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**The International Ten-Day Teaching Seminar on Cardiovascular Epidemiology and Prevention**

**The International Seminar on Epidemiology and Prevention of Cardiovascular Diseases**

**Report of the 51st Seminar (INTLSEM2020)**

**August 31, 2021**

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**Background**

The International Ten-Day Teaching Seminar on Cardiovascular Epidemiology and Prevention (International Seminar) was founded in 1968 by Ancel Keys and Jeremiah Stamler and Seminar Co-Directors Geoffrey Rose and Richard Remington. It has been convened annually through the 50th Seminar in Goa, India, in 2018. Its mission has been and remains to build a global cadre of population health researchers, across geopolitical and disciplinary boundaries, to prevent cardiovascular diseases (CVD) and promote cardiovascular health (CVH). The Seminar has been hosted in 40 countries and has provided a unique learning experience for more than 1500 Fellows from all regions of the world.

Its pedagogic design balances didactic with group- and self-learning experiences in a two-week residential academic retreat. In this way, the Basic Seminar introduces selected early career health professionals (the ‘Fellows’) to epidemiologic and statistical concepts and methods and their application to cardiovascular research, policy, and practice. The experience includes small-group preparation of hypothetical research proposals to demonstrate distinctions among the major epidemiologic approaches to a single assigned research question.

In this special setting, a new cohort of Fellows each year joins a distinguished and largely continuous international Faculty, forming a ‘community of scholars’. All participate fully in the academic and social program, including meals and extra-curricular activities. In this unique way networks are formed among Fellows and Faculty that may have lasting impact on the Fellows’ further career development and professional achievements.

Exceptionally, on three occasions this Basic model has been modified to convene more experienced researchers (including some previous Seminar Fellows) in an advanced format: Their focus has been on research proposals in cardiovascular epidemiology with the intent of their full implementation. These Advanced Seminars have addressed the relation of population- and individual-level dietary sodium intake and blood pressure (the INTERSALT Study); the relation of low total cholesterol levels to cancer risk; and the relation of blood glucose levels to incident coronary heart disease.

While the Advanced Seminars have been highly successful, the Basic program has generally taken precedence due to the high continuing demand for this level of training. For the 51st Seminar, however, it was decided to return on this occasion to the Advanced Seminar model and focus on a current major global gap in cardiovascular epidemiologic research by addressing the recently introduced concept of ideal cardiovascular health (CVH). The Seminar would take place for the first time in the US, at the Northwestern University Feinberg School of Medicine, in Chicago. This report addresses the Aims, Fellows, Faculty, Program, and Products of the 51st International Seminar.

**Aims**

The aims of the 51st Seminar, in keeping with the history described above, were presented in the Conference Plan submitted to the National Heart, Lung, and Blood Institute, NIH, as follows:

**Specific Aim 1:** To develop 1-4 preliminary proposals for multi-national collaborative population research projects on the broad topic of promotion and preservation of ideal cardiovascular health (CVH) throughout the lifespan, from the beginning of life.

**Specific Aim 2:** To demonstrate the Advanced Seminar model of The International Seminar on Cardiovascular Epidemiology and Prevention (The International Seminar) as a unique and powerful vehicle for fostering and accelerating development of such critical and timely research proposals and regional capacity with both local and global significance.

**Specific Aim 3:** To foster and concretely advance a culture of multi-national collaborative research as a vital strategy to address challenges and opportunities for improving global cardiovascular health in the 21st Century.

The Conclusion of this Report summarizes our assessment of achievement of these aims.

**Fellows**

A previous report (Report on Participant Recruitment and Selection – 22 March 2020) summarized early steps in the Seminar process – expected size and composition, plan for publicizing the Seminar and selecting Fellows, implementation of the plan, and composition of the initially selected 24 Fellows from 115 applicants. Due to uncertainties whether the just-appearing coronavirus pandemic might disrupt attendance by an unusually large number of candidates, 14 fully qualified Alternates (versus the usual 2-3) were selected as well to insure a full, geographically diverse cohort of Fellows.

The 24 selected Fellows represented all 6 WHO Regions and 17 countries; 5 International Seminar and 8 WHF Emerging Leaders Fellows were included. Two-thirds were women; nearly all were 30-49 years of age; and their primary organization/institution was a research institute (8), academia (7), a hospital (5), or a public/community health organization (4).

Concerns and events surrounding the emerging COVID-19 pandemic forced postponement of the Seminar from 2020 to 2021 and, a year later, the decision to cancel the in-person component of the 2021 Seminar in Chicago and substitute a virtual program. Ultimately 33 Fellows and Alternates (thereafter considered equivalent to the previously designated Fellows) elected to continue and commit fully to the program.

Figure 1 identifies these participants and summarizes their demographic composition as a group. On the model of previous Seminars, 4 groups of 8-9 Fellows were formed, each with broad geographic representation. For each group a Team Leader was selected by the Director on the basis of prior training and experience as shown in their application materials. Each served as a contact point to coordinate communications within the Team. Together the Team Leaders also provided critical liaison with the Director throughout the program.

The 33 Fellows were diverse in gender, age, and race as shown for those who elected to report this optional information. They represented all 6 WHO Regions, all 7 World Bank Geopolitical Regions, and all 4 World Bank Income Regions – 2 Low-Income and 9-12 Fellows each in Low-Middle, High-Middle, and High-Income Countries.

Initial work within the Teams proved challenging owing to their wide geographic and time zone distribution. Three technologies were utilized for distinct functions – Microsoft Teams for Team communications, Google Drive for document sharing, and Zoom for meetings. Of the 2 main tasks for the Fellows, first was to focus on the 7 CVH metrics and how to standardize their definition and measurement in population studies of CVH generally. This work was done by individuals or small clusters of Fellows across the 4 Teams.

Once the task of proposal development became the priority, Teams were merged into 2 Groups, each of which would create a proposal independently – Teams 1 and 3 forming Group A and Teams 2 and 4 forming Group B. The 2 corresponding Team Leaders became Co-Chairs of the respective Groups.

In these ways the Fellows by and large engaged productively in the main work of the Seminar, and the Team Leaders/Group Co-Chairs more than fulfilled the roles for which they volunteered when invited to serve in this capacity.

**Faculty**

Figure 2 lists the Faculty, including the specialty and role of each member. They constitute a highly qualified and diverse group, with a variety of specialties potentially contributing to the learning experience of the Fellows. Regular Seminar faculty (7/19, designated by \*), having participated in the program for several years, would serve as experienced Team and Group facilitators (5/19). They were supplemented both by several Northwestern University faculty (8/19, in addition to the Director) and by 2 new faculty from Mozambique and Australia, all to serve as subject matter advisors (14/19).

Summary demographics indicate predominance of women (10/19) and a large proportion of non-Caucasian faculty (8/19). Altogether 7 were continuing regular faculty while 12 were first-time guest faculty.

Faculty have participated in varying degrees to date by providing personal introductory videos, suggested reference materials for the Google drive Reading Room, subject matter videos, and direct consultation with Fellows. Their expertise, and that of other consultants as may be required for full proposal development, will continue to be called upon in the post-Seminar phase.

**Program**

The original plan of the 2020 Seminar was to (1) conduct several preliminary activities over the weeks immediately preceding the August 2020 meeting in Chicago; (2) meet for an intensive week of programmed in-person proposal development by Teams formed in the pre-Seminar phase; and (3) continue work in a post-Seminar phase to bring one or more selected proposals to the stage of fully developed and submitted research grant applications. Postponement of the meeting into 2021 offered the unexpected benefit of a greatly extended period for this phase.

Figure 3 illustrates the planned Tasks and Timelines developed for this extended pre-Seminar phase and beyond. Specific tasks outlined for both Fellows and Faculty detailed the work to be done in each of 7 areas. Uncertainties due to COVID-19 regarding new meeting dates and budget delayed launch of the pre-Seminar phase until Spring of 2021, when the second updated Contingency Plan was approved. At this time, most Fellows remained able to begin the work, while others had now become unable to continue. The 33 Fellows introduced above were those able to renew their commitment to the program among the 44 who were eligible as

Fellows or Alternates.

The pre-Seminar work on development of the Core Protocol (item 4) focused primarily on the 7 CVH metrics and how to standardize their definition and measurement in population studies of CVH. In due course, proposal development (item 5) took precedence. This transition was the occasion for the First Global Meeting of the Seminar, on June 28 via Zoom, across 19 time zones, with 14 Fellows and 12 Faculty attending (Report of the Meeting available on request).

To stimulate discussion of the theme adopted for proposal development, a brief slide presentation made the following key points (Slides or recording of the Meeting available on request):

* When cardiovascular risk is low – or absent – major cardiovascular events don’t occur.
* The absence of cardiovascular risk is defined as Ideal cardiovascular health (CVH).
* Ideal CVH is common in childhood but rare in middle age.
* Ideal CVH is ‘lost’ beginning in early life and continuing throughout the life course, counter to the public health goal of improving population CVH.
* Ending the CV pandemic requires not only primary prevention, a remedial approach to reverse existing CV risk in individuals and populations, but also primordial prevention, to avert CV risk in the first place and – uniquely – to end transmission of risk from the present generation to the next and later generations.
* A fundamental epidemiologic question – addressing the classic triad of time, place & person – is: What is the distribution of CVH (ideal, intermediate, and poor) over the life course in multiple diverse populations? More specifically, is the observed *loss of ideal CVH* universal? And what are the determinants of *sustained ideal CVH* among the few and its loss in the great majority?

The discussion by Faculty and Fellows that followed in the final segment of the Meeting set the stage for further consideration of research approaches to these questions that led, during July and August, to production of 2 distinct but complementary research proposals.

**Products**

(1) Core Protocol

The first product of the Seminar was the beginning development of the Core Protocol for Population Studies of Cardiovascular Health. Fellows considered, individually and in small clusters, what the scope of such a document should be, given the long-term goal to promote cardiovascular health globally, through primordial prevention beginning in childhood and adolescence.

An overall outline addressed the 7 CVH metrics, as defined by Lloyd-Jones and others (*Circulation* 2010) and was accompanied by several individual- and population-level measures of social determinants of health and multiple types of environmental exposures, dimensions of health services, and elements of health policy. Also to be included was specification of questionnaire content and physical, laboratory, and imaging examinations as were attention to special subgroups by age, rural/urban residence and minority status, and pregnancy and other aspects of women’s health.

Because of difficulties achieving effective and timely communication to enable this remote work, it became impractical to elaborate the Core Protocol beyond the CVH metrics themselves, which would be essential to the next task of proposal development. The product to date provides the starting point for the larger Core Protocol project in the post-Seminar phase.

(2) Research Proposals

Specific Aim 1 of the Conference Plan was “To develop 1-4 preliminary proposals for multi-national collaborative population research projects on the broad topic of promotion and preservation of ideal cardiovascular health (CVH) throughout the lifespan, from the beginning of life.” From the concept of ideal CVH and current evidence from population studies of its loss with age. The priority research topic was identified by the Fellows and Director as investigation of the trajectories with age of ideal CVH, from early life throughout the life course – their variation among diverse national populations and the determinants of the most favorable trajectories observed.

Two approaches to such a study were identified. Initially, interest was exclusively on conduct of comparative population surveys to generate new and better-standardized data on the CVH metrics and key related factors in multiple, diverse populations. Subsequently, it was judged that existing data – from completed surveys or cohort studies – could yield important insights through secondary analysis, following rigorous harmonization of data from sufficiently diverse populations. Group A undertook development of the proposal for secondary analysis of existing data (An International Study on Trajectories and Determinants of Cardiovascular Health Metrics – INTERMET) (Figure 4A). Group B continued work on creation of new data through comparative population surveys (International Study of Cardiovascular Health Across the Lifespan – INTER-CVH) (Figure 4B).

By their own efforts, with some Faculty consultation, each Group successfully completed this task, utilizing the standard NIH format of the PHS-398 Research Plan – Specific Aims, Significance, Innovation, and Approach. Guidance was provided in part through a 3-part series of video and slide presentations outlining the necessary thought process to progress from the research question to a completed Research Plan (available on request).

The results of this work – both the Core Protocol and the 2 preliminary research proposals – were presented and reviewed in accordance with the timeline in Figure 3, at the Second Global Meeting of the Seminar on August 20 (Report available on request). Each presentation was followed by comment from a Faculty discussant, then by general discussion raising points for consideration in further development of each proposal. The Specific Aims of each proposal are shown here in draft form (Figures 4A, 4B).

**Next steps**

The Tasks and Timeline for the post-Seminar phase are currently being formulated. The goal is to implement both of the proposed projects with such modifications and further development as are both scientifically and strategically warranted. Those Fellows and Faculty who will continue the work will remain in close communication to adopt detailed plans for the 2 proposals.

An early priority is to identify potential support for tasks to be accomplished between now and submission of research grant applications. Limited funds are presently or potentially available from NHLBI (carryover from the current R13 Conference Support grant), WHF/ISCEP, and the Northwestern University Institute for Global Health/Center for Global Cardiovascular Health. Supplementation from other sources will be required.

A related priority is to assess the correspondence between the aims of the 2 projects with the mission, objectives, and support mechanisms of potential funding agencies and organizations.

**Conclusion**

**Aim 1** of the 51st International Seminar, INTLSEM2020, has been successfully achieved, by development 2 preliminary proposals for multi-national collaborative population research projects on promotion and preservation of ideal CVH throughout the lifespan, from the beginning of life. This achievement is well documented by the draft proposals and their presentation and discussion in the Second Global Meeting of the Seminar.

**Aim 2** has been achieved by demonstrating the Advanced Seminar model as a unique and powerful vehicle for fostering and accelerating development of critical and timely research proposals. The resulting proposals are novel and have high promise of contributing significantly to evidence on the life course of ideal CVH in diverse populations globally.

This has been accomplished despite the major disruption and reorganization required in response to the COVID-19 pandemic – the challenges that were experienced were largely overcome. However, the loss of in-person collaboration among Fellows and Faculty – the experience and contribution of the ‘community of scholars’ – and inevitable isolation of individual Fellows from one another were detrimental to the rate and depth of progress on some tasks. The virtual format does not compensate adequately for the in-person meeting of the Seminar.

**Aim 3** is expected to be achieved with realization of the multi-national collaborative projects that have been proposed, when they reach full implementation. The working relationships among Fellows and Faculty that have become established reflect this collaborative culture and are expected to continue and grow well into the future.

**Acknowledgements**

It is a pleasure to acknowledge the dedication of Fellows and Faculty to the aims of the 51st International Seminar and the efforts and contributions they have made to the success of the program. Special commendation is due to the Team Leaders/Group Co-Chairs, Gaston Perman (Buenos Aires), Kavita Singh (Gurgaon), Sara Soares, (Porto) and Lisa Ware (Johannesburg). Their exceptional contributions in charting the course and monitoring progress of the program has been invaluable to their colleagues and the success of the Seminar overall. Biostatistical Faculty Shrikant Bangdiwala and George Howard are deserving of special appreciation for their contributions of learning materials and timely consultation with Fellows in proposal development.

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Our host institutions, the Department of Preventive Medicine and Center for Global Cardiovascular Health are recognized with appreciation for their support in principle even though unable to accommodate the in-person Seminar as originally planned.

It is also a pleasure to acknowledge the financial support of the National Heart, Lung, and Blood Institute, NIH; the World Heart Federation; and the Department of Preventive Medicine, Feinberg School of Medicine, Northwestern University. Their contributions will continue to support the career development and global health research experience of the 33 Fellows of the 51st International Seminar.