



Published in final edited form as:

J Am Geriatr Soc. 2017 October ; 65(10): 2158–2160. doi:10.1111/jgs.14942.

Network for Investigation of Delirium across the U.S. (NIDUS): Advancing the Field of Delirium with a New Interdisciplinary Research Network

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Conflict of Interest: The authors have no conflicts of interest related to this manuscript and have completed COI disclosure forms.

Author Contributions: DMF participated in the study design and drafted the initial manuscript. SKI conceived the study design and conceptualization, and critical revision of the manuscript. All authors have contributed to the manuscript preparation and final revisions.

Sponsor's Role: The NIDUS Network is supported by the National Institute on Aging, Grant No.R24AG054259 (SKI). The funding agencies had no role and the authors retained full autonomy in the preparation of this manuscript.

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Delirium, a manifestation of brain organ dysfunction, presents acutely with impaired attention and disorganized thinking, and imposes a high degree of caregiver burden. Delirium can occur at any age, but occurs more often in older adults due to their increased vulnerability, affecting over 2.6 million in the U.S. each year (>5 persons every minute). Typically following acute illness, hospitalization, or surgery, delirium often leads to loss of independence, cognitive decline, and increased morbidity and mortality. Moreover, delirium is associated with excess healthcare costs of over \$164 billion per year.^{1,2} Delirium can be difficult to detect and manage, and is receiving increased attention in the medical literature.³⁻⁵

A number of factors, including cognitive impairment, infection, dehydration and psychoactive medications are predictive of delirium (Inouye et al., 2014). In most cases, delirium is multi-factorial, which makes finding effective approaches for prevention and treatment highly challenging, and research studies methodologically complex. Importantly, delirium can be prevented with a multi-dimensional clinical strategy.⁶ Despite its importance, delirium is not well understood and is vastly under-recognized. Fundamental advances in diagnosis and treatment of delirium are lagging. The pathophysiology of delirium remains poorly understood and there are no biomarkers to serve as diagnostic indicators or therapeutic targets.⁷ Although the number of measures for screening and diagnosis of delirium has increased in the past decade, the proportion of patients with unrecognized delirium remains high.^{8,9}

In November 2016, a team of delirium experts led by Sharon K. Inouye, M.D., M.P.H., Professor of Medicine at Harvard Medical School and Director of the Aging Brain Center at Hebrew SeniorLife's Institute for Aging Research (IFAR), were awarded a \$3.7 million grant over five years. This award is the first of its kind from the National Institute on Aging (NIA)/ National Institutes of Health, and is intended to build an interdisciplinary collaborative network of delirium researchers nationally and internationally. Dr. Inouye, along with 12 interdisciplinary experts in delirium research, will create the Network for Investigation of Delirium across the U.S. (NIDUS) and beyond to foster collaboration and accelerate scientific discovery in delirium. NIDUS will unite delirium researchers from 27 organizations across the U.S. in focused collaborative efforts. NIDUS takes an interdisciplinary approach that includes many medical specialties, nursing, social work, rehabilitation, cognitive science, neuroscience, epidemiology, biostatistics, and related fields, and will create a collaborative network to bring new approaches to accelerate scientific discovery in delirium.

NIDUS is comprised of two research cores and three task forces. The *Research Resources and Database Core*, led by Edward Marcantonio, MD, SM, Pratik Pandharipande, MD, and Thomas Trivison, PhD, will develop a database of ongoing delirium studies to encourage

collaboration and secondary analyses of existing data. The *Measurement and Harmonization Core*, led by Richard Jones, ScD and Dale Needham, MD, PhD will develop resources to help researchers choose tools for assessing delirium and delirium severity. The three NIDUS task forces, *Pilots and Innovation*, *Mentorship and Career Development*, and *Dissemination* are further described in Table 1.

The NIDUS network provides structured activities for interdisciplinary delirium researchers, including scientific symposia and delirium research Boot Camps. NIDUS is offering pilot grant opportunities (Table 1), and providing information and resources on delirium, which can be accessed at: <https://deliriumnetwork.org/>. The kick-off for presenting NIDUS to professionals will occur at the American Delirium Society (ADS) meeting in Nashville, TN on June 6, 2017. This will be an opportunity to meet and talk with NIDUS investigators, and to learn first-hand about our exciting opportunities, resources, and activities through the cores and task forces. The ADS meeting is June 4–6, 2017 and registration information is available at: <https://americandeliriumsociety.org/ads-2017>.

Another key activity of NIDUS is the annual delirium research “Boot Camp” where researchers with a passion for delirium research can apply for the 2.5-day intensive training session in delirium research. The Boot Camp is intended for delirium researchers across disciplines—either newly entering the field or changing research directions-- who have previous training in the fundamentals of clinical research, with the goal of enhancing the cadre of trained scientists focusing on delirium. Accepted applicants will be expected to submit a specific research proposal, and will be paired with a NIDUS mentor. The study of delirium is complex and methodologically challenging, and the Boot Camp provides approaches to help address some of these complexities. The Boot Camp will be held November 1–3, 2017 in Boston, MA, and will include interactive training in delirium assessment, mock grant review, individual methodological consultations, and didactics on the latest updates, biomarkers, neuroimaging, electrophysiology, and mixed methods in delirium research. Travel grants are available to selected applicants. The application can be accessed on the NIDUS website at <https://deliriumnetwork.org/>.

We have reached a pivotal moment where the importance of delirium is gaining traction among scientists, clinicians and the general public. Approximately one year ago the iDelirium group and website (www.idelirium.org) were established. iDelirium is a federation of international delirium organizations advocating for delirium with a unified voice, which launched the inaugural World Delirium Day on March 15, 2017. While there is growing awareness of its importance, many large gaps remain in our scientific understanding of delirium and in the implementation of best practices into clinical care. While not directly affiliated, the NIDUS scientific network complements the work of iDelirium by helping address the many gaps and challenges in delirium science, establishing a research infrastructure and databases to increase collaboration among delirium researchers globally, and helping to mentor the next generation of interdisciplinary delirium scientists. The need for additional research on delirium is compelling and urgent. Clinicians and researchers across fields are encouraged to join the broad range of interdisciplinary experts in delirium research as leaders, scientists and innovators. Together, we are working to advance the field

of delirium, with the ultimate goal of improving clinical care for this common and devastating condition.

Acknowledgments

This work is dedicated to the memory of Jane Ann McDowell for her lifelong work in delirium.

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Table 1

NIDUS Cores and Task Forces

CORE or TASK FORCE	ACTIVITIES	LEADERS
1. Research Resource Core	<ul style="list-style-type: none"> Development of database indexing information on all major delirium studies in the U.S. and beyond. 	<u>Leader:</u> Edward Marcantonio, MD, SM <u>Co-leaders:</u> Pratik Pandharipande, MD Thomas Trivison, PhD
2. Measurement and Harmonization Core	<ul style="list-style-type: none"> Web resources for selecting delirium measures Harmonization of delirium measures across studies 	<u>Leader:</u> Richard Jones, ScD <u>Co-leader:</u> Dale M. Needham, MD, PhD
3. Pilots & Innovation	<ul style="list-style-type: none"> Pilot Grants: 2 awards per year, \$50,000 each 	<u>Leader:</u> Thomas Robinson, MD <u>Co-leader:</u> Michael Avidan, MBBCh
4. Mentorship & Career Development	<ul style="list-style-type: none"> Mentor-mentee pairing Delirium Research Boot Camp, Nov 1–3, 2017 Regular webinars for mentees 	<u>Leader:</u> Donna Fick, PhD, MSN, <u>Co-leader:</u> E. Wesley Ely, MD, MPH
5. Dissemination	<ul style="list-style-type: none"> NIDUS Website and Blog Twitter and social media Scientific Symposium at American Delirium Society 	<u>Leader:</u> Andrew Auerbach, MD <u>Co-leader:</u> Jan Busby-Whitehead, MD

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