8. Annual Reports Received	

Table 1: Access Database fields

Dear <<Name of Lead Applicant>>

Re: <<Title of Research Database>>

The Health Research Authority is performing an audit on the usage of all Research Databases that have previously been granted a favourable ethics opinion.

We remind you that the continuing favourable ethics opinion (if relevant) is contingent upon regular submissions of information to the HRA through annual reports, until closure and submission of the final report.

As a point of contact for <<Title of Research Database>> please could you provide us with the following information about this database,

1. How many requests are received from researchers wishing to access the database per year?
2. How many requests for database access are granted per year?
3. Please list any publications that have resulted from research using the database?

We look forward to hearing from you at your earliest convenience

Table 2: Email sent out to contact email addresses

Name	Description	References
<i>Database access and sharing</i>	<i>Responses relating to access and data sharing processes.</i>	<i>38</i>
Different understandings of what 'data sharing' means	Responses here provide evidence of a range of understandings of what 'data sharing' is, and how it operates in relation to the respondent's database.	5
Formal and informal access processes affect data on access	Responses indicating that formal and informal processes exist relating to access (typically informal approaches and formal applications). Many of these illustrate the lack of data on the former due to records only being available for the latter.	7
No external access	Responses here indicate that no external access has been granted to the database. These responses break down into two general types; those indicating explicitly that access was not facilitated; and those indicating only internal use of the database by the host organisation or research team.	26
Access Not Facilitated	Responses indicating explicitly that access was not facilitated to the database.	11
Internal Use Of Database Only	Responses indicating that the database was only used by the host organisation or research team.	15
<i>Database management</i>	<i>Responses relating to management of the database.</i>	<i>10</i>
Governance	Responses describing how the management and/or operation of the database has changed in response to changes in governance processes over time.	5
Information Technology (IT)	Responses describing how IT issues have affected operation and/or development of the database.	3
Workforce	Responses indicating workforce issues affecting the operation and/or viability of the database (e.g. availability of key staff).	2

Table 3: Coding of emails received

Determining data sharing and number of publications coming from research databases that have been given a favourable opinion by UK research ethics committees

Samantha Trace¹, Mike Bracher² and Simon Kolstoe^{1,3}

¹ School of Health Care Professions, University of Portsmouth, PO1 2UP, UK

² School of Health Sciences, University of Southampton, SO17 1EN, UK

³ Correspondence to: Dr Simon Kolstoe; simon.kolstoe@port.ac.uk

Abstract

Objective To determine ~~the level of~~ data sharing and number of publications coming from research databases that have been given a favourable opinion by UK NHS research ethics committees.

Design Cohort study

Inclusion Criteria & Setting All research databases listed on the UK Health Research Authority's Assessment Review Portal (HARP) that had received a favourable ethics opinion as of January 2018.

Main Outcome Measures Publications and data access requests either listed on HARP or notified through subsequent email correspondence.

Results Out of 354 eligible databases, 34% had granted access requests and 40% had produced at least one peer reviewed paper or conference abstract/talk. We could not establish contact with 9% of databases, and 19% reported no access requests or publications. Only 9% of databases were up to date with all annual reports. Email responses from database owners showed a range of attitudes towards data sharing.

Conclusion Less than half of Research Databases that have received a favourable opinion from NHS research ethics committees share their data and produce publications. There is also considerable variability in the operation of Research Databases and understanding of the purpose of Research Databases. This work was hampered by incomplete records due to researchers not submitting annual reports.

Key words

Research Database; Research Ethics; Data Sharing; Publication;

Word Count:

3,8613,822

Article Summary

Strengths and limitations of this study

- By using the UK Health Research Authority's "HARP" database we were able to identify all research databases using National Health Service (NHS) data that were registered as of January 2018
- We were able to identify both publications and access requests from the majority of databases
- We identified numerous incomplete records in the HARP database
- Research teams were not consistent in their definition of a research database, and it is likely that many relevant databases may not be registered with the HRA

Introduction

As data analysis processes continue to evolve, research databases represent increasingly important resources within healthcare research, yet there is evidence that they are currently under-utilised[1]. In the UK a research database is defined as:

"...a structured collection of individual-level personal information, which is stored for potential research purposes beyond the life of a specific research project with defined endpoints. Research purposes in this context refers to analysis of data to answer research questions in multiple projects."[2]

The Health Research Authority (HRA) is the administrative body that convenes and organises research ethics committees (RECs) authorised to review studies involving human participants that take place within the National Health Service (NHS), as well as falling under certain legislation[3]. Although most of the HRA's functions applies to research undertaken in England, its role coordinating policy, and managing the Integrated Research Application System (IRAS), gives it close links to the other devolved UK nations (Scotland, Wales and Northern Ireland) including access to records for audit and service improvement purposes. Through IRAS, the HRA flags research database applications, and provides a specific question set for researchers wishing to have their arrangements for collection, storage and use of data reviewed (including arrangements for release of non-identifiable data for analysis by external researchers). This requirement is outlined in the UK wide GAFREC (Governance Arrangements for Research Ethics Committees) policy whereby the:

"...collection of personal information from past or present users of health or social care services, or use of previously collected information from which individual users of these services could be identified, either directly from that information or from its combination with other information in, or likely to come into, the possession of someone to whom the information is made available"

always requires an ethics review, however the review of more generalised database projects by ethics committees:

... may have benefits by facilitating programmes of research using information on human subjects without a need for specific project-based applications. Applicants

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may seek generic ethical approval extending to specific projects undertaken using the data, subject to conditions agreed with the REC.”[4]

Consequently, in the UK, research databases differ from other types of research projects in that they are normally intended to be used multiple times, over a longer period of time, and perhaps by different research teams wishing to test a variety of hypotheses. When reviewing research databases RECs therefore consider the access arrangements being made available to researchers wishing to interrogate the database, including arrangements for subsequent publication of research results. Indeed, this means thereere is an implicit assumption that research databases will be used to generate many more publications than a normal research project.

In order to test this assumption, and to benchmark UK performance with other national studies[1], the HRA invited us to audit UK research database applications made through the IRAS system. This request formed part of the wider “Transparency Agenda” being pursued as a statutory duty by the HRA, but further encouraged by organisations such as the AllTrials campaign[5] and the REWARD Alliance[6]. A previous audit by the HRA showed that only one third of regular projects reviewed by RECs publish their results[7], raising a subsequent concern that research database projects may also be underperforming in terms of publishing outputs.

Methods

The initial inclusion criteria for this audit was projects flagged as Research Databases ~~were on the identified by searching the~~ HRA Assessment Review Portal (HARP) ~~using the initial inclusion criteria of research database applications on the system~~ as of 1st January 2018. The number of eligible databases were then reduced using the following criteria:

- Favourable Ethics opinion
- Not a duplicate record or renewal request
- Not a Welsh application

A Microsoft Access database was created with an entry for each research database and information contained on HARP along with any uploaded annual or final reports were used to populate the database fields listed in Table 1 of the supplementary information. Following creation of the Access Database, primary contacts for all research databases were emailed (using the text in table 2 of the supplementary information) and asked to disclose the number of access requests and publications. Responses to this initial email were used to complete or update fields in the Access Database. Second emails were sent 5 weeks later to those who had not responded to the first email. A third and final email was sent a further 6 weeks later (11 weeks after the initial email) to those who had not responded to the first two emails. Emails were loaded into NVivo[8] and a content analysis conducted by two investigators who subsequently discussed and agreed on consensus categories.

Where conflicting information on a Research Database was noted from annual reports and subsequent email responses, the information from the email response was considered more up to date. The annual report template form was modified in 2011 adding a number of new

1 fields, although some researchers continued using the older version of the form after this
2 date. Reports on the old form did not contain all the information required for this audit
3 leading to missing categories for some research database records.
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6 Results

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9 453 Research Databases were initially identified, but then reduced to 354 eligible databases
10 ~~as illustrated in Figure 1 after excluding four duplicates.~~ Welsh databases ~~(were excluded~~
11 ~~because only titles and reference numbers were included in HARP with no point of contact).~~
12 ~~Four duplicates and were identified and excluded.~~ 90 HARP entries ~~that were were found to~~
13 ~~be~~ renewals of previous applications. ~~These latter entries although these~~ were difficult to
14 initially identify as the titles and chief investigators were often not identical with the original
15 studies. ~~Indeed m~~Many of these duplicates/renewals were only identified following email
16 contact with researchers who complained they had received two emails for the same
17 database. Once identified, all duplicate applications were combined, and renewal
18 applications were combined with their parent (initial) application, but the start date of the
19 initial application retained. The final list of 354 unique Research Databases had initial
20 application dates ranging from May 2002 (when the first electronic records were compiled)
21 to December 2017. The combination of data obtained from HARP and information obtained
22 from annual and final reports was sufficient to fully populate the Access Database fields in
23 60 (17%) cases. Even following the three email contacts complete records were only
24 obtained for 223 (63%) of the Research Databases. 44 (12%) invalid email addresses were
25 identified following the first email to primary contacts, and when the second contact was
26 subsequently used only 11 further responses were received. This left 33 (9%) databases that
27 we were unable to contact. A few responses were received from individuals no longer
28 involved with the Research Databases who provided updated contact details due to
29 personnel changes.
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40 Annual and Final Reports

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43 The HRA stipulates that approved Research Databases submit annual reports for the
44 duration that the database is collecting data and a final report if the database is closed[4].
45 Figure ~~12~~ shows a summary of annual reports that had been uploaded to HARP prior to
46 contacting researchers by email. 54 (15%) Research Databases were less than a year old
47 (meaning no annual report was yet due), and 108 (31%) had all or at least one annual
48 report(s) on file. This left 192 (54%) of Research Databases with no annual report on file
49 despite these being due (none filed 39% + received not filed 15%). 13 Research Databases
50 dated prior to 2012 had no information on whether any reports had been received or
51 requested. HARP did contain evidence (in the form of reminder letters held on file) that
52 annual reports had on occasion been asked for, but such chasing emails/letters had not
53 been sent or recorded in a systematic manner. Similarly there were 54 Research Databases
54 where an annual report was noted as "Received Not Filed". Here it seemed that although a
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1 letter was filed on HARP acknowledging receipt of an annual report, no electronic report
2 was present, although such reports may have been reviewed by the REC in hard copy but
3 then not subsequently scanned and added to HARP. Of the 108 Research Databases with
4 annual reports, only 32 (9% of all Research Databases in this study) were up to date with all
5 reports.
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10 Most Research Databases did not have completion dates and thus were open ended. Final
11 reports were present for 16 (5%) Research Databases and, following email contact, a further
12 4 (1%) of Research Databases stated they had closed. It is impossible to determine how
13 many of the 33 Research Databases without valid contact details were now closed and thus
14 due a final report.
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17 **Amendments**

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20 Amendments are different from annual reports as they can be submitted at any time and
21 normally notify changes of methodology or notification of significant event(s). 110 (31%) of
22 Research Databases had at least one amendment recorded on HARP. Changes to database
23 paperwork (such as version numbers, additional posters or advertising materials, changes of
24 job title etc.) were the most common reason for an amendment with modifications of
25 inclusion criteria, adding additional data linkages or including new participant groups, the
26 next most common. Other less frequent amendments included changes in personnel,
27 changes in process (different data capture methods or procedures), changes to location of
28 the database and addition of new sites. No Research Databases reported any serious data
29 breach.
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35 **Data Access Requests**

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38 The number of data access requests were known for 245 (69%) of the Research Databases.
39 123 of these (35% of total) reported no access requests, leaving all the access requests
40 coming from only 122 (34% of total). Although the mean number of requests from these
41 were 7.9, this was skewed by two outliers with 237 and 142 respectively. Of the 1948 total
42 number of access requests, 1818 (93% of access requests) were granted. There were 52
43 requests noted as 'pending consideration' and two 'withdrawn'. As over 90% of access
44 requests were granted overall, we considered the 'pending consideration' requests as
45 granted, and the 'withdrawn' as not granted. Data summarising access requests and
46 requests granted is presented in Figure [23](#).
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51 **Publications Resulting from Research Databases**

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54 The publication status was determined for 230 (65%) of the Research Databases.
55 'Publication' was defined to include presentations, conference abstracts and articles
56 submitted for publication in professional journals. 88 (25%) reported no publication, with
57 142 (40%) declaring the 1868 publications. This gave a mean number of publications for all
58 Research Databases with known publication status of 8.1, but this average is skewed by one
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1 major outlier with 315 publications, and a further two with over 80 publications. 31 (9% of
2 total) Research Databases had only one publication. A distribution of the number of
3 publications coming from the research databases is shown in figure 34.

4 **Age of Research Databases**

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9 Previous research looking at publication rates of projects reviewed by HRA RECs indicated
10 that most projects take at least four years before a resulting publication in a peer reviewed
11 journal is produced [7]. It might also be expected that the older a Research Database is the
12 more likely it will be for other researchers to know about it and thus make a data access
13 request. Here, the number of Research Databases approved per year is shown in figure 45,
14 although it should be noted that some databases may have been in operation prior to the
15 HRA application date. The mean age of all the Research Databases was 4.7 years, while the
16 mean age of Research Databases with at least one publication was 5.8 years. Interestingly
17 this compares to the mean age of a Research Database with at least one access request
18 being 6.5 years. Figure 56 shows the total numbers of publications and access requests
19 granted by the age of database.
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26 **Relationship between response to the Audit, data access, publication and age**

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28 MedCalc[9] was used to calculate odds ratios. There was a strong negative relationship
29 between registration prior to 2012 and responding to the Audit (OR=0.52 p=0.005 CI 0.32-
30 0.82). There was no significant relationship between age and publication status (OR 1.27, p
31 = 0.27, CI 0.82-1.97). As previous evidence suggests publication becomes more likely after 4
32 years[7,10], we looked to see if a similar pattern emerged here by splitting the data into
33 research databases younger and older than four years, but did not find any significant
34 relationship (OR 1.28, p=0.26, CI 0.83-1.99). However, research databases with at least one
35 data access request granted were significantly more likely to report at least one publication
36 (OR 13.77, p<0.0001, CI 7.75-24.45). Out of the 354 Research Databases, 18 made some
37 mention of patient or participant involvement (PPI) in their annual reports. This was
38 strongly associated with having at least one publication or data request or both (OR 18.7,
39 p<0.005, CI 2.46-142.12).
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47 **Observations from correspondence with Investigators**

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49 95 replies were received in response to our first email, 56 from the second, and a further 77
50 from the third. Responses often included comments explaining or further clarifying answers
51 to the three questions we asked. A representative sample of responses are summarised in
52 the supplementary information. Following coding, responses were grouped into two main
53 categories: "Database access and sharing" and "Database management" as outlined in table
54 3 of the supplementary information.
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Discussion

The HRA Assessment Review Portal (HARP) is the authoritative database of all studies reviewed and given a favourable opinion by UK RECs. However, one important finding from this study was that the data contained in HARP was incomplete and in some cases inaccurate. The main reason for this was failure by researchers to send in required reports. There was also evidence that reports had been received in hard copy, perhaps viewed by the REC, but then not subsequently scanned and filed on HARP. While it must be acknowledged that the HRA can only populate HARP with the information it is given by researchers, this study seems to provide evidence to support the argument that more could be done by the HRA to ensure their records are complete and accurate. Information about data access requests received, granted, and publications relating to the database, could only be obtained for 60 (17%) of Research Databases based purely on the information in HARP, rising to 226 (64%) following email contact with the research teams. Concerningly we did not have valid contact details for 33 (almost 10%) of Research Databases, and although we gave up after three attempts, the HRA may need to follow these up further with the research sponsor. It was interesting, although perhaps to be expected, that the older databases were statistically less likely to reply to emails. Combining the 226 where we were able to obtain the necessary data items with the 33 that couldn't be contacted, we were still left with 95 (27%) databases where even following email contact not all the data we required was gathered.

As the concept of a Research Database includes storing and making data available for longer periods of time, it was not surprising that only a small number had provided final reports (indicating that the database was closed or closing). The email responses that we received indicated a number of reasons for closing databases including lack of funding, failure to gather the intended information, or changes in policies/legislation/clinical practice making the Research Database no longer relevant. However, ~~none of these reasons would justify discarding data that could have potential future use, and while~~ although there are legal restrictions on the storage of identifiable patient information (through legislation such as the European General Data Protection Regulation), concerns regarding reproducibility and the importance of "Open data"[11] ~~mean that there does seem to be an ethical argument for continued~~ archiving of anonymised datasets either by sponsors or perhaps through other national or international arrangements is increasingly becoming expected. Further guidance from the HRA on what to do with "closed" Research Databases could be useful.

Despite Research Databases existing to store and share data, 67 (19% of total) reported that they had neither a publication nor allowed data access to other researchers. Of the rest 116 (33%) had granted access requests and (a mostly overlapping) 142 (40%) had produced publications (the discrepancy from 100% is due to having no information for 30%, and a smaller number with only partial information). The mean numbers of data access requests (7.9) and publications (8.1) per database (where these figures were known) could be viewed as indicating that the 30% or so of Research Databases that share data or publish are doing very well, however, these averages are distorted by a small number of very successful

1 databases such as the *I-DSD (International Disorders of Sex Development) Research*
2 *Database* with 237 granted access requests and 14 publications[12]. Similarly the
3 *Searchable Online Database for MRC UK Brain Banks Network* reported 142 granted access
4 requests and 315 publications. Another large research database, the *South London and*
5 *Maudsley NHS Foundation Trust Biomedical Research Centre Case Register (SLaM BRC)* [13]
6 had 104 access requests granted, and although they named only a few publications, they did
7 advise that an online search would undoubtedly find more. This suggests that for the larger
8 databases the number of publications recorded here could be an underestimate.
9 Interestingly, the features of these more successful Research Databases included long
10 running support from large institutions and research councils, coupled with charity and
11 institutional funding. They also seemed to show evidence of collaborative working with
12 many contributing sites and participant involvement initiatives.

13 Calculating odds ratios did not demonstrate a link between age and data access or
14 publications, but an increase in publications compared to access requests for databases
15 aged between four and eight years (figure 56) support observations made from other types
16 of studies [7,10,14] that it takes researchers about four or so years to obtain and analyse
17 results, and then produce their first publication. However, there were fewer Research
18 Database applications in the 2013 to 2015 period (figure 45), perhaps distorting our results.
19 Odds ratios did, however, demonstrate a strong correlation between the granting of at least
20 one access request and producing at least one publication (OR 13.77, $p < 0.0001$, CI 7.75-
21 24.45). Interestingly the average age of a database with one publication was 5.8 years, while
22 the average for at least one granted access request was 6.5 years, indicating that many
23 publications came from the database owners themselves. This may reflect the time taken to
24 set up the database in the first place whereupon following the first publication other
25 researchers become aware of the database and subsequently request access.

26 This fact that only 34% of research databases reported granting access requests, and 40%
27 reported publications, is concerning ethically especially from the perspective of research
28 participants who may have initially given consent for their data to be included in a research
29 database with the belief that their data would be shared widely and thus be of use to
30 multiple projects. Although the email responses from researchers did provide some valid
31 reasons for not sharing data or publishing papers (for instance the research database being
32 designed as part of a feasibility study, as prospective participant registry, or concerns
33 around the possibility of re-identifying participants if the data was combined with other
34 information held by third party researchers), more could be done to encourage researchers
35 to at least acknowledge the database in their other work or publications[15], and thus
36 remain accountable to the participants who contributed.

37 Analysis of the email responses also indicated a certain level of confusion over what
38 constitutes a research database. In one case the researchers admitted that they had flagged
39 their work as a research database in error, in another case an application was not renewed
40 when the research team realised an ongoing favourable ethics opinion was not required for
41 their specific type of study, and in other cases applications that had previously been flagged
42 as another type of study were subsequently re-flagged as Research Databases or vice versa.
43 One database reported they only chose to register as a Research Database to enable them
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1 to share information with a funder, and others admitted that they found it easier to apply as
2 a Research Database rather than as a specific project so that they could share their data
3 with collaborators and also use it for many different projects that they had not yet designed.
4 Here the implication was that by calling their work a Research Database it would allow them
5 more flexibility to use their own data.
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9 Along with incorrect flagging, other reasons given for not sharing or publishing data
10 included a lack of resources in terms of staffing or the funding required to promote the
11 database as a resource. Here it was interesting to note that some of the Research
12 Databases with the most access requests granted did charge to cover costs, and advertised
13 these costs along with their access arrangements via their websites [12]. ~~This seems like a
14 good example of best practice that could be promoted more widely.~~
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16
17 A number of studies justified the lack of access or publications by the amount of time
18 required to gather enough data to make analysis worthwhile. Though this might be
19 expected for databases within the first few years since application, some much older studies
20 also used this excuse. This echoes evidence from elsewhere regarding no standard definition
21 of what a reasonable time to prepare for data-sharing might be [16–18], although it may
22 also be a consequence of some extremely long-running cohort studies being included in our
23 sample.
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27 One promising finding from this study was the high percentage of data access requests that
28 were granted (93%). Here it was interesting to note that some databases reported screening
29 requests or working with people wanting to make potential requests to ensure that the
30 requests were suitable. Others reported lengthy application processes or publicising very
31 specific approval criteria to try and reduce the number of rejected requests.
32

33 **Study Limitations**

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36 The major limitation of this study was the incomplete records on the HARP database along
37 with the absence of annual reports. Furthermore a pragmatic decision was made to limit the
38 questions sent to researchers in our subsequent emails rather than send a more extensive
39 survey or questionnaire. This resulted in often ambiguous replies from researchers making it
40 difficult to complete all the fields in our Access database. An improvement to our
41 methodology would therefore have involved sending a formal questionnaire or data entry
42 form, perhaps similar to the templates produced by the HRA for final and annual reports.
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46 We also only looked at studies that had been prospectively labelled as databases. It would
47 be interesting to determine how many other types of studies subsequently decided to
48 establish databases as part of their open access/data sharing arrangements. This would not
49 be a trivial task as it would involve writing to all chief investigators registered on HARP, but
50 would potentially identify further relevant databases.
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54 We also accepted a wide definition of the term “publication” to include peer reviewed
55 publications, conference abstracts, posters and presentations. This was a potentially
56 contentious decision as although peer reviewed research papers are the “gold standard” of
57 scientific publication, there are a variety of other dissemination methods that are
58 appropriate depending upon the situation[19]. For instance, the recent emphasis on
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3 “Patient and Public Involvement” (PPI) has tried to encourage researchers to produce
4 bulletins and research summaries that are lay friendly and accessible[20]. While this should
5 not be the only way research is disseminated, it is entirely valid for the purpose of
6 maintaining accountability with research participants. It would perhaps therefore be a
7 valuable future piece of work to determine what “appropriate” or “sufficient”
8 publication/dissemination may look like for a Research Database. Interestingly the
9 databases in our study that produced newsletters and bulletins as part of their PPI work
10 were more likely to report publications and share their data with other researchers.
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14 15 **Acknowledgements**

16
17 We thank Dr Janet Messer for support during this research and feedback on our initial
18 report to the HRA.
19

20 21 **Funding Statement**

22
23 This work was funded by the Health Research Authority ([#15182](#)) in the form of tuition fees
24 and a small stipend for ST to complete a MRes under the supervision of SEK.
25

26 27 **Competing Interests**

28
29 SEK is chair of the Hampshire A HRA research ethics committee, the MOD research ethics
30 committee, and a member of the HRA’s Confidentiality Advisory Group (CAG). He is also an
31 academic and the ethics advisor at the University of Portsmouth. ST is a lay member of the
32 Hampshire B HRA research ethics committee. MB has no competing interests.
33

34 35 **Author Contributions**

36
37 SEK devised the project, arranged for funding and supervised ST. ST conducted the research
38 and drafted the manuscript. MB supervised the qualitative elements of the research and
39 coded the email responses in addition to ST. All authors contributed to the final manuscript.
40

41 42 **Reporting Checklist**

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44 The SRQR (Standards for Reporting Qualitative Research) checklist was used to ensure
45 accurate reporting.
46

47 48 **Data Sharing**

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50 This study analysed data held in confidence by the UK Health Research Authority (HRA).
51 Permission to access the original data can be requested by contacting the [authors or the](#)
52 HRA.
53

54 55 **Patient and Public Involvement**

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57 As a government body the HRA involves patients and the public through their public
58 involvement network. This research/audit was conducted as part of the HRA’s transparency
59 agenda to provide better information for patients and the public.
60

Approvals

As an audit of existing records (secondary data) held by a regulator this work did not require an ethics review. Both SEK and ST have regular access to HARP records as part of their roles on HRA research ethics committees.

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Figure Captions:

Figure 1: Annual reports contained on HARP

Figure 2: Data access requests received and granted grouped by frequency. NB, the “access requests granted” columns are sometimes higher than the “access requests received” columns because databases receiving multiple access requests did not always grant all of them.

Figure 3: Distribution of publications coming from the research databases.

Figure 4: Number and year of Research Database Applications.

Figure 5: Cumulative numbers of publications (grey line) and access requests (black line) granted for all databases by age of databases (e.g. at 5 years there are 641 access requests and 828 publications for all databases 5 years old and younger).

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