BIOGRAPHICAL SKETCH

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NAME: Flood, Ann Barry

eRA COMMONS USER NAME (credential, e.g., agency login): ann_flood

POSITION TITLE: President

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
University of Kansas, Lawrence, KS	BA	08/1965	Mathematics and Sociology
Stanford University, Stanford, CA	MA	04/1968	Sociology
Stanford University, Stanford, CA	PHD	01/1977	Sociology (Organizational)
Stanford University, Stanford, CA	NIH training grant	12/1979	Formal Organizational Theory (NIMH)

A. Personal Statement

My role in this STTR will be to facilitate the overall developments and especially to provide guidance to ensure that our device is developed optimally for its intended use and users, i.e., post Phase 2. In particular, I will work with the team developing the EPR resonators and HDR needles to help ensure they are appropriate for all intended users, i.e., the patients, operators, and clinicians. This involves a multi-stage process that begins even in the early stages prior to preclinical and clinical use. I will work especially with Dr. Hassan to ensure that the design and developments of the resonator and needles are consistent with the needs of clinical teams placing and using HDR as well as the oximetry device in patients as well as for maximal comfort and safety of the patient. I will work with Mr. Schreiber and the team at UC to ensure the device software controls and interface for the operators and clinical users are appropriate for its intended use in a clinical radiation oncology setting. Last, I will work with the group at Varian to ensure it is compatible with their HDR application. The developments will assume the operation of Clin-EPR's EPR device and the resonator adapted for HDR will ultimately be done by existing staff and the output will be used by the clinicians responsible for clinical-decision making for the patient. I am confident I can carry out these responsibilities because of my experience and expertise, which I describe below.

I am the President and Co-Owner of Clin-EPR, LLC. I am also currently Professor Emerita at Dartmouth Medical School (Geisel) (since 2015); I had been a tenured Full Professor there since 1996. The relevant expertise and experiences from my academic career are based most fundamentally on my training and experience as a researcher evaluating healthcare teams and healthcare organizations, evaluating factors that impact work performance in professional settings, evaluating the dual roles of patient/shared decision maker, and developing effective tools to improve quality and efficiency in the workplace. My specific qualifications include the experience and expertise gained in my roles, for more than 8 years, as Associate Director for Human Factors and Clinical Studies at the EPR Center at Dartmouth. I was responsible for preparing and supervising staff in obtaining IRB approval (and subsequently in reporting to the IRB and to other monitoring and oversight committees as appropriate) and in conducting clinical studies involving investigational medical devices, quality management systems for engineering changes, and in evaluations of workflow and human factors issues in using medical devices. I directed efforts by external human factors and design consultants as well as regulatory consultants and led the consultant team from Farm Design, Inc., which helped developed an in vivo EPR dosimetry device for non-expert, 'turn-key' use in a largescale radiological emergency setting. I was also responsible for designing, developing, and maintaining the standard methods and the quality management processes at the EPR Center.

My oversight of all the clinical studies for dosimetry (>600 volunteers) as well as the oximetry clinical studies (>40 volunteers) at Dartmouth was preceded by my extensive research and experience in conducting clinical studies and healthcare organizational studies of work performance and technology assessment, evaluating how organizational structures and work processes, as well as explicit policies and standards, can help improve them. These studies were conducted in national samples of hospitals and multiple clinics and branch sites for

clinics. I also chaired the Ph.D. Program and the Postdoctoral Program at the Dartmouth Institute for Health Policy and Clinical Practice (TDI). For approximately ten years, I was (co) editor-in-chief (EIC) for the principal research journal of the association for health services research; in addition to my own work in these areas, I was responsible as EIC for reviewing numerous studies related to work performance.

In 2007, I co-founded Clin-EPR, LLC as the principal owner, President, and as a human factors expert. Harold Swartz, M.D., Ph.D., M.S.P.H. is the other co-founder and serves as Chief Scientific Officer. Dr. Swartz is well-recognized internationally as the founding leader in developing EPR for improving clinical care. Together with our team at Clin-EPR, we have worked to establish clinical studies at several universities and research institutions in the US and internationally, using EPR instruments Clin-EPR has manufactured and serviced. We have leveraged our connections to Dartmouth to participate in several student entrepreneurial projects at Tuck School of Business and medical device engineering projects at Thayer School of Engineering. While we had collaborated with the EPR Center at Dartmouth and the Section of Radiation Oncology at Dartmouth-Hitchcock Medical Center (DHMC), we have decided that it is advantageous to concentrate our studies with the partners we have established at other USA universities, both to avoid any appearance of conflict of interest with our roles at Dartmouth but also because they have a much larger clinical practice and greater experience with clinical studies programs in cancer than we can find at DHMC. We have also networked with several potential manufacturers (since we use Good Clinical Practice guidelines but not GMP conditions in our manufacturing and testing) as well as potential investors. Clin-EPR recently completed a patent application for our novel design of an implantable resonator and coupling system that will enable us to measure oxygen in virtually any solid tumor in humans. We completed a preliminary freedom to operate analysis to help ensure the commercial viability of our product, including the EPR oximetry instrument as well as our new patented design. We are also investigating the best timing to bring on a Chief Operating Officer with experience in managing medical device companies and in bringing in investors.

In 2018 Clin-EPR made the strategic decision to invest in establishing a strong collaborative relationship with them. Accordingly, we have one of our clinical EPR systems at the UC on an indefinite loan there, as we work together to establish a vigorous clinical EPR capability that leverages their EPR expertise and the excellent clinical setting at the UC with our company's capabilities. We therefore have already established relationships with the staff, and they have the facilities ready to carry out the studies and work proposed in this STTR. I am excited to be able to work with this talented team at UC on this very important and innovative work to improve and extend this technology to applications in cervical cancer. This project should make it feasible in the near future for our company to contribute significantly to the care of patients with cancer while also advancing the commercialization of our products.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2015 -	Professor, Emerita, Dartmouth College, Geisel School of Medicine, Radiology, Dartmouth Institute for Health Policy and Clinical Practice (TDI), Community & Family Med, Hanover, NH
2010 - 2018	Associate Director of Human Factors and Clinical Studies, Dartmouth College, Geisel School of Medicine, EPR Center for the Study of Viable Systems at Dartmouth, Hanover, NH
2010 - 2015	Associate Director, Dartmouth College, Geisel School of Medicine, Dart-Dose CMCR, Pilot Studies (Director), Hanover, NH
2007 -	President, Clin-EPR, LLC, Lyme, NH
2002 - 2011	Editor-in-Chief (co), Health Services Research, Chicago, IL
2001 - 2015	Adjunct Professor, Dartmouth College, Sociology, Hanover, NH
1996 - 2015	Professor, Dartmouth College, Geisel School of Medicine, TDI, Community & Family Med, Radiology, Hanover, NH
1994 - 2009	Chair, Doctoral and Postdoc Programs, Dartmouth College, Geisel School of Medicine, Center for the Evaluative Clinical Sciences (CECS, now TDI), Hanover, NH
1991 - 2007	Director, Health Policy Studies, Dartmouth College, Geisel School of Medicine, CECS, Hanover, NH
1991 - 1996	Associate Professor, Dartmouth College, Geisel School of Medicine, CECS, Hanover, NH

1989 - 1990	Health Policy Staff Member (as RWJF Health Policy Fellow), US Senate, Finance Committee, Washington, DC
1987 - 1991	Associate Professor, University of Illinois at Champaign-Urbana (UIUC), Sociology, Medical Humanities and Social Sciences (Medicine), Institute of Government, Community and Public Health, Urbana, IL
1980 - 1987	Assistant Professor, University of Illinois, Sociology, Medical Humanities and Social Sciences Program (Medicine), Urbana, IL

Honors

1965	Graduated with Highest Distinction, Honors in Sociology, University of Kansas
1965	Fellow, Alpha Kappa Delta (honorary fraternity for sociology); Pi Mu Epsilon (honorary fraternity for mathematics)
1965	Phi Beta Kappa, University of Kansas chapter
1986 - 1988	Faculty Fellow, Institute for Govt and Public Affairs UIUC
1986	Visiting Professor, Lanzhou University, College of Medicine, China
1987	Hospital Structure and Performance, Outstanding Academic Book of 1987, Choice (book review journal)
1988 - 1989	Robert Wood Johnson Health Policy Fellow, RWJF (Institute of Medicine [IOM])
1989 - 1990	Visiting Scholar, University of Oxford
1991 - 1994	Member, Board of Trustees, Hospital Research and Educational Trust
1992 - 1999	Member, Advisor Committee for Health Policy Research Fellows Program, RWJF
1992 - 1994	Member, Com. on Ethical, Legal & Clinical Issues involving Women in Clinical Studies, IOM
1994	Winner, Henry Christian Award for Health Services/Epidemiology
1994 - 1996	Member, Pharmacy and Therapeutics Committee, Wellpoint Pharmacy Management (Blue Cross Blue Shield)
1996	Fellow, Association for Health Services Research
1997	Eliot Freidson Award for Best Paper in Medical Sociology, American Sociological Association
2001 - 2006	Member, Institutional Ethics Assessment Task Force, Veterans Administration
2002 - 2004	Member, Panel Study of Medicare and Markets, National Academy of Social Insurance
2011	Emeriti Editor-in-Chief, Health Services Research
2014 - 2017	Executive Committee, ISOTT (International Society for Oxygen Transport to Tissue)
2019 – 2021	Member, National Advisory Com., U. of Washington at Seattle NRSA Postdoctoral Program
2021	Keith G. Provan Distinguished Scholar Award for 2021, presented by the Academy of Management/Health Care Management Division

PATENTS "Implantable resonator system for deep-tissue EPR oximetry with implantable resonator system for deep-tissue EPR oximetry with reduced noise" US Patent No. 11,439,316.

C. Contribution to Science

1. Clinical and human factors issues in clinical oximetry of tissues for improving cancer treatment: From 2010-2018, I served as Associate Director for Clinical Studies and Human Factors at the EPR Center at Dartmouth. Since 2014, I have worked with the EPR oximetry team to evaluate the instrument and have led the regulatory and practical aspects of conducting the clinical studies involving India ink as sensors to assess the level of oxygen in tumor tissues. This work has great clinical importance because EPR oximetry has the potential to directly measure pO_2 in tissue repeatedly and noninvasively (after initially placing the sensor material in the tissue). Low levels of oxygen in cancer tumors (hypoxia) have been well established to be an independent and powerful predictor of tumor responsiveness to cancer therapies including radiation therapy, chemotherapy and surgery. EPR oximetry can also measure whether the tumor is responsive to hyperoxic treatments (such as breathing 100% oxygen for a few minutes). Responsiveness to hyperoxic treatment as well as understanding the baseline hypoxic levels offer important opportunities to personalize treatments, thereby improving outcomes. I have taken the lead to conduct comparative effectiveness studies and a framework to compare clinical oximetry methods. I have taken the lead on

evaluating the human-instrument interface and practical conduct of the studies, presenting and publishing on practical and statistical considerations in the interpretation of the data and the translation of bench-ready instruments into practical medical devices. I have taken a lead to prepare reports of benchmark studies using *in vivo* EPR and materials to obtain FDA approval for investigational use of EPR.

a. Flood AB, Wood VA, Schreiber W, Williams BB, Gallez B, Swartz HM. Guidance to Transfer 'Bench-Ready' Medical Technology into Usual Clinical Practice: Case Study - Sensors and Spectrometer Used in EPR Oximetry. Adv Exp Med Biol. 2018;1072:233-239. PubMed Central PMCID: PMC6126358.
b. Caston RM, Schreiber W, Hou H, Williams BB, Chen EY, Schaner PE, Jarvis LA, Flood AB, Petryakov SV, Kmiec MM, Kuppusamy P, Swartz HM. Development of the Implantable Resonator System for Clinical EPR Oximetry. Cell Biochem Biophys. 2017 Dec;75(3-4):275-283. PubMed Central PMCID: PMC5972368.
c. Vaupel P, Flood AB, Swartz HM. Oxygenation status of malignant tumors versus normal tissues: Critical evaluation and updated data source based on direct measurements with pO_2 microsensors. Appl Magn Res. 2021 52(10):1481-7. https://doi.org/10.1007/s00723-021-01414-2
d. Schaner PE, Williams BB, Chen EY, et al. (including Flood AB). First-in-human study in cancer patients establishing the feasibility of oxygen measurements in tumors using electron paramagnetic resonance with the OxyChip. Front. Oncol. 2021 11(Oct 17) https://doi.org/10.3389/fonc.2021.743256

2. Clinical and human factors issues in biodosimetry for large-scale radiation disasters: In my role as Associate Director, I have supervised the evaluation of human factors in the development of the EPR devices (in vivo tooth dosimetry, in vivo nail dosimetry, and clipped nail dosimetry) for use as a field-deployed point-of- care biodosimetry method to rapidly evaluate up to one million people potentially exposed to life threatening ionizing radiation in a terrorist event or major accident involving radiation. I have taken the lead in developing a comparative effectiveness framework adapted to public disaster healthcare and have reported simulations of the feasibility and timeliness of six major methods for biodosimetry (one of which is EPR in vivo tooth dosimetry). I have been invited to present this work at workshops held by the FDA and NIAID as well as many international conferences on biodosimetry for large scale disasters.

a. Flood AB, Williams BB, Schreiber W, Du G, Wood VA, Kmiec MM, Petryakov SV, Demidenko E, Swartz HM. Advances in in vivo EPR Tooth Biodosimetry: Meeting the targets for initial triage following a large-scale radiation event. Radiat Prot Dosimetry. 2016 Dec;172(1-3):72-80. PubMed Central PMCID: PMC5225975.
b. Flood AB, Ali AN, Boyle HK, Du G, Satinsky VA, Swarts SG, Williams BB, Demidenko E, Schreiber W, Swartz HM. Evaluating the Special Needs of The Military for Radiation Biodosimetry for Tactical Warfare Against Deployed Troops: Comparing Military to Civilian Needs for Biodosimetry Methods. Health Phys. 2016 Aug;111(2):169-82. PubMed Central PMCID: PMC4930006.
c. Flood AB, Boyle HK, Du G, Demidenko E, Nicolalde RJ, Williams BB, Swartz HM. Advances in a framework to compare bio-dosimetry methods for triage in large-scale radiation events. Radiat Prot Dosimetry. 2014 Jun;159(1-4):77-86. PubMed Central PMCID: PMC4067227.
d. Swartz HM, Wilkins RC, Ainsbury E, Port M, Flood AB, Trompier F, Roy L, Swarts SG. What if a major radiation incident happened during a pandemic? Considerations of the impact on biodosimetry. Internat J Radiat Biol. 2021 Nov 17; 1-6 DOI: 10.1080/09553002.2021.2000659 PMID: 34730484

3. Organizational and professional determinants of quality of care in US hospitals: My initial research was part of a major national study of the quality of surgical care in the United States, originally funded by an award from the National Academy of Sciences and then by two major grants from the predecessor of the DHH Agency for Healthcare Research and Quality (AHRQ). It was the first major study of hospital care using a combination of computerized medical records (>600,000 patients in 1224 hospitals) and an intense study of ~10,000 surgical patients in 17 hospitals chosen to be representative of US hospitals. We developed strategies to evaluate quality of care based on outcomes (death and major morbidities after surgery) that led to the development of federal reports of quality indicators of hospitals in the 1980s. I worked with the team studying organizational and professional factors that were expected to influence quality of care. From that work, several publications drew many editorials, comments, and two highly influential papers reported on the influence of having a large volume of surgical cases on achieving better outcomes.

a. Flood AB, Scott WR. Hospital Structure and Performance. Baltimore, MD: Johns Hopkins University Press; 1987.
b. Flood AB, Scott WR, Ewy W. Does practice make perfect? Part I: The relation between hospital volume and outcomes for selected diagnostic categories. Med Care. 1984 Feb;22(2):98-114. PubMed PMID: 6700280.
c. Flood AB, Scott WR, Ewy W, Forrest WH Jr. Effectiveness in professional organizations: the impact of surgeons and surgical staff organizations on the quality of care in hospitals. Health Serv Res. 1982 Winter;17(4):341-66. PubMed Central PMCID: PMC1068694.
d. Nembhard IM, Flood AB, Kimberly JR, Kovner AR, Shortell SM, Zinn JS. Moving organizational theory in health care forward: A discussion with suggestions for critical advancements. Health Care Manage Rev, 2020, 45(1), E1–E12 DOI: 10.1097/HMR.0000000000000271

4. Understanding how financial incentives impact utilization of healthcare: A continuation of my work on how organizations and policies can influence the utilization and quality of healthcare, I studied how financial incentives within an organization and external to it (such as insurance policies) can impact the type and amount of utilization of services patients receive and the quality of their outcomes. The article on 'through the lens' cited below was awarded the ASA's Eliot Freidson award for best paper of the year in medical sociology. This work has also been applied to cancer care (including an examination of the influence of policy on the continuum of cancer care) and to technology assessments of surgical care as well as to evaluating privacy and security issues in the use of electronic medical records.

   a. Flood AB, Fennell ML, Devers KJ. Health reforms as examples of multilevel interventions in cancer care. J Natl Cancer Inst Monogr. 2012 May;2012(44):80-5. PubMed Central PMCID: PMC3482967.
   b. Flood AB, Bott DM, Goodrick E. The promise and pitfalls of explicitly rewarding physicians based on patient insurance. J Ambul Care Manage. 2000 Jan;23(1):55-70. PubMed PMID: 11184896.
   c. Flood AB, Fremont AM, Jin K, Bott DM, Ding J, Parker RC Jr. How do HMOs achieve savings? The effectiveness of one organization's strategies. Health Serv Res. 1998 Apr;33(1):79-99. PubMed Central PMCID: PMC1070248.
   d. Flood AB, Fennell ML. Through the lenses of organizational sociology: the role of organizational theory and research in conceptualizing and examining our health care system. J Health Soc Behav. 1995;Spec No:154-69. PubMed PMID: 7560846.

5. Shared decision making by patients and doctors: My research has also been used to understand decision making by patients, especially in the context of trying to develop effective aids to help patients engage in shared decision making when there are several medically acceptable treatment options available. This work has been influential in both evaluating and improving patient aids as well as contributing to the theoretical understanding of patient decisions.

   a. Partin MR, Nelson D, Flood AB, Friedemann-Sánchez G, Wilt TJ. Who uses decision aids? Subgroup analyses from a randomized controlled effectiveness trial of two prostate cancer screening decision support interventions. Health Expect. 2006 Sep;9(3):285-95. PubMed Central PMCID: PMC5060359.
   b. O'Connor AM, Llewellyn-Thomas HA, Flood AB. Modifying unwarranted variations in health care: shared decision making using patient decision aids. Health Aff (Millwood). 2004;Suppl Variation:VAR63-72. PubMed PMID: 15471770.
   c. Flood AB, Wennberg JE, Nease RF Jr, Fowler FJ Jr, Ding J, Hynes LM. The importance of patient preference in the decision to screen for prostate cancer. Prostate Patient Outcomes Research Team. J Gen Intern Med. 1996 Jun;11(6):342-9. PubMed PMID: 8803740.
   d. Flood AB, Lorence DP, Ding J, McPherson K, Black NA. The role of expectations in patients' reports of post-operative outcomes and improvement following therapy. Med Care. 1993 Nov;31(11):1043-56. PubMed PMID: 7694013.

   Publications: https://www.ncbi.nlm.nih.gov/myncbi/ann.flood.1/cv/477970/