Construction of an Efficient and Rapid Emergency Open Access Mechanism with Multi-stakeholder Participation: Postprint

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Abstract

[Purpose/Significance] Following the outbreak of the COVID-19 pandemic, the practical significance of research on open access mechanisms for scientific research resources has become increasingly prominent. [Method/Process] Focusing on establishing a rapid and efficient emergency open access mechanism for scientific research resources, this study approaches from the perspective of public health emergencies. By collecting practical cases of emergency open access in the field of library and information science both domestically and internationally in recent years, it analyzes the roles of seven stakeholders—researchers, data centers, universities and research institutions, research funding agencies, libraries, publishers, and preprint platforms—in emergency open access of information resources. Based on stakeholder roles and collaborative relationships, it constructs a multi-stakeholder collaborative mechanism model for emergency open access across three layers: the open access resource provision layer, the open access integration and utilization layer, and the open access support layer. This further forms a system where the resource provision layer interconnects open resources, the open access support layer provides external support, and the integration and utilization layer consolidates resources from all parties. [Results/Conclusion] Based on this collaborative mechanism model and in light of actual conditions, targeted recommendations are proposed for emergency open access to scientific research materials.

Full Text

Preamble

Title: Construction of an Efficient and Rapid Emergency Open Access Mechanism with Multiple Participants

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Abstract:
[**Purpose/Significance**] Since the outbreak of COVID-19, the practical importance of research on open access mechanisms for scientific resources has become increasingly apparent. [**Method/Process**] Focusing on how to establish a fast and efficient emergency open access mechanism for scientific resources, this study uses public health emergencies as an entry point. By collecting practical cases of emergency open access in the field of library and information science both domestically and internationally in recent years, we analyze the roles of seven key stakeholders—researchers, data centers, universities and research institutions, funding agencies, libraries, publishers, and preprint platforms—in emergency open access of information resources. Based on the functions and collaborative relationships of these stakeholders, we construct a multi-party collaborative mechanism model for emergency open access across three layers: an open access resource provision layer, an open access integrated utilization layer, and an open access support layer. This forms a system where the resource provision layer interconnects open resources, the support layer provides external assistance, and the integration layer consolidates resources from all parties. [**Result/Conclusion**] Based on this collaborative mechanism model, the study offers targeted recommendations for emergency open access of research materials in light of actual conditions.

Keywords: open access; public health emergency; information resources; library and information science

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2 Literature Review

2.1 Public Health Emergency Response Mechanisms and Open Access

Public health emergencies are characterized by their sudden onset and require rapid response mechanisms [6]. Such emergencies can cause significant threats to public health safety [7], necessitating high-efficiency countermeasures [2] to promote coordinated emergency response. Traditional approaches often rely on administrative and legal measures, but these frequently prove insufficient for

addressing public health crises, highlighting the need for open access (OA) as a complementary solution [8].

Open access breaks down barriers to scientific research and promotes public welfare [9], facilitating faster processing of public health emergencies and advancing scientific collaboration [1, 3]. Studies have examined OA from various perspectives, including policy development [2], ethical considerations [4], and support services [5]. However, existing research lacks systematic investigation into multi-stakeholder collaborative mechanisms specifically for emergency OA. During the 2015 Ebola outbreak, for instance, scientific data sharing demonstrated the critical importance of coordination among multiple parties [3]. This study therefore examines emergency OA mechanisms from the conceptual foundations of policy, collaboration, and information sharing.

From the policy perspective, researchers have analyzed the legislative frameworks and policy instruments needed to support emergency OA [10]. Institutionally, studies have explored how representative organizations can drive policy updates to facilitate emergency response [23]. D. Shaw et al. [4] constructed a coordination framework involving government, research institutions, publishers, and funding agencies, while C. Curdt et al. [24] emphasized how publishing ethics can promote collaboration. From a collaboration standpoint, T. A. Horan et al. [11] identified the "information infrastructure" essential for OA, and N. Kapucu [12] stressed the need for appropriate communication channels among organizations. G. Trecarich et al. [13] evaluated open knowledge systems, noting that broader OA participation enhances emergency response capabilities.

From the information sharing perspective, the timeliness and accuracy of scientific data are fundamental to effective response. J. P. Chretien et al. [2], Y. Shu et al. [15], and K. Little et al. [1] emphasized policy requirements for data sharing, while other scholars [16, 17] examined the technical and organizational frameworks for information dissemination.

2.2 Collaborative Mechanisms for Public Health Emergencies and Open Access

Public health emergencies require coordinated action among researchers, publishers, funding agencies, libraries, and other stakeholders [18]. However, existing OA mechanisms often lack clear division of labor and systematic coordination, leading to inefficiencies [19]. While policy coordination has been studied [19, 20, 21], and organizational coordination frameworks proposed [4, 25], research specifically addressing emergency OA mechanisms remains limited.

Funding agencies play a crucial role by mandating OA policies and providing financial support [34, 35]. Preprint platforms have emerged as vital channels for rapid dissemination, offering public access to preliminary findings and accelerating the research cycle [36, 37]. However, challenges persist regarding quality control, long-term preservation, and integration with formal publication systems.

3 Research Design

This study uses the COVID-19 pandemic as a case to examine emergency OA mechanisms. We collected 29 relevant cases through systematic search using the query: TI=(open access) OR TI=(emergency health crisis) OR TI=(public emergency health crisis) OR TI=(public health emergency) AND Y1=(2018-2020). After screening for relevance and quality, we identified seven key stakeholders: researchers, publishers, funding agencies, libraries, data centers, universities/research institutions, and preprint platforms. By analyzing their roles and interactions in these cases, we constructed a multi-layer collaborative mechanism model.

4 Analysis of Open Access Subjects in Public Health Emergencies

4.1 Researchers

Researchers are primary producers of scientific information. During COVID-19, publishers expedited review processes to rapidly disseminate research findings. For instance, Elsevier created a COVID-19 resource center, providing free access to virus-related research. Chinese platforms like SinoMed offered extensive resources on SARS, Ebola, dengue fever, and COVID-19. However, researchers face barriers including publication costs and restrictive copyright agreements, limiting their ability to share data openly.

4.2 Publishers

Publishers serve as critical intermediaries, providing both formal publication channels and quality control. During COVID-19, major publishers like Elsevier and Springer Nature made coronavirus research freely available. Yet tensions exist between publishers' business models and OA requirements. Most publishers maintain paywalls for the majority of content, and their lengthy publication processes can delay emergency response. While some adopt hybrid OA models, the associated article processing charges (APCs) remain prohibitive for many researchers.

4.3 Data Centers

Data centers, often government-led public institutions, provide storage, management, and access services for research data. GenBank, for example, hosts viral genome sequences essential for COVID-19 research. The Emergency Access Initiative (EAI) demonstrates how data centers can facilitate rapid, temporary access to critical information during crises. However, coordination among different data centers remains inconsistent, and long-term sustainability requires stable funding and clear governance.

4.4 Libraries

Public and academic libraries provide information services during emergencies, including resource navigation, data management support, and research assistance. The U.S. National Library of Medicine (NLM) coordinated with publishers to create the COVID-19 Information Resource Center. Libraries also advocate for OA policies and provide infrastructure support. However, they often lack sufficient funding and authority to drive large-scale OA initiatives independently.

4.5 Universities and Research Institutions

Universities and research institutions are both producers and consumers of scientific information. They establish institutional repositories and data sharing platforms, such as Harvard's Dataverse. These institutions can mandate OA policies for their researchers and provide technical infrastructure. However, they face challenges including high operational costs, inconsistent policies across institutions, and concerns about intellectual property and confidentiality.

4.6 Funding Agencies

Funding agencies influence OA through policy mandates and financial support. The Agency for Healthcare Research and Quality (AHRQ) requires data sharing for public health research. The cOAlition S initiative demonstrates how funders can drive systemic change toward full and immediate OA. During emergencies, funders can accelerate OA by providing dedicated grants for data sharing and covering APCs, though implementation varies across agencies.

4.7 Preprint Platforms

Preprint platforms enable rapid dissemination of preliminary findings before formal peer review. BioRxiv and MedRxiv played crucial roles in sharing COVID-19 research quickly. While accelerating information flow, preprints lack formal quality control, requiring clear labeling to prevent misinformation. Coordination between preprint servers and publishers is essential to ensure eventual formal publication and long-term preservation.

5 Subject Relationship Analysis and Collaborative Mechanism Construction

5.1 Limitations and Inter-Subject Collaborative Relationships

Each stakeholder has distinct limitations: researchers face publication costs; publishers balance profit motives with public good; data centers require sustainable funding; libraries lack authoritative power; universities have policy inconsistencies; funding agencies have limited jurisdictional reach; and preprint platforms lack quality control. These limitations create interdependencies that

necessitate collaboration. For example, publishers depend on researcher submissions, while researchers rely on publishers for dissemination and libraries for access. Funding agencies can incentivize OA compliance, and data centers provide infrastructure for all parties.

5.2 Construction of Emergency Open Access Collaborative Mechanism

Based on these relationships, we propose a three-layer collaborative mechanism model [Figure 1: see original paper]:

(1) OA Resource Provision Layer
This layer comprises data centers, publishers, libraries, and preprint platforms that directly provide OA resources. Data centers supply raw data and infrastructure; publishers provide peer-reviewed content; libraries offer curation and access services; and preprint platforms enable rapid dissemination. These actors must coordinate to ensure resource interoperability and avoid duplication.

(2) OA Support Layer
Universities, research institutions, and funding agencies constitute this layer, providing policy, financial, and infrastructural support. They develop OA policies, allocate funds for APCs and infrastructure, and advocate for systemic change. Their support enables the provision layer to operate effectively during emergencies.

(3) OA Integration and Utilization Layer
Researchers and the public form this layer, generating and utilizing OA resources. Researchers produce knowledge and share data, while the public accesses and applies information. This layer's needs drive the entire mechanism.

5.3 Mechanism Analysis

5.3.1 Inter-layer and Cross-layer Collaboration

During emergencies, the three layers must transition from normal to emergency mode rapidly. The support layer activates policies and funding, the provision layer scales up services and relaxes access restrictions, and the utilization layer intensifies knowledge production and sharing. Cross-layer feedback loops ensure continuous adaptation—for instance, researcher needs inform publisher policies, and funding agency mandates shape institutional practices.

5.3.2 Normalized vs. Emergency OA Mechanisms

The collaborative mechanism should maintain baseline OA capacity during normal periods while enabling rapid escalation during emergencies. This requires pre-established agreements among stakeholders, such as automatic OA mandates for emergency-related research, pre-negotiated APC waivers, and interoperable data standards. The COVID-19 Technology Access Pool exemplifies such proactive coordination.

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Note: Figure translations are in progress. See original paper for figures.