Statement from Ross Koppel, Ph.D. PANEL 1. Identifying the Issues

HIT Policy Committee; Adoption/Certification Workgroup

February 25, 2010 9:00 a.m. – 3:00 p.m. OMNI Shoreham Hotel Washington, DC

Requested Biographical Information:

Ross Koppel, Ph.D. (University of Pennsylvania Sociology Department Faculty; Principal Investigator at the Center for Clinical Epidemiology and Biostatistics, School of Medicine, University of Pennsylvania; Chair-Elect, AMIA Evaluation Working Group; Faculty, The Rand Corporation, President of the Social Research Corporation.) Professor Koppel's work in medical informatics reflects his 40-year career as researcher and professor of sociology of work and organizations, statistics, ethnographic research, survey research, and medical sociology. He is the principal investigator of Penn's study on hospital workplace culture and medication errors. In the past 4 years Dr. Koppel has published over 25 articles and book chapters on HIT in *JAMA, Health Affairs, JAMIA, Journal of Biomedical Informatics, Journal of Clinical Care, Journal of the American Geriatrics Society, Journal of Managed Care, AHRQ-M&M,* and *Infection Control and Hospital Epidemiology* in addition to his books (one on research methods (Sage Publications) and two in press). Koppel is also the author of several works on evaluation and use of statistical methods in medical settings.

His work generally combines sophisticated statistical analyses with survey research and skilled ethnographic research – focusing on use of HIT *in situ*. Prof. Koppel is currently Co-PI of an AHRQ-funded project to develop a guide to implementing HIT while mitigating unintended consequences. That guide is based on new models of interactions between technology and organizations, which Koppel co-authored with Michael Harrison. In addition to his work in medical informatics, Koppel has authored over a 160 academic papers and articles, several monographs, and several books and book chapters. Many of those works addressed the interaction between technology and the workplace, training for use of technology, hospitals as workplaces, illness and society, and the cost of disease and caregiving to the U. S. economy.

Dr. Koppel is the recipient of the Distinguished Career Award in the Practice of Sociology from the American Sociological Association (ASA). He has also been honored with the William Foote Whyte Award from the ASA's section on Public Sociology, the Robert E. Park Award from the Association for Applied and Clinical Sociology, the Distinguished Career Award from the Society for Applied Sociology, and several other awards for his work in Sociological scholarship and practice. He has served as president of all of America's associations of applied sociologists. Koppel also: is the incoming chair of AMIA's Evaluation Working Group; sits on several academic

journal editorial boards, serves on the Board of the European Sociology Association's Section on Qualitative Methods; has twice served on the White House Conference on Future of Small Business & Entrepreneurship; was president of the section on Temporal Ecology of the Research Committee on Social Ecology of the International Sociological Association; and has served as an evaluator for the National Science Foundation, the National Endowment for the Humanities, and the Agency for Healthcare Research and Quality.

Many of Professor Koppel's writing in medical informatics are considered classics in the field. These include, most recently:

Ross Koppel & David Kreda 2009 Healthcare information technology vendors' "Held Harmless clauses – Implications for patients and clinicians. Commentary. J Amer Med Assoc. *JAMA* March 25.

Jos Aarts & Ross Koppel 2009 Implementing CPOE in American, European & Australian hospitals: Lessons from differing social, economic, governance, & workplace environments. *Health Affairs*Mar/Apr

Ross Koppel 2009 AHRQ Morbidity and Mortality Reports. Robert Wachter, editor. Commentary on EMR Mistaken Identity Case. April

Harrison, Michael and Ross Koppel 2008 Interactive Sociotechnical Analysis – Identifying and Coping with Unintended Consequences of IT Implementation. Chapter in, ***Handbook of Research on Advances in Health Informatics and Electronic Healthcare Applications:*** *Global Adoption and Impact of Information Communication Technologies.* K Khoumbati, ed. Institute of Information & Communication Technology

Ross Koppel, Tosha Wetterneck, Joel Leon Telles, Ben-Tzion Karsh 2008 Workarounds To Barcode Medication Administration Systems: Their Occurrences, Causes, And Threats To Patient Safety. *Journal of American Medical Informatics Association, JAMIA* July/August

Ross Koppel, Charles E. Leonard, A. Russell Localio, Abigail Cohen, Ruthann Auten, Brian L. Strom Identifying and Quantifying Medication Errors: Evaluation Of Rapidly Discontinued Medication Orders Submitted To A Computerized Physician Order Entry System. *Journal of American Medical Informatics Association, JAMIA* July/August

Harrison, Michael, Ross Koppel, and Shirly Bar-Lev 2007 Unintended Consequences of Information Technologies in Health Care - An Interactive Sociotechnical Analysis. *Journal of the American Medical Informatics Association*. September/October Vol 14, No. 5: 542-549

Lori Ann LaRosa, Neil O. Fishman, Ebbing Lautenbach, Ross J. Koppel, Knashawn H. Morales, Darren R. Linkin 2007 Evaluation of Antimicrobial Therapy Orders Circumventing an Antimicrobial Stewardship Program: Investigating the Strategy of "Stealth Dosing." *Infection Control and Hospital Epidemiology*. May, Vol. 28, No. 5:551-556

Ross Koppel 2006 Defending computerized physician order entry from its supporters. *Journal of Managed Care* Vol 12 No. 7, July. pages 369-370

Ross Koppel, Joshua Metlay, Abigail Cohen, Brian Abaluck, Russell Localio, Stephen Kimmel, Brian Strom. 2005 Role of computerized physician order entry systems in facilitating medication errors. *JAMA: J of the Amer Medical Assoc*. Mar 9 V.293; #10;1197-1203

Ross Koppel, A. Russell Localio, Abigail Cohen, Brian L. Strom 2005 Neither panacea nor black box: Responding to three Journal of Biomedical Informatics papers on computerized physician order entry systems. *Journ. of Biomedical Informatics* 30 (4)

Ross Koppel 2005 What Do We Know About Mediation Errors Made Via a CPOE System Vs. Those Made Via Hand-Written Orders? *Journal of Clinical Care* 9 (5) October.

Metlay, Joshua, Abigail Cohen, Sean Hennessy, Stephen Kimmel, Ross Koppel, Daniel Polsky 2005 Medication Safety among Older Adults: Home Based Practice Patterns. Journal of the American Geriatrics Society. 53 (6), 976-982

Ross Koppel 2005 The Invention of the Risk Factor: Insurance Companies and the Creation of Public Health Programs and Modern Medicine. Contemporary Sociology: v34, n5, Sept

Ross Koppel 2005 "Computerized Physician Order Entry Systems: The Right Prescription?" *Leonard Davis Institute for Health Economic Issue Brief*. v10, n5 (March)

Koppel, Ross 2002 Alzheimer's Disease: The Cost To U.S. Businesses In 2002. Washington, D.C. The Alzheimer's Association. (New and revised edition of 1998 publication.)

Koppel, Ross 2002 American Public Policy: Formation and Implementation. Chapter in Using Sociology: An Introduction from a Clinical and Applied Perspective. Third Edition. Roger Straus, Editor. Lanham, MD: Rowman and Littlefield, Publisher. (Note: coauthored earlier version of this chapter in 2nd edition with Thomas Rice.)

Koppel, Ross 2001 Evaluation. Chapter in *Handbook of Clinical Sociology*. Second Edition. John Bruhn and Howard M. Rebach, Editors. NewYork: Plenum Press

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Biographic information (to be read at the committee meeting):

ROSS KOPPEL, PH.D. Good morning. I thank the committee for inviting me and for focusing on HIT safety issues.

I teach at the University of Pennsylvania, and I'm also at Penn's Medical school where I direct research on the causes of medication error. I teach research methods, work and organizations, medical sociology, and statistics. I'm Co-PI of an AHRQ-funded effort to develop a guide to implementing HIT. With colleague at Harvard, I'm researching how EHRs reflect physicians' narratives. I'm incoming chair of AMIA's Evaluation working group, and have several other hats. And in the past few years I've published about 20 articles on HIT.

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STATEMENT: America should commit itself to using EHRs and other forms of HIT. We can do this before the end of this decade if we are willing to apply systematic analysis of patient safety defects and a scientific approach to informatics and usability analyses. Faith-based EHRs won't get us to heaven.

Like everyone else, I want HIT to increase patient safety, care efficiency, treatment quality, savings, and drug ordering guidance. I want HIT to provide coherent structures for tests results and other data and to enable better clinical insight by better visualization of complex data.

Unlike many of my fellow HIT scholars and advocates, however, I've studied the surveys used to guide our current HIT strategy. These surveys explored why doctors and hospitals had not embraced HIT's benefits. The findings pointed to the cost of HIT, to the physicians' resistance – technophobic, hide-bound, even too old – and overwhelmed hospital IT staff, among other user inadequacies. But years of research on HIT pointed elsewhere, so I reviewed the surveys' answer options. The reason these surveys find doctors and hospitals as <u>the problem</u> is because the <u>only</u> answer options were about doctors and hospitals. There were no options to select what researchers such as myself have found are legitimate barriers to voluntary HIT adoption.

The surveys didn't ask:

- Does HIT slow or speed your clinical work?
- Do EHRs present data in helpful ways or do they generate unnecessary cognitive burdens because, for example, data that should be contiguous are displayed on five different screens?

- How many information displays are disarticulated, confusing, or missing key elements?
- Does HIT distract from patient care or improve it?

I could go on. But we'll end with a key question for today:

- How responsive are HIT vendors to acknowledging and repairing defects? And how timely are those defects repaired?

The absence of relevant questions diverts us from understanding the actual HIT needs of clinicians and patients. Now, I'm certain very few of those survey designers were intentionally deceptive. Rather, the restricted options reflect a zeitgeist that says HIT is intrinsically beneficial. Anything that encourages HIT purchases is good for patient safety. Anything that retards it is bad.

With this backdrop, let's review your questions:

What are patient-safety risks that may be introduced inadvertently through the use of electronic health records (EHRs) or other HIT products? Are there specific types of risks that are more common than others?

In my published work and publicly available presentations, I've identified about 80 specific patient safety risks from HIT. These included: inability to see patient's list of current medications, abnormal lab reports in sheep's clothing, drug cancelling routines that triple the dosage, CPOE orders that never appear on the eMAR or are strangely transformed, etc, etc.

If forced to choose general categories, I'd say poor usability and a primary focus on back-office or accounting needs to the detriment of clinical needs, and most are related to clinicians' inability to obtain constructive responses to reports of defects.

On the usability issue, I'm reminded of Human Factors' professor Stephanie Guerlain[1] insight about EHRs. She said if HIT vendors designed a car, you'd have to click on the speedometer icon to see how fast you are going.

What are the causes of those risks?

Many, but my top pick would be a rush to market and a locked-in customer: If a hospital buys a $70 million to $100 million system, and then spends five times that implementing it, they are wed to it for many years. For vendors, getting to market is key, and their desire for market share is engorged by current subsidies and punishments. Extraordinary user switching costs retard adoption of better systems and limit vendors'

[1] http://www.sys.virginia.edu/people/sag.html

motivation to fix problems and or update for the installed base. I know a CMIO who called his hospital "incarcerated by the vendor."

I've got only a few minutes, so here are some specifically patient-safety-related examples (from the many hundreds I receive each year:

- Doses requiring hand conversions of units because the CPOE matches neither the eMAR nor the pharmacy – even though they are from the same vendor
- When entering data on the EHR, the physician clicks "no allergies" and "no known allergies." But the next doctor sees "Multiple Allergies" which everyone knows means "No Allergies." Alas, there are many patients who have multiple allergies. Those patients will also be listed on the EHR as "Multiple Allergies," and thus ignored.
- CPOE systems that accept dose units or drip rates that don't exist or are 1000 times the accepted range.
- For all drugs that involved two elements (which is about 25% or so) the drug order to the outpatient pharmacy was totally garbled. Sometimes word-salad, sometimes it would show a dosage 50 times the dose specified.

What these cases have in common is that the vendors claimed either they never heard of the problem or it was the user's fault. Later they said it would take months to repair, or would be addressed in the next upgrade.

With the garbled drug order problem, CMIOs taped sheets of papers with the names of hundreds of multi-element drugs that needed to be ordered via non-standard procedures.

What are ways to prevent and/or mitigate those risks?

Transparency: Current vendor contractual clauses prohibit clinicians from openly discussing errors they encounter. There are non-disclosure or confidentiality clauses and contractual sanctions that "chill" dialogue and restrict doctors from sending pictures of dangerous HIT screen to colleagues.

Openness and Responsiveness: Medical errors are so terrible, medical costs are so daunting: we all want to a solution. Because HIT holds so much promise, we tend to ignore reports of defects. Instead, we blame users and implementers, rewarding enthusiasm, and punishing whistleblowers. Training more technicians or doctors to use inadequate systems will not only not address these defects, but it will propagate the errors already known to haunt users of today's HIT.

How would you weigh the benefits and risks of using EHRs in patient care?

I think EHRs help patient care and I think they are better than paper. They are also better than carrier pigeons and smoke signals. Our goal, however, must be good and safe HIT. More of the same is not good enough.

How might data on risks best be identified as greater HIT adoption occurs?

Change the culture of silence to one that embraces insights on risks. Demand independent and meaningful evaluation of systems *in situ*. Constant user feedback should be encouraged, not silenced. Constructive responses to risks will both help to identify and correct them.

I don't have time to address the other questions, but allow one last comment.

SUMMARY: HIT is not like any other device. It's not a tool, it's the living core of the organization, it's the information ecosystem. The reason the best EHRs are home gown (like the Marshfield Clinic folks here) is that they evolved with the organization. To improve out-of-the box EHRs, organizations must conduct systematic evaluation, and vendors must listen and respond to clinicians. Analysis of HIT use will show it's not the doctors who are resistant to that evolution, but those calling them resistant.

Thank you.