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## Supplementary information

# Clinical trial recovery from COVID-19 disruption

In the format provided by the authors

**Supplementary Box 1 | Data collection and analysis**

**Figure 1a–c**
We retrieved ClinicalTrials.gov XML records from https://clinicaltrials.gov/AllPublicXML.zip on 29th May, 26th June, and 31st July 2020, using the standard data model to obtain study start date, study status, condition or disease, and reason for suspension. We further classified condition or disease into therapeutic areas, and identified COVID-19-related trials using the MeSH term 'COVID-19' (including synonyms 'SARS-CoV-2', 'severe acute respiratory syndrome coronavirus 2', '2019-nCoV', '2019 novel coronavirus', 'Wuhan coronavirus'), supplemented with the World Health Organization ICTRP record of COVID-19 trials. We used the study status field to identify suspended trials and searched for explicit mention of COVID-19 in the reported reason for suspension.

**Figure 1d and 2**
We conducted a double-blinded, English-language online survey of 245 clinical trial investigators and study coordinators, administered via third-party recruitment platform over May 8–18, 2020. Respondent sample demographics were as follows.

| Variable | *n* | % |
|---|---|---|
| **Geographic location** | | |
| US | 104 | 42% |
| UK | 33 | 13% |
| Italy | 19 | 8% |
| Germany | 18 | 7% |
| Spain | 16 | 7% |
| Canada | 13 | 5% |
| France | 12 | 5% |
| Other | 30 | 12% |
| **Primary therapeutic area** | | |
| Oncology | 65 | 27% |
| Cardiovascular | 49 | 20% |
| Neurology | 47 | 19% |
| Rheumatology | 26 | 11% |
| Infectious disease | 22 | 9% |
| Other | 36 | 15% |

| Variable | *n* | % |
|---|---|---|
| **Trials conducted over past 12 months** | | |
| 3–5 | 32 | 13% |
| 6–10 | 121 | 49% |
| 11–15 | 58 | 24% |
| >15 | 34 | 14% |
| **Role on studies** | | |
| Principal investigator | 206 | 84% |
| Study coordinator | 39 | 16% |
| **Primary practice setting** | | |
| Academic medical center | 169 | 69% |
| Community hospital | 44 | 18% |
| Independent group / solo practice | 32 | 13% |

***Figure 1d***
*Out of the trials that you conduct and that have paused enrollment, when do you expect majority to restart?*

a. Within next 2 weeks
b. In 2–4 weeks
c. In 4–6 weeks
d. In 6–8 weeks
e. In 8–12 weeks
f. Not sooner than 12 weeks from now

***Figure 2a, upper panel***
*Within your clinical trials, what share of patient interactions do you conduct remotely? How do you expect this to change in future? Please provide % of total interactions for the below.*

a. Pre-COVID-19
b. Today
c. At crisis peak
d. 6 months post-crisis

Survey question did not reference specific time frame, and relied on investigators' judgement of timing of crisis peak.

***Figure 2a, lower panel***
*What share of your interactions with sponsors or CROs take place remotely? How do you expect this to change in future? Please provide % of total interactions for the below.*

a. Pre-COVID-19
b. Today
c. At crisis peak
d. 6 months post-crisis

Survey question did not reference specific time frame, and relied on investigators' judgement of timing of crisis peak.

***Figure 2b, left panel***
*How do you expect the usage of the following interventions to evolve in your clinical trial practice after the COVID crisis as compared to pre-COVID situation?*

Respondents are shown 16 interventions as listed in figure 2b, and for each selected one answer from:

a. Expect to see less post-COVID-19 than pre-COVID-19
b. Expect no change between pre- and post-COVID-19
c. Expect to see more post-COVID-19 than pre-COVID-19

**Figure 2b, right panel**
*Among the innovations that you expected to increase, please select the top 3 that you are most interested in and that you believe will bring most value*

Respondents are shown all interventions among the 16 previously displayed, for which they had answered 'Expect to see more post-COVID-19 than pre-COVID-19', and are able to select up to 3.

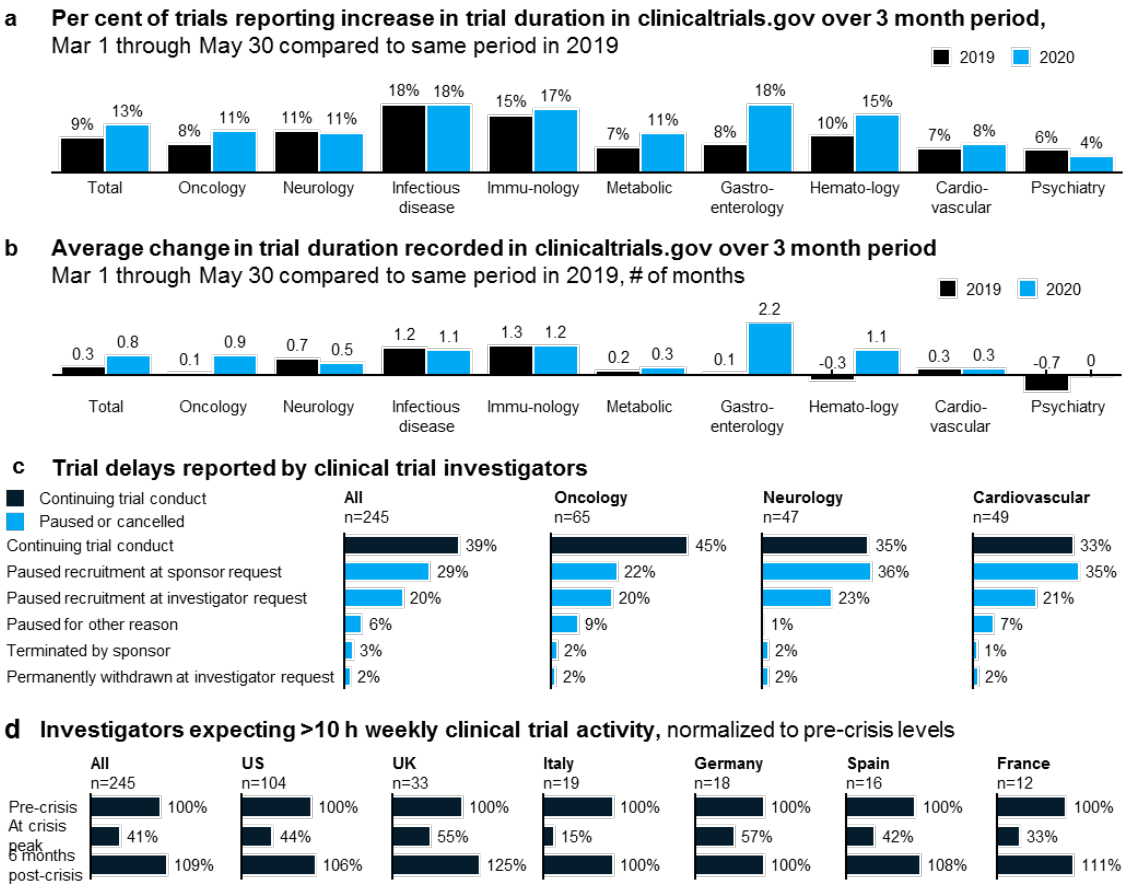


Fig. S1 | **Global clinical trial disruption due to COVID-19. a** | Per cent of trials in clinicaltrials.gov that reported increase in trial duration during Mar–May 2020, due to change in start date, completion date, or announced suspension. **b** | Average changes in trial duration reported to clinicaltrials.gov due to change in start or completion date recorded over 3-month period Mar–May 2020. Positive number of months reflects increase in trial duration. Changes reported over equivalent period in 2019 shown for comparison purposes. **c** | Trial investigators were asked the status as of May 2020 of trials for which they were actively recruiting pre-COVID-19. **d** | Investigator responses of actual and expected weekly hours spent on clinical trial activities. Survey question did not reference specific time frame, and relied on investigators' judgement of timing of crisis peak.

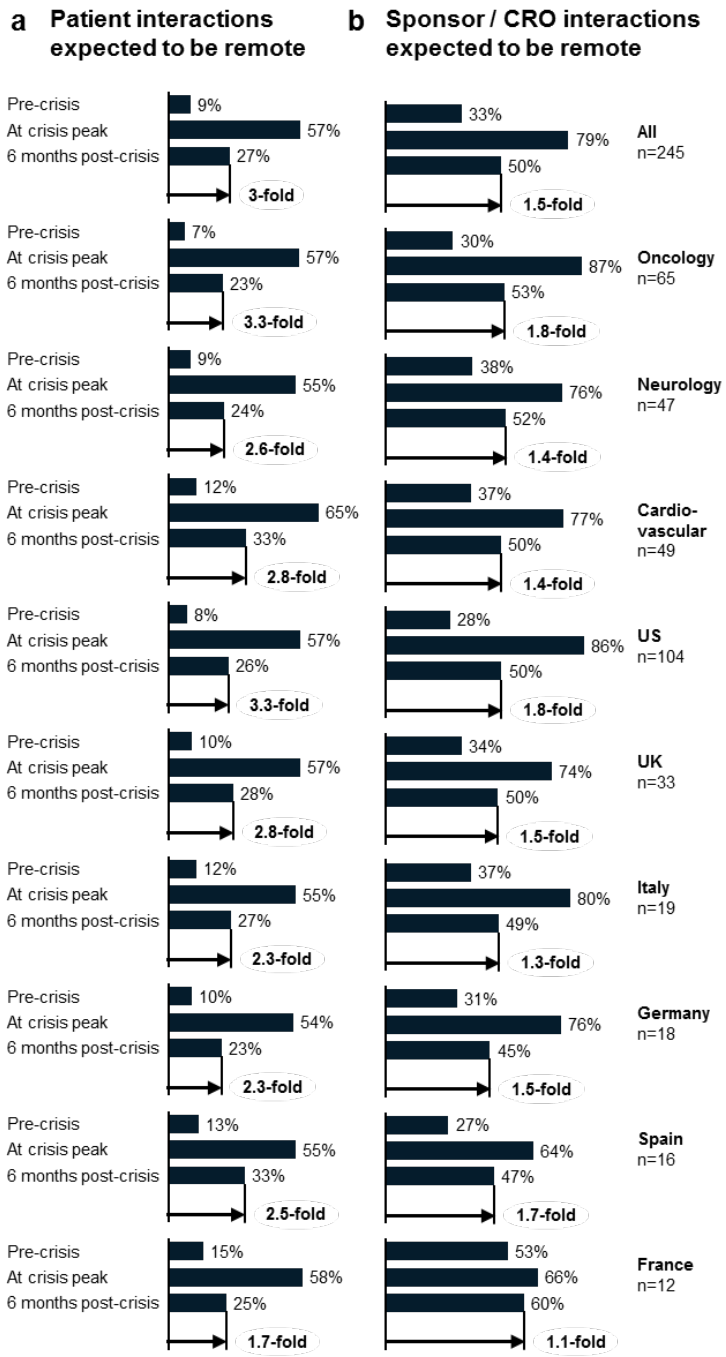


Fig. S2 | **Trial investigator expectations of remote engagement. a** | Average % of patient interactions reported or expected to be remote. **b** | Average % of sponsor/CRO interactions reported or expected to be remote.

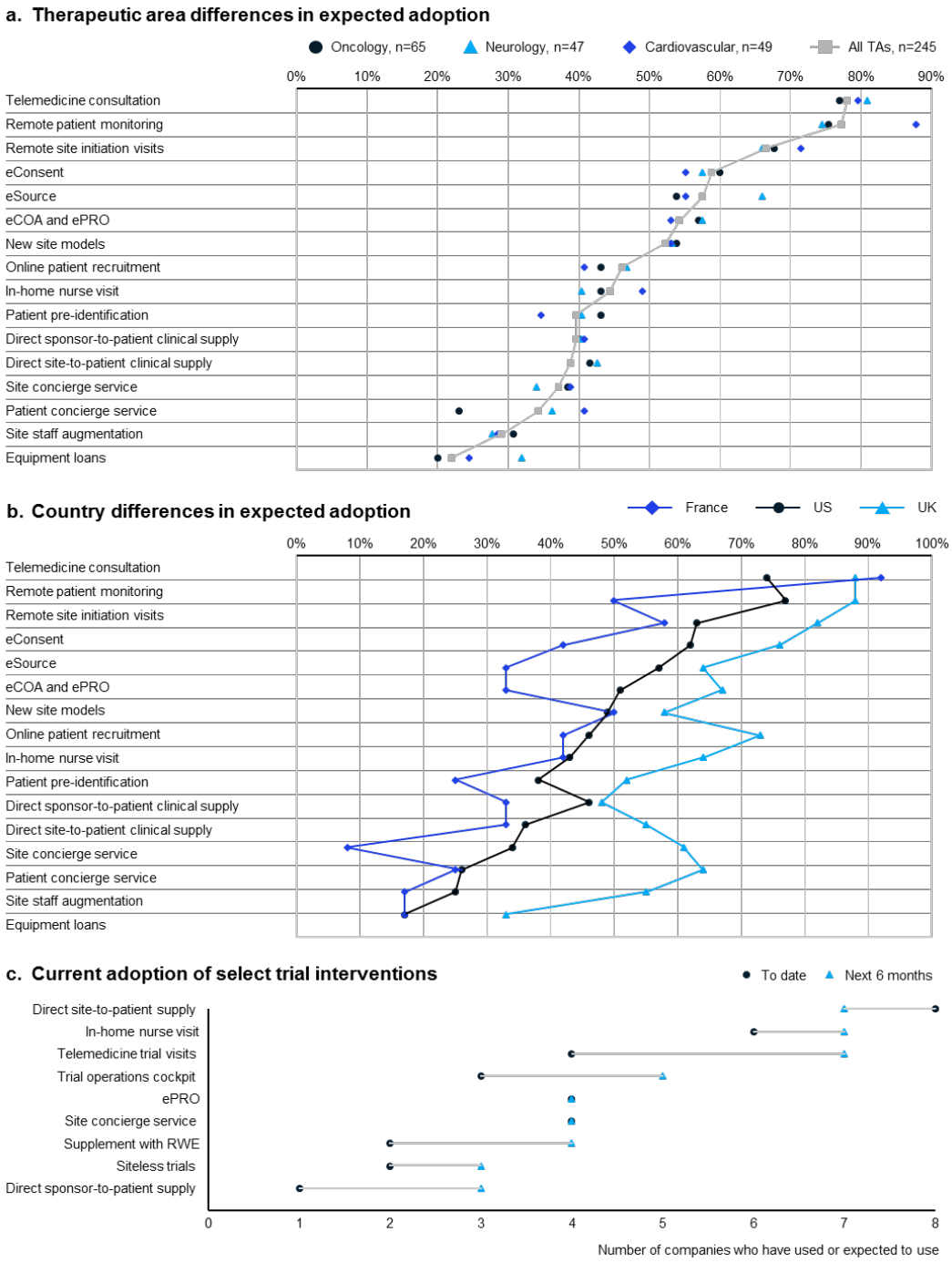


Fig. S3 | **Sponsor and investigator adoption of clinical trial innovations. a** | Investigators were asked whether each of 16 trial interventions presented in randomized order would increase in adoption post-crisis. Largest therapeutic areas in sample were oncology (65), neurology (47), cardiovascular (49). **b** | Investigator responses from select countries on whether each of 16 trial interventions presented in randomized order would increase in adoption post-crisis. **c** | Biopharma executives were polled in advance of McKinsey's Clinical Operations Leader Roundtable on 11 May 2020 on whether they had adopted or expected to adopt the nine clinical trial innovations shown.