Date: Sun, 23 Jan 2011 13:56:20 -0500
To: "Dr. Baruch Fischhoff - Chair, National Academy Committee on Improving Intelligence" <baruch@cmu.edu>, "Dr. Anne-Marie Slaughter - Director, Policy Planning Staff via Ms. Marisa S. McAuliffe" <mcauliffems@state.gov>,
From: Lloyd Etheredge <lloyd.etheredge@policyscience.net>

Subject: 210. Red Team: Sentinel (N=60 million) is working! Upgrading Grand Strategy = Science Statesmanship + IT? Fwd: NEJM (1/12/2011), "Developing the Sentinel System . . ."

Dr. Fischhoff, Dr. Slaughter, and Study Group Members:

I attach a copy of "Developing the Sentinel System . . . " from The New England Journal of Medicine of January 12, 2011. There are implications (for Science Statesmanship + IT) in other areas of science that should be considered by a Red Team + National Academies project and briefed to President Obama for his decision.

The article announces the N=60 million domestic startup of new online research capabilities for human health. The new online system (that now translates different data formats and that will evolve with a Universal Access Language for the exchange of biomedical and health care information) is a foundation for a new global rapid learning system. Sentinel also will be linked to Kaiser and other "Everything Included" databases with full genetic, protein, behavioral and other data for additional analysis.

Traditionally, much of the time of research scientists is spent collecting data. The new capabilities create opportunities for rapid learning in which hypotheses can be developed and tested, 24x7, by researchers and students worldwide, and almost at the speed of thought.

Updating Bush-Era Thinking

The Obama Administration has moved brilliantly and quickly: A better and more cooperative

world has become possible, more quickly, than envisioned in the Global 2025 planning forecast. Thus, there are political and scientific opportunities available, beyond the future that was envisioned by the National Intelligence Council in the Bush Administration - i.e., before considering the potential of American leadership + new IT technology. [Re political opportunities: # 4 at www.policyscience.net at II.D.]

Science Statesmanship + IT: Political, Health, and Economic Benefits

The same ideas to use global IT capabilities to share research data in very large, inclusive, databases and provide free software tools can transform and accelerate the creative process. Below, I suggest (draft) ideas about other scientific areas in which the Obama Administration's scientific leadership can create new political, health, and economic benefits for the world.

[Beyond specific benefits, Science Statesmanship + IT can contribute to a good future for international relations, based on scientific values and a shared commitment to a better world. Thus, given the DNI's wide purview, I suggest a high-level Red Team with the National Academies to scope-out the possibilities and assure that the political/scientific options are briefed to the President and plans reach his desk for decision quickly.]

- Commercial Agriculture - Prevention, Treatment, and Rapid Learning. In the same spirit as the NIH/FDA Sentinel system for humans, global research to prevent, and to develop and evaluate new treatments for, conditions that damage plants (including commercial agricultural products) can develop inter-operable codes and link agricultural research Centers and projects in interested countries. <1> Advice from the National Academies can estimate thresholds for the size of databases (i.e., which may be much less than N=60 million) for the startup projects.

- Animal Health and Aquaculture. Veterinary medicine and commercial animal husbandry also can - with a light touch of American leadership - have similar systems for electronic health records and rapid learning, to shared international benefit. Faster R&D for prevention and better/lower cost treatments of conditions affecting commercial fisheries and world aquaculture can follow the same model. <2>

- Bio-Fertilizers. Another area for scientific statesmanship and large N data/collaboration

systems is the rapid development of bio-fertilizers. Traditionally, we have thought of fertilizer as inorganic, using petroleum-based and other chemicals. However research has clarified a rich and varied microbial life in fertile soils. An experimental powder with, for example, 17 species has been created that can live happily together, be sprinkled on soil, and reduce the need for commercial fertilizer by 50% or more. However the number of variables involved to develop global commercial applications is very large - optimal bio-fertilizer packages are likely to vary with the nature of the original soil, the plant species grown exclusively or in rotation, the temperature and rainfall, etc. The best commercial products also may depend upon using the genomic databases of the plants and the organisms. Thus, this is an ideal problem for rapid learning with large online databases + free software on the Sentinel R&D model. The reduced costs of fertilizer, and improved yields, may play a vital role to improve agricultural productivity and income in many UDCs.

- Math Education. Too much data are being lost in the world's K-12 educational systems: The same model can be applied, domestically and internationally, to accelerate arithmetic and math education. Shared pools of quiz/test items and results can be part, for interested schools, teachers, school districts, countries and/or students, of Everything Included data systems for fast discovery R&D. It may be possible to develop better generic methods for specific topics; also, by analogy with medicine, we can envision faster discovery of diagnostic tools and customized aides for students.

The Sentinel-model project might be especially interesting for Asian countries, like China, Japan, or S. Korea that - while they obtain higher mean scores - do so at a fierce extra cost of student hours in school and in homework, the exclusion of other educational material and extra-curricular activities, and the intense use of social pressure that may have long-term costs. The R&D possibilities of more efficient use of school & students' time, and more productive results, could add these systems to a global coalition for fast discovery, together with ideas for new measures and theories to be included in the Everything Included, evolving, system.<3>

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<1> Pharmaceutical companies support Sentinel because - rather than spend money for proprietary databases - they can refocus R&D money and time to computer simulation and other analysis tools to understand the data and develop ideas for better drugs. The same shift of R&D strategy and political support are likely from commercial companies involved in agricultural research.

<2> Re animal health: Avian virus outbreaks, for example, have created massive economic damage, especially to Third World countries: Thus, it is an advantage to have a surge capability and a global system based on the Sentinel approach, to engage rapid learning and vaccine development/testing for emerging/mutating infectious diseases. An animal health rapid learning network can help human health in the cases, like swine flu or mad- cow disease, that can more easily jump the species barrier to human epidemics.

<3> There also will be corporate R&D benefits. Companies (Kaplan?) could move any discover-ies into practice quickly, offering new teaching materials or online aides to students that help the students, themselves, to diagnose what's slowing them down and get well-targeted help that they need, whenever there is a problem.

Perspective:
Developing the Sentinel System n A National Resource for Evidence Development

NEJM | January 12, 2011 | Topics: Drugs, Devices, and the FDA
Rachel E. Behrman, M.D., M.P.H., Joshua S. Benner, Pharm.D., Sc.D., Jeffrey S. Brown, Ph.D., Mark McClellan, M.D., Ph.D., Janet Woodcock, M.D., and Richard Platt, M.D.

The Food and Drug Administration (FDA) now has the capacity to “query” the electronic health information of more than 60 million people, posing specific questions in order to monitor the safety of approved medical products. This pilot program, called Mini-Sentinel, uses a distributed data network (rather than a centralized database) that allows participating health plans and other

organizations to create data files in a standard format and to maintain possession of those files. These organizations perform most analyses of their own data by running computer programs distributed by a coordinating center, and they provide consistent summarized results for the FDA's review.1 The principles and practices involved in this effort to improve the safety of medical products can inform other uses of electronic health information to answer additional important questions about health and health care.

When the FDA announced the Sentinel Initiative in May 2008, it established a vision and objectives for the program, including the development of the Sentinel System, which will eventually be able to search the electronic health data of a minimum of 100 million patients.2 Laying the groundwork for that system has required an extraordinary range of input from public and private organizations. Under a cooperative agreement with the FDA, the Engelberg Center for Health Care Reform at the Brookings Institution has been convening an ongoing series of discussions among stakeholders to address the near- and long-term challenges inherent in implementing the Sentinel System.3 In 2009, the FDA gave the Harvard Pilgrim Health Care Institute the lead role in fulfilling a 5-year contract to establish a system n the Mini-Sentinel n for developing and testing approaches and methods that could be used to inform the structure and operations of the full Sentinel System. The institute is now leading a diverse partnership of approximately 200 epidemiologists, clinical content experts, statisticians, and data specialists from 27 institutions that are participating in this pilot system (www.minisentinel.org).

Through the Mini-Sentinel, capabilities are being developed for actively monitoring the safety of approved medical products using the electronic health information in claims systems, inpatient and outpatient medical records, and patient registries. The Mini-Sentinel builds on the work of the Vaccine Safety Datalink project (managed by the Centers for Disease Control and Prevention), the HMO Research Network, the Population Medicine Distributed Research Network (PopMedNet, funded by the Agency for Healthcare Research and Quality), and the Observational Medical Outcomes Partnership, among others.4

In the first year of the Mini-Sentinel project, its leaders established a network of data partners and a system with robust patient-privacy policies that could be used in querying the network's databases. The initiative's distributed data network allows each data partner to maintain physical

and operational control over its own patient-level data, while providing the aggregated information needed to address the FDA's questions. Source data reside behind the data partners' institutional firewalls, where they are transformed into a standard format. This approach allows each data partner to answer the FDA's queries by executing standardized computer programs distributed by the Mini-Sentinel Operations Center. A typical result might include the number of new users of a product who experience a particular outcome, grouped according to age, sex, other treatments, and health status. This use of distributed analysis n whenever possible n eliminates or greatly reduces the exchange of protected health information. The data partners can obtain full-text medical records when necessary to confirm diagnoses or exposures and to determine the existence or severity of risk factors.

The initial focus of Mini-Sentinel has been on developing the ability to use claims data. In the next year, laboratory-test results and vital signs, derived from electronic health records and clinical laboratory records, will be added. The partnership is also evaluating procedures whereby Mini-Sentinel data partners will be able to link to data held by other organizations, such as state immunization registries and device registries.

The FDA will soon begin to actively monitor the data, seeking answers to specific questions about the performance of medical products, such as the frequency of myocardial infarction among users of oral hypoglycemic agents (a topic selected because it has been difficult to identify drug-induced myocardial infarction through existing prospective surveillance mechanisms). The FDA will also monitor the occurrence of adverse events associated with select routinely administered vaccines. Using the Mini-Sentinel system, the FDA will also be able to obtain rapid responses to new questions about medical products and, eventually, to evaluate the health effects of its regulatory actions. This monitoring portfolio will expand as the FDA and its collaborators acquire experience and develop operational efficiencies and as additional data resources become available.

The distributed-database-and-analysis model and the infrastructure of the Mini-Sentinel data network can be extended to other forms of evidence development. Provisions in the economic stimulus and health care reform legislation, and a recent report from the President's Council of Advisors on Science and Technology,5 envision expanded use of electronic health information

for other types of public health surveillance, quality measurement, comparative effectiveness research, and biomedical research n all of which are essential to improving the country's health and health care delivery system.

Issues relevant to other secondary uses of electronic health information include recruitment of appropriate data partners, development and refinement of analytic methods, implementation of standards to ensure that analytic methods are consistent across the data sources, and above all, protection for the rights and privacy of patients. Data privacy and security are top priorities that were key considerations in the decision to build Mini-Sentinel as a system that uses a distributed data system and distributed analysis whenever possible. The committed collaboration among representatives of patients and consumers, health care professionals, Mini-Sentinel's data partners and safety scientists, and the medical-products industry has been essential to the Sentinel Initiative's progress.

It is particularly challenging to establish appropriate governance for a distributed data network that can support multiple secondary uses for health information. The current infrastructure is supported by a single federal agency, the FDA, and all the data are provided by private organizations, yet potential users of such a system reside not only broadly in government but also in academia, the private sector, and other user communities. To facilitate the development of this infrastructure into a national resource, this distributed system may ultimately be best managed by a consortium of interested parties operating as a public–private partnership. For example, specialized network-coordinating centers might rely on a consistent infrastructure to use the same sources of health information for various purposes, including public health uses, effectiveness research, quality measurement, and health services research.

The envisioned Sentinel System will build on the knowledge, partnerships, data resources, privacy protections, and technical capabilities that are being developed in the Mini-Sentinel program. Success in the form of improved safety of medical products will depend on the continued engagement of all concerned stakeholders and on ensuring that patients, consumers, and health care providers understand that all medical products pose risks and that postmarketing surveillance is critical to expanding the limited evidence base that exists when products are approved. Success also depends on the continued development of surveillance methods and on

increasing the workforce of scientists who are trained to develop and interpret this evidence effectively.

Health care data represent a precious resource that must be used to the fullest possible extent to promote the public health, while the rights of patients and consumers are protected. As an early working model for secondary uses of data produced in the routine delivery of health care, the Sentinel System can and should become a national resource for evidence development and a cornerstone of a learning health care system.

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