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Aging, the Medical Subspecialties, and Career Development: Where We Were, Where We Are Going

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Abstract

Historically, the medical subspecialties have not focused on the needs of older patients. This has changed with the implementation of initiatives to integrate geriatrics and aging research into the medical and surgical subspecialties and with the establishment of a home for internal medicine specialists within the annual American Geriatrics Society (AGS) meeting. With the support of AGS, other professional societies, philanthropies, and federal agencies, efforts to integrate geriatrics into the medical and surgical subspecialties have focused largely on training the next generation of physicians and researchers. They have engaged several subspecialties, which have followed parallel paths in integrating geriatrics and aging research. As a result of these combined efforts, the integration of geriatrics and aging research into the medical and surgical subspecialties has seen enormous progress, and topics once considered to be geriatric issues are becoming mainstream issues in medicine. However, this integration remains a work in progress and will need to adapt to changes associated with health care reform.

Introduction

As recently as 20 years ago, the medical and surgical subspecialties were not focused on the needs of older patients. At that time, Drs. William Hazzard and Donna Regenstreif of the John A. Hartford Foundation (JAHF) outlined a vision and launched an initiative for integrating geriatrics and aging research into the subspecialties of Internal Medicine (IM) (later called the T. Franklin Williams Scholars Program), and the late Dr. Dennis W. Jahnigen articulated a vision for and led an analogous JAHF-sponsored effort focused on surgical and related medical specialties.[1, 2] The IM specialties program engaged the breadth of IM subspecialties through their professional societies and realization of this integration vision accelerated in 2006, with the efforts of a small, interdisciplinary group of investigators who established a home for IM specialists within the annual meeting of the American Geriatrics Society (AGS). Since then, many subspecialties have followed parallel paths to integrate geriatrics and aging research (Table 1). With the aging of the U.S. population and the emerging realization by all specialties that care of older adults is central to their spheres of practice, these topics are becoming mainstream issues in IM specialties.

Efforts to integrate geriatrics and aging research into the subspecialties have focused largely on career and curriculum development. Annual AGS meetings and biennial Alumni meetings have included sessions on job searches, mentoring relationships, grant-writing skills, and research

methodologies critical to aging populations, among others. Outside the AGS meetings, the integration of aging research into career development within the medical subspecialties has been supported by the T. Franklin Williams Scholars (TFWS) programs, which were funded by The Atlantic Philanthropies and JAHF, and administered by the Association of Specialty Professors (ASP), part of the Alliance for Academic Internal Medicine (AAIM). Similarly, AGS administered the Dennis W. Jahnigen Scholars Program, which supported career development for surgical and related medical specialists. These efforts are now supported by approximately 15 grants awarded annually by the National Institute on Aging (NIA), through its Grants for Early Medical and Surgical Specialists Transition to Aging Research (GEMSSTAR) program, and by a number of professional societies across IM.

Since its inception in 2002, the Williams Scholars program has represented an investment of just over $10 million, with Williams Scholars garnering approximately $151 million in grant funding from the National Institutes of Health (NIH), and additional funding from foundations (JAHF and The Atlantic Philanthropies) and other federal sources (e.g., Veterans Affairs). The program has received more than 300 applicants and sparked the careers of 99 scholars. Williams Scholars have matured into valued faculty at every level (even full professors and division chiefs) across 12 IM specialties, and they have conducted ground-breaking research in their fields (e.g., connections between impaired mitochondrial fatty acid oxidation and insulin resistance in aging[3] and interventions to prevent infections among nursing home residents[4]). Other Williams Scholars awardees have identified potential therapeutic targets in hypertension-associated left ventricular hypertrophy,[5] explored new research directions in high-impact areas such as venous thromboembolism in older adults following joint replacement,[6] shown efficacy of high-dose influenza vaccine in older adults,[7] promoted antimicrobial stewardship in long-term care facilities,[8] reviewed management of persistent pain in older adults,[9] developed tools to understand pelvic floor dysfunction,[10] predicted toxicity and survival among older adults induction chemotherapy,[11, 12] and conducted randomized controlled trials of interventions against pneumonia.[13] Among the most recent scholars, one is now an NIA Paul Beeson Career Development awardee who has established the prognostic value of frailty in liver transplantation,[14] and another has recently published a paper on the overtreatment of diabetes in older adults with tight glycemic control.[15]

This is the last year that Williams Scholars will be funded through The Atlantic Philanthropies and the JAHF, as The Atlantic Philanthropies are completing their mission and the JAHF is moving into new directions. It is therefore a good time to reflect on the progress made in integrating geriatrics and aging research into the medical subspecialties, particularly with respect to career development. This was the focus of a May 16, 2015 session at the annual AGS meeting.

Progress in Integrating Geriatrics into the Medical Subspecialties

American Academy of Allergy, Asthma, and Immunology (AAAAI)

In 2007, AAAAI formed a task force to explore issues in patient care related to older adults with asthma. This task force has become a standing committee that promotes clinical care, education, and research on asthma and allergy in older adults. Other accomplishments include symposia at the annual AAAAI meeting, the development of a teaching slide set, a wide range of articles on asthma and allergic rhinitis in older adults, the inclusion of geriatrics questions on fellowship in-training examinations, and a patient education brochure targeted to older adults with asthma. With support from an ASP Small Project grant, AAAAI has developed an online curriculum on allergy and immunology in older adults, piloted implementation of the curriculum into select fellowship programs, and released a final version to all fellowship programs in allergy and immunology.

American College of Cardiology (ACC)

ACC has established a Geriatric Cardiology Section (GCS) that now includes approximately 2,000 members and more than 400 fellows. The GCS has several working groups focused on advocacy and public policy, palliative care, communications, education, international activities, early career physicians (including fellows-in-training), and research related to geriatrics and cardiology. These groups participate in monthly calls with the GCS Leadership Council and hold face-to-face meetings at the annual conferences of ACC and the American Heart Association. ASP supported a cardiology fellows' retreat that led to the establishment of a Fellows-in-Training Working Group, a clinical care project that allows fellows to gain experience in conducting online assessments of older patients with cardiovascular disease (CVD) and the development of a pilot study designed to set the stage for a future Geriatric Cardiology Research

Network. In addition, with support from the JAHF, the GCS and ACC have developed a curriculum, Essentials of Cardiovascular Care for Older Adults (ECCOA), which is available on the ACC website (www.acc.org/eccoa) and is in the process of being translated into Chinese. The ACC GCS published 2 seminal papers in ACC's flagship journal, the *Journal of the American College of Cardiology*.[16, 17] In collaboration with AGS and supported by a U-13 collaborative conference grant from NIA (U13 AG047008), ACC's GCS developed a conference series addressing key issues in geriatric cardiology. Members of the ACC GCS Leadership Committee are also working to formally incorporate training in geriatric cardiology into the ACC's Core Cardiovascular Training Statement (CoCATS).

American College of Rheumatology (ACR)

With support from an ASP Small Project Award, ACR has developed and disseminated self-assessment questions focused on geriatric conditions in musculoskeletal health. These questions, which are available online, are widely used and have become part of a board of self-assessment and preparatory tools. To reinvigorate its Geriatrics Rheumatology Special Interest Group, a proposal has been developed focusing on evaluating key gaps in clinical practice and research, understanding and addressing the barriers to achieving successful careers in aging and rheumatology, and planning symposia to bring in speakers who normally do not attend meetings in rheumatology. ACR also has a Committee on Research, which includes a subcommittee focused on early careers, and it is working to increase awareness of its activities to integrate geriatrics and rheumatology. ACR invited an NIA representative, Dr. Susan Zieman, to its Rheumatology Research Workshop, which served to promote GEMSSTAR and focus on career development for junior faculty.

American Diabetes Association (ADA)

Unlike many other professional societies, ADA is a large, diverse organization that includes professionals, patients with diabetes, and their families. The Older Adults Working Group of ADA, which has been in place for several years, has promoted the acceleration of several activities. Among these is an ADA consensus conference, organized by ADA and supported by a JAHF ASP Small Project Grant. That conference led to the joint publication of clinical recommendations for improving care among older patients.[18] These recommendations have now

been incorporated into the annual update published by ADA: *Standards of Medical Care in Diabetes* (American Diabetes Association, in Diabetes Care). A workshop, supported by ADA and NIA, on diabetes and cardiovascular disease in older adults led to a 2014 publication in *Diabetes*.[19] The Older Adults Working Group is also developing a position statement on diabetes in long-term care, given the many challenges for patients in this setting who often are transferred from acute hospitals on complex insulin regimens. In addition, the ADA Academy, a series of Grand Rounds programs focused on the latest evidence-based research related to diabetes prevention and management, includes Diabetes in Older Adults as one of five current topics. ADA has also developed a Diabetes and the Older Adults Self-Assessment Program targeted to the diverse group of health professionals who work with older adults.

American Society of Clinical Oncology (ASCO)

ASCO began its integration of aging components with the development of geriatric oncology fellowships in collaboration with the JAHF. This collaboration spurred the development of programmatic integration throughout the Society's annual meeting, with inclusion of geriatric oncology in all tracks, a clinical science symposium dedicated to geriatrics research, an extended education session focused on integrating geriatric oncology into practice, and the B.J. Kennedy Award and Lecture for scientific excellence in geriatric oncology. Additional educational resources are available through ASCO University, ASCO's online learning platform, which features a curriculum in geriatric oncology, and in ASCO's publications, including the Special Series on Geriatrics in the *Journal of Clinical Oncology* and a monthly geriatric oncology section in *The ASCO Post*. The ASCO Geriatric Oncology Special Interest Group supports broad-based efforts across ASCO; this group is currently undertaking a project to digitize and centralize geriatric oncology tools and educational resources. Additionally, ASCO's patient website, Cancer.Net, has a section dedicated to geriatric oncology. ASCO advocates for advancement of research benefitting the older population with cancer, including a recently published manuscript "Advancing the Evidence Base for Treating Older Adults with Cancer." Outside of ASCO, the Cancer and Aging Research Group provides a forum for mentoring and collaboration and holds NIA-supported meetings on research methodology, and the *Journal of Geriatric Oncology* is in its sixth year, with a growing impact factor.

American Society of Hematology (ASH)

Until recently, there has been little formal activity to integrate geriatrics and aging research into hematology. However, the Special Interest Group in Hematology and Aging, lobbied the ASH Executive Committee to promote attention to aging-related issues at ASH with an emphasis on the missions of research and education. With encouragement from the Executive Committee, the Special Interest Group successfully applied for a Scientific Workshop focused on hematology and aging. Held in December 2014, this workshop convened more than 300 participants and explored new research related to stem cells, aging, and disease pathogenesis; preclinical models and clinical implications of the biology of aging; aging phenotypes linking clinical observations with biologic mechanisms; and funding opportunities from NIA and the National Heart, Lung, and Blood Institute. This workshop and other Interest Group efforts have stimulated further interest in aging and hematology and the inclusion of aging experts in several ASH committees. Several of these experts have been recipients of the GEMSSTAR, T. Franklin Williams Scholars awards, or Paul B. Beeson Career Development Awards in aging research.

American Society of Nephrology (ASN)

In 2008, the ASN offered a 2-day course in geriatric nephrology for its membership and this course has become a standard offering in the ASN's annual meeting program. In 2009, ASN approved the formation of the Geriatric Nephrology Advisory Group (GNAG) which has spearheaded a number of initiatives to integrate geriatrics into the field of nephrology. In addition to updating the ASN's Geriatric Nephrology Pre-Course, key ASP-supported initiatives of this group include the development and maintenance of an online geriatric nephrology curriculum accessible through the ASN website, collaboration with other professional societies to conduct a landmark workshop on supportive care for patients with kidney disease, conducting a workshop to support teaching of communication skills needed for advance care planning for junior faculty members in nephrology, development of an online video series titled "Nephrology Rounds" focusing on the relevance of geriatrics to the care of patients with kidney disease, and establishment of visiting professor and small grants programs to support clinical care, teaching, and research in geriatric nephrology. In addition, the Nephrology Self-Assessment Program has a dedicated geriatric edition.

Infectious Diseases Society of America (IDSA)

The field of infectious diseases has had the highest number of Williams Scholars (14 scholars), compared with other subspecialties and a number of additional GEMSSTAR recipients. Examples of critical discoveries made by these scholars include the areas of immune senescence,[20] influenza vaccine efficacy,[7] antibiotic stewardship,[8] and infections in older adults including nursing home residents.[13, 21] Since 2003, IDSA has held an annual interest group meeting on infection in older adults, and it has included aging and infection as a topic at Fellows Day symposia during its annual meetings. In addition, IDSA has developed and updated guidelines on fever and infection in long-term care residents (http://cid.oxfordjournals.org/content/48/2/149.full.pdf+html). The Association also has received small grants from the JAHF to hold a fellowship survey and symposium and to develop a website on nursing home infections. Williams Scholars awardees have developed guidelines to revolutionize the approach to infection control and prevention within long-term care settings as well as developing surveillance criteria to define infections within these settings.[23, 24]

Society of General Internal Medicine (SGIM)

ASP support has had tremendous impact in catalyzing and sustaining geriatric initiatives in SGIM. The most visible and enduring accomplishment is the ongoing Distinguished Professor of Geriatrics series, which is now in its twelfth year and has been copied by other groups in general medicine, including those focused on women's health and cancer research. ASP support has also allowed SGIM to offer travel awards to trainees focused in geriatrics, as well as supporting walk rounds for posters focused in geriatrics at every annual meeting. With ASP support, SGIM held a retreat in 2012 to generate a research agenda focused on geriatric topics in general medicine. SGIM also held a geriatrics symposium in 2014, leading to the publication of six articles in the *Journal of General Internal Medicine* on topics related to the interface between general medicine and geriatrics. ASP support also has promoted the development of educational tools to assess competencies in geriatric medicine among general medicine residents and the broad dissemination of this toolkit to improve patient care and obtain feedback data. SGIM has focused on care transitions between nursing homes and ambulatory providers with a retreat focused on developing a checklist and an educational guide of best practices for care transitions.

Society of Hospital Medicine (SHM)

Since 2011, SHM has facilitated career development for hospitalists interested in geriatrics by supporting early-career aging research through the GEMSSTAR and T. Franklin Williams Scholars programs. SHM also has focused on efforts to improve end-of-life care, for example through collaboration with the Hastings Center to develop educational resources including user tool kits, implementation guides, and research support. In addition, SHM has focused on patient care through its Acute Care for Older Persons project, a series of interviews with 17 stakeholder organizations to identify unanswered questions and research priorities. This project, which has led to publications in the *Journal of General Internal Medicine* and the *Journal of Hospital Medicine*, has identified priorities in the areas of advanced care planning, care transition, dementia, depression, medical management, physical function, surgery, medical care, and geriatrics training. Results from the project also were presented at the 2014 meetings of SHM, AGS, and the Gerontological Society of America.

Looking Ahead: Opportunities

NIA

NIA furthers its mission to improve the health and well-being of older Americans, in part by supporting and conducting research on aging processes and physiologic changes that affect vulnerability to and management of disease, the effects of the processes underlying age-related diseases, and age-associated complexities such as comorbidity, polypharmacy, and geriatric syndromes such as frailty. Like other Institutes at NIH, and like the research community in general, the NIA is undergoing a philosophical shift from a disease-specific focus to a collaborative, problem-based one. Specific priorities and interests are outlined in NIA's Strategic Directions (http://www.nia.nih.gov/about/living-long-well-21st-century-strategic-directions-research-aging), which was developed through extensive communication within NIA and with the research community.

NIA also furthers its mission by training and developing highly skilled researchers and clinician-scientists. Funding opportunities are available at various time points in a research career and can help particularly with the challenges associated with transitioning to independence. Although Williams Scholars and the analogous JAHF-sponsored process in the surgical specialties (Dennis W. Jahnigen Scholars) funding is ending, GEMSSTAR (http://www.nia.nih.gov/research/dgcg/grants-early-medical-surgical-specialists-transition-aging-research-gemsstar), which was initiated in 2010 and is co-funded by NIA and several other partners, represents a unique funding opportunity targeting early-career physician-scientists focused on aging research in the specialties. These annual awards, which combine a small, 2-year NIA-funded research project (R03) and a professional development plan funded by other sources such as specialty society partners, continue to gain popularity, and several awardees have successfully garnered subsequent K awards, including the NIA Beeson Award and R01s. A biennial GEMSSTAR conference series, launched via an NIA U13 conference grant to the AGS, convenes all past and current GEMSSTAR awardees with several past Williams and Jahnigen scholars as mentors. Each conference includes sessions on a topic in aging research, mentoring, and career development, along with a poster session and an opportunity to interact with NIA and NIH staff and leaders in specialty aging research. These conferences, as well as Williams and Jahnigen activities at AGS (such as the session on Medical Subspecialties) and resultant mentorship, have been integral to the success of the Williams, Jahnigen, and GEMSSTAR

programs. Together, these activities remain the most supportive mechanisms for reaching out to the medical and surgical specialties. Mentored career development awards, such as the K08 and K23 mechanisms (including Beeson awards), are also available, as well as the underused K99/R00 Pathway to Independence award. For investigator-initiated awards such as the R03 Small Research Grant, the R21 Exploratory/Developmental Research Grant, and the R01 independent Research Project Grant, special consideration, in the form of percentage points added to the priority score, is given to new and early-stage investigators. Other NIA-supported resources include longitudinal cohorts, clinical trials, large databases, online resources, Older Adults Independence Centers (Pepper Centers), and the NIA research blog, *Inside NIA*. Sample federal resources are listed in Table 2. Non-federal opportunities are available from AGS, the Gerontological Society of America, the American Federation for Aging Research, and others.

In addition to growing the GEMSSTAR program, NIA meets annually with the leadership of professional societies to communicate on research priorities and to assist in implementing interest groups and sections in geriatrics and aging research. However, investigators are also encouraged to keep society leadership informed of aging-related research, clinical and training developments, and needs in their fields. NIA also encourages researchers to contact staff to discuss ideas for workshops and research projects. The Institute offers several specific infrastructure grants (R24) to build communities that will advance the science of aging and geriatrics around a particular problem (i.e., delirium, HIV in aging, and multiple chronic conditions), and it welcomes input for similar collaborative resource-building initiatives for the future. Spearheaded by NIA staff, the NIH has recently launched a trans-NIH interest group on aging, the GeroScience Interest Group, and now is considering the establishment of a clinically focused, trans-NIH interest group in aging and geriatrics. NIA is also interested in augmenting its cadre of reviewers with expertise in aging research to serve on review committees for the GEMSSTAR program and for NIA-assigned applications and aging-related applications in general. The NIH Center for Scientific Review has launched a program (http://public.csr.nih.gov/ReviewerResources/BecomeAReviewer/ECR/Pages/default.aspx) to help early-stage investigators gain experience as reviewers.

The John A. Hartford Foundation (JAHF)

Like other funders, the JAHF has historically funded aging–focused faculty development efforts in siloed programs in the fields of medicine, nursing, and social work. However, congruent with its new strategic vision to improve care for older adults, the Foundation now aims to bring together investigators, educators, and clinicians from across these disciplines to enhance the way care is delivered to older Americans. Building on the ongoing work detailed in this article, a new initiative – the Hartford Change AGEnts – was launched in 2013 to provide the skills, tools, and resources to effect changes in health care through offerings such as an online platform, a small grants program, and training institutes. The program was successful in engaging and assisting leaders in aging research and practice. Concluding at the end of 2016, the initiative included a number of subspecialists who desired to contribute to real and sustained change in the care of our aging society. Additional efforts to support T. Franklin Williams Scholars and other subspecialists will continue through JAHF co-funding of the NIA U13 conference series mentioned in the previous section. The JAHF is also engaging subspecialists in its three new priority areas: age-friendly hospitals/health systems, end-of-life and serious illness care, and family caregiving. For example, cardiologists and oncologists are actively engaged in the development, testing, and dissemination of models of care that align clinical decisions with patient health outcome goals and preferences.

Conclusion: Thoughts from Dr. William Hazzard

As demonstrated by subspecialty sections within AGS and the work described here, much progress has been made in integrating geriatrics and aging research into the subspecialties under the umbrella of AAIM, The Atlantic Philanthropies, and the JAHF. However, The Atlantic Philanthropies is completing its mission in 2015, and the JAHF is pursuing new directions, especially as related to the preparation of the workforce required to meet the health care needs of the aging U.S. population. Moreover, despite the efforts of SGIM and SHM in advocating for the inclusion of geriatrics within general internal medicine, these closely related fields are not fully integrated. Thus progress in merging general internal medicine, hospital medicine, the medical subspecialties, and geriatrics remains a work in progress in a time of uncertain funding for all of these disciplines and especially research and training in academic centers.

Moreover, efforts to integrate geriatrics and aging research into the subspecialties are also being deeply affected by the process of health care reform, especially since the passage of the Affordable Care Act (ACA), in which increasing safety, especially in the hospital and notably with respect to iatrogenic complications in the care of elderly patients, is a centerpiece of the movement. Efforts are underway not only to increase safety at the hospital, but also to change the focus of care away from the hospital to post-acute care and primary care practices. Under the auspices of the Center for Medicare and Medicaid Innovation (CMMI) under the ACA, emphasis (and payment) will shift from the quantity of care provided (notably of high cost, procedure-based care in a fee-for-service model) to supporting measures reflecting the value of care to each patient at the center of attention, often in a multidisciplinary team-based fashion. In this context, the subspecialties will be needed, but the successful subspecialists of the future will be those who are more aware of where patients receive their care, offer better care of older patients in a variety of settings, and work in teams. Thus “people skills” and team-building skills, which are often not specified in the review criteria for extramural grant applications or promotion of faculty, will be prized by funding agencies in grant review and by institutions as they consider faculty promotions and compensation for faculty. Subspecialties will have to account for these skills as they consider how they will train future specialists and meet the needs of the most rapidly growing and vulnerable population needing care: older adults.

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Conflict of Interest

Elements of Financial/Personal Conflicts	Author 1 AH		Author 2 KH		Author 3 LM		Author 4 FM	
	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		X	X			x		x
Grants/Funds	X		X		x			x
Honoraria		X		X		x		x
Speaker Forum		X		X		x		x
Consultant	X			X		x		x
Stocks		X		X		x		x
Royalties		X	X			x		x
Expert Testimony		X		X		x		x
Board Member	X			X		x		x

Patents		X		X		x		x
Personal Relationship		X		X		x		x

Elements of Financial/Personal Conflicts	**Author 5 ME**		**Author 6 JH**		**Author 7 WH**		**Author 8 KS**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Employment or Affiliation		x		x		x		**X**
Grants/Funds		x		x		x	X	
Honoraria		x		x		x		X
Speaker Forum		x		x		x		X
Consultant		x		x		x		X
Stocks		x		x		x		X
Royalties		x		x		x		X
Expert Testimony		x		x		x		X
Board Member		x		x		x		X
Patents		x		x		x		X
Personal Relationship		x		x		x		X

Elements of Financial/Personal Conflicts	Author 9 HK		Author 10 SJL		Author 11 UEM		Author 12 MWR	
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Employment or Affiliation		**X**		x		X (I am a VA employee)		X
Grants/Funds	X		x		X		X	
Honoraria		X		x		X		X
Speaker Forum		X		x		X		X
Consultant		X		x		X		X
Stocks		X		x		X		X
Royalties	X			x		X		X
Expert Testimony		X		x		X		X
Board Member		X		x		X		X
Patents		X		x		X		X
Personal Relationship		X		x		X		X

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	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		x	X			x		**X**
Grants/Funds		x	X			x		X
Honoraria		x		X		x		X
Speaker Forum		x		X		x		X
Consultant		x		X		x		X
Stocks		x		X		x		X
Royalties		x		X		x		X
Expert Testimony		x		X		x		X
Board Member		x		X		x		X
Patents		x		X		x		X
Personal Relationship		x		X		x		X

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Employment or Affiliation		**X**		X				
Grants/Funds	X			X				

Honoraria		X		X				
Speaker Forum		X		X				
Consultant		X		X				
Stocks		X		X				
Royalties		X		X				
Expert Testimony		X		X				
Board Member		X		X				
Patents		X		X				
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SZ is affiliated with the National Institute on Aging and contributed to the concept and design and preparation of the paper. ME and RW are affiliated with The John A. Hartford Foundation and contributed to the preparation of the paper.

References

1. Katz PR, Burton JR, Drach GW, et al. The Jahnigen scholars program: a model for faculty career development. *Journal of the American Geriatrics Society.* 2009;57:2324-2327.

2. A statement of principles: toward improved care of older patients in surgical and medical specialties. *Journal of the American Geriatrics Society.* 2000;48:699-701.

3. Nguyen D, Samson SL, Reddy VT, Gonzalez EV, Sekhar RV. Impaired mitochondrial fatty acid oxidation and insulin resistance in aging: novel protective role of glutathione. *Aging Cell.* 2013;12:415-425.

4. Mody L, Krein SL, Saint SK, et al. A targeted infection prevention intervention in nursing home residents with indwelling devices: a randomized clinical trial. *JAMA internal medicine.* 2015;175:714-723.

5. Blanton RM, Takimoto E, Aronovitz M, et al. Mutation of the protein kinase I alpha leucine zipper domain produces hypertension and progressive left ventricular hypertrophy: a novel mouse model of age-dependent hypertensive heart disease. *The journals of gerontology.* 2013;68:1351-1355.

6. Kapoor A, Chew P, Silliman RA, et al. Venous thromboembolism after joint replacement in older male veterans with comorbidity. *Journal of the American Geriatrics Society.* 2013;61:590-601.

7. DiazGranados CA, Dunning AJ, Kimmel M, et al. Efficacy of high-dose versus standard-dose influenza vaccine in older adults. *The New England journal of medicine.* 2014;371:635-645.

8. Jump RL, Olds DM, Seifi N, et al. Effective antimicrobial stewardship in a long-term care facility through an infectious disease consultation service: keeping a LID on antibiotic use. *Infect Control Hosp Epidemiol.* 2012;33:1185-1192.

9. Makris UE, Abrams RC, Gurland B, Reid MC. Management of persistent pain in the older patient: a clinical review. *JAMA.* 2014;312:825-836.

10. Huang AJ, Gregorich SE, Kuppermann M, et al. Day-to-Day Impact of Vaginal Aging questionnaire: a multidimensional measure of the impact of vaginal symptoms on functioning and well-being in postmenopausal women. *Menopause.* 2015;22:144-154.

11. Hurria A, Togawa K, Mohile SG, et al. Predicting chemotherapy toxicity in older adults with cancer: a prospective multicenter study. *J Clin Oncol.* 2011;29:3457-3465.

12. Klepin HD, Geiger AM, Tooze JA, et al. Geriatric assessment predicts survival for older adults receiving induction chemotherapy for acute myelogenous leukemia. *Blood.* 2013;121:4287-4294.

13. Juthani-Mehta M, Van Ness PH, McGloin J, et al. A cluster-randomized controlled trial of a multicomponent intervention protocol for pneumonia prevention among nursing home elders. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America.* 2015;60:849-857.

14. Lai JC, Feng S, Terrault NA, Lizaola B, Hayssen H, Covinsky K. Frailty predicts waitlist mortality in liver transplant candidates. *American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons.* 2014;14:1870-1879.

15. Lipska KJ, Ross JS, Miao Y, Shah ND, Lee SJ, Steinman MA. Potential overtreatment of diabetes mellitus in older adults with tight glycemic control. *JAMA internal medicine.* 2015;175:356-362.

16. Bell SP, Orr NM, Dodson JA, et al. What to Expect From the Evolving Field of Geriatric Cardiology. *Journal of the American College of Cardiology.* 2015;66:1286-1299.

17. Forman DE, Rich MW, Alexander KP, et al. Cardiac care for older adults. Time for a new paradigm. *Journal of the American College of Cardiology.* 2011;57:1801-1810.

18. Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. *Diabetes care.* 2012;35:2650-2664.

19. Halter JB, Musi N, McFarland Horne F, et al. Diabetes and cardiovascular disease in older adults: current status and future directions. *Diabetes.* 2014;63:2578-2589.

20. Panda A, Qian F, Mohanty S, et al. Age-associated decrease in TLR function in primary human dendritic cells predicts influenza vaccine response. *Journal of immunology.* 2010;184:2518-2527.

21. Mody L, Juthani-Mehta M. Urinary tract infections in older women: a clinical review. *JAMA.* 2014;311:844-854.

22. High KP, Brennan-Ing M, Clifford DB, et al. HIV and aging: state of knowledge and areas of critical need for research. A report to the NIH Office of AIDS Research by the HIV and Aging Working Group. *J Acquir Immune Defic Syndr.* 2012;60 Suppl 1:S1-18.

23. Stone ND, Ashraf MS, Calder J, et al. Surveillance definitions of infections in long-term care facilities: revisiting the McGeer criteria. *Infect Control Hosp Epidemiol.* 2012;33:965-977.

24. Smith PW, Bennett G, Bradley S, et al. SHEA/APIC guideline: infection prevention and control in the long-term care facility, July 2008. *Infect Control Hosp Epidemiol.* 2008;29:785-814.

Table 1. Progress in Integrating Geriatrics into the Subspecialties of Internal Medicine.

	AAAAI	ACC	ACCP	ADA	AGA	ACR	ASH	ASN	ASCO	IDSA	SGIM	SHM
Involves aging component into other aspects of the society	++++	++++	++	+++	+++	++++	++++	++++	++++	++++	++++	++++
T. Franklin Williams Scholars partner	++++	++++	+	++++	++	++++	++	++++	++	++++	+	++++
Current aging component	++++	++++	+	++++	+++	+++	+++	++++	++++	++++	++++	++++
Has competed for small project grant	++++	++++	+	++++	++	++++	++	++++	++++	+++	++++	++++
Has held meeting to set research agenda	+++	++++	+++	++++	++	++	+++	++++	++++	+++	+++	++++
Geriatrics section in journal	++	+++	++	++++	+++	++	++	+++	++++	+++	+++	+++
Fellowship curriculum in aging	++++	++++	N/A	+++	++++	++++	N/A	++++	++++	++	N/A	N/A
CME material in aging	+++	++++	+++	+++	+++	++	+++	++++	++++	+++	+++	+++
Geriatric content in training examinations	++	++++	N/A	+++	++	++	+++	++++	+++	++	+++	N/A

Scale: Four plusses note the farthest advances; one plus indicates that efforts have just begun.

AAAAI, American Academy of Allergy, Asthma, and Immunology; ACC, American College of Cardiology; ACCP, American College of Chest Physicians; ADA, American Diabetes Association; AGA, American Gastroenterological Association; ACR, American College of Rheumatology; ASH, American Society of Hematology; ASN, American Society of Nephrology; ASCO, American Society of Clinical Oncology; CME, continuing medical education; IDSA, Infectious Diseases Society of American; N/A, not applicable; SGIM, Society of General Internal Medicine; SHM, Society of Hospital Medicine

Table 2. Federal Resources for Researchers in Geriatrics and Aging

Resource	Website
NIA Strategic Directions	http://www.nia.nih.gov/about/living-long-well-21st-century-strategic-directions-research-aging
GEMSSTAR	http://www.nia.nih.gov/research/dgcg/grants-early-medical-surgical-specialists-transition-aging-research-gemsstar
Online resources, including standardized toolkits	http://www.nia.nih.gov/research/scientific-resources
Inside NIA, a blog for researchers	http://www.nia.nih.gov/research/blog
Claude D. Pepper Older American Independence Centers	http://www.nia.nih.gov/research/dgcg/claude-d-pepper-older-american-independence-centers-oaics
Edward R. Roybal Centers for Translation Research in the Behavioral and Social Sciences of Aging	http://www.nia.nih.gov/research/dbsr/edward-r-roybal-centers-translation-research-behavioral-and-social-sciences-aging
Resource Centers for Minority Aging Research	http://www.nia.nih.gov/research/dbsr/resource-centers-minority-aging-research-rcmar
Geriatric Research Education and Clinical Centers	http://www.va.gov/grecc/