**Research: increasing value, reducing waste 1**

**How to increase value and reduce waste when research priorities are set**

**Recommendations**

1 More research on research should be done to identify factors associated with successful replication of basic research and translation to application in health care, and how to achieve the most productive ratio of basic to applied research

• Monitoring—periodic surveys of the distribution of funding for research and analyses of yields from basic research

2 Research funders should make information available about how they decide what research to support, and fund investigations of the effects of initiatives to engage potential users of research in research prioritisation

• Monitoring—periodic surveys of information on research funders’ websites about their principles and methods used to decide what research to support

3 Research funders and regulators should demand that proposals for additional primary research are justified by systematic reviews showing what is already known, and increase funding for the required syntheses of existing evidence

• Monitoring—audit proposals for and reports of new primary research

4 Research funders and research regulators should strengthen and develop sources of information about research that is in progress, ensure that they are used by researchers, insist on publication of protocols at study inception, and encourage collaboration to reduce waste

• Monitoring—periodic surveys of progress in publishing protocols and analyses to expose redundant research

**Research: increasing value, reducing waste 2**

**Increasing value and reducing waste in research design, conduct, and analysis**

**Recommendations**

1 Make publicly available the full protocols, analysis plans or sequence of analytical choices, and raw data for all designed and undertaken biomedical research

• Monitoring—proportion of reported studies with publicly available (ideally preregistered) protocol and analysis plans, and proportion with raw data and analytical algorithms publicly available within 6 months after publication of a study report

2 Maximise the effect-to-bias ratio in research through defensible design and conduct standards, a well trained methodological research workforce, continuing professional development, and involvement of non-conflicted stakeholders

• Monitoring—proportion of publications without conflicts of interest, as attested by declaration statements and then checked by reviewers; the proportion of publications with involvement of scientists who are methodologically well qualified is also important, but difficult to document

3 Reward (with funding, and academic or other recognition) reproducibility practices and reproducible research, and enable an efficient culture for replication of research

• Monitoring—proportion of research studies undergoing rigorous independent replication and reproducibility checks, and proportion replicated and reproduced

**Research: increasing value, reducing waste 3**

**Increasing value and reducing waste in biomedical research regulation and management**

**Recommendations**

1 People regulating research should use their influence to reduce other causes of waste and inefficiency in research

• Monitoring—people regulating, governing, and managing research should measure the extent to which the research they approve and manage complies with the other recommendations in this Series

2 Regulators and policy makers should work with researchers, patients, and health professionals to streamline and harmonise the laws, regulations, guidelines, and processes that govern whether and how research can be done, and ensure that they are proportionate to the plausible risks associated with the research

• Monitoring—regulators, individuals who govern and manage research, and researchers should measure and report delays and inconsistencies that result from failures to streamline and harmonise regulations

3 Researchers and research managers should increase the efficiency of recruitment, retention, data monitoring, and data sharing in research through the use of research designs known to reduce inefficiencies, and do additional research to learn how efficiency can be increased

• Monitoring—researchers and methodologists should do research to identify ways to improve the efficiency of biomedical research

4 Everyone, particularly individuals responsible for health-care systems, can help to improve the efficiency of clinical research by promoting integration of research in everyday clinical practice

• Monitoring—people responsible for management of health-care systems or research should measure the proportions of patients who are enrolled in research

**Research: increasing value, reducing waste 4**

**Increasing value and reducing waste: addressing inaccessible research**

**Recommendations**

1 Institutions and funders should adopt performance metrics that recognise full dissemination of research and reuse of original datasets by external researchers

• Monitoring—assessment of the proportion of institutional and funding-agency policies that explicitly reward dissemination of study protocols, reports, and participant-level data

2 Investigators, funders, sponsors, regulators, research ethics committees, and journals should systematically develop and adopt standards for the content of study protocols and full study reports, and for data sharing practices

• Monitoring—surveys of how many stakeholders adopt international standards

3 Funders, sponsors, regulators, research ethics committees, journals, and legislators should endorse and enforce study registration policies, wide availability of full study information, and sharing of participant-level data for all health research

• Monitoring—assessment of the proportion of stakeholder policies that endorse dissemination activities, and the proportion of studies that are registered and reported with available protocols, full study reports, and participant-level data

**Research: increasing value, reducing waste 5**

**Reducing waste from incomplete or unusable reports of biomedical research**

**Recommendations**

1 Funders and research institutions must shift research regulations and rewards to align with better and more complete reporting

 • Monitoring—when assessing research (or researchers), funders and research institutions should consider the accessibility of research protocols, study materials, study data, and their use by others

2 Research funders should take responsibility for reporting infrastructure that supports good reporting and archiving

 • Monitoring—funders and research institutions should regularly report expenditures for reporting infrastructure and archiving

3 Funders, institutions, and publishers should improve the capability and capacity of authors and reviewers in high-quality and complete reporting

 • Monitoring—researchers should use reporting guidelines, registries, archives, etc; and take up training opportunities