

Electronic Medical Care Advancement for Cardio- and Endovascular Medicine

Electronic Medical Care Advancement

Electronic medical care advancement is a new field that uses the Internet to advance the professional development and clinical expertise of clinicians in order to improve clinical care. In this model, the Internet serves as a “collaborative clinical networking platform (CCNP),” which enables the exchange and co-development of clinical experience, skills, observations, and services.

By using the Internet as a CCNP, physicians, clinical institutions, and the therapeutics industry are afforded new capabilities and next-generation evolutions in knowledge, quality, and market intelligence. The ways in which specialty clinicians use, interact, and adapt with the CCNP equate to “communities of practice” that generate “clinical asset and data ecosystems.”

As described by Parboosingh et al, “communities of practice” (CoPs) refers to groups with shared passion and goals who collectively learn how to perform better through ongoing interaction (Wegner et al). Through storytelling, for example, they critically reconstruct practice experiences, describe and seek validation of improvisations, and engage in generative dialogue in search of opportunities to enhance practice performance (Parboosingh et al).

A global, cross-disciplinary, and multi-specialty group of clinicians focused on endovascular and interventional cardiac interventions using an Internet CCNP represents a virtual community of practice: “Internet-based CoP can play an important role in the externalization of tacit knowledge of the individual (e.g., clinical practice knowledge) into explicit and diffused knowledge (e.g., evidence, protocols, or clinical guidelines)” (Falkman et al).

These virtual communities of practice exchange clinical experience (case studies, experiential narratives), general observations, clinical pearls, tips and best practices regarding diagnostic and procedural skills, clinical data and discoveries, and ideas for practice efficiencies or improvements. The CCNP can also support real-time consultation and knowledge access at the site of care, channels for specialists to provide consultative services, and opportunities for working group collaboration or clinical investigation.

The Power of EMCA/ Collaborative Clinical Networking

There are myriad ways in which collaborative clinical networking advances medical care, including more effective and relevant learning, broader and faster dissemination

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of expertise, and more innovative problem solving. All of these translate to higher-quality care. The first way to explain this is via the concept of collective intelligence. When physicians are able to share ideas, knowledge and expertise multiplies, thus improving the experience of both doctor and patient, and leading to superior outcomes. As George Por explains it: “the capacity of human communities to evolve towards higher-order complexity and harmony, through such innovative mechanisms as differentiation and integration, competition and collaboration” (collective intelligence wiki). There is great power in synthesizing diverse points of view and including a broader number and types of perspective.

The new capabilities provided by Web 2.0, which are web services and tools that enable interactive, open, and participatory online communities, allow for this sort of collective intelligence. It is real-time, cross-geography, and cross-domain collaboration: “The dynamic interactive environment of Web 2.0 challenges critical thinking because many individuals (perhaps unknown to each other but nonetheless collaborating) are contributing to and impacting an important area, our health care. The more we use, share, and exchange information on the Web in a continual loop of analysis and refinement, the more open and creative the platform becomes; hence, the more useful it is in our work” (Liesegang). It also opens the door to potential teleradiology and teleconsultation.

In this day and age, cross-disciplinary interaction is a key part of quality care. As Gortzis says, “Collaboration is needed among organizations (e.g., local, national, international, etc.), professional groups (e.g., interventionists, physicists, technologists, etc.), and disciplines (e.g., interventionists, other clinical disciplines, etc.) to break down barriers, identify common

goals, and pave the way for better-quality outcomes for patients” (Gortzis). Another way to understand the advanced capabilities of these collaborative networking communities is found in the concept of complex adaptive systems (CAS). A clinical department or practice is a CAS, or a collection of individuals whose actions are interconnected. Each individual’s action affects the entire system (McDaniel and Driebe); thus, communication is essential. One study found that improvements in communication and participation among all members had a great, collective impact on the experience (Thomas et al).

Ingredients of a CCNP System

The Web 2.0 platform is the first ingredient of a CCNP system, followed by Web 3.0 in the future. Web 2.0 technologies, termed collaborationware or collective intelligence (O’Reilly), are intelligent ways to share knowledge (Liesegang). Characteristics include user-generated content, networked membership, reciprocal sharing, vested and valued contributors, trusted relationships, and social learning; examples include blogs, wikis, and real simple syndication (RSS) feeds.

In a CCNP system, clinicians are able to exchange a wealth of information. The information includes primary representations of experience, such as case reports, narratives, studies, clinical images, and practice-based de-identified data. Indirect knowledge in the form of generalized observations, best practice distillations, and tools and tips regarding procedural and professional skills can also be useful. As part of this, information and media repositories are growing. A noteworthy example is the Health Education Assets Library (HEAL). HEAL is “a digital library providing free access to a centralized national repository of high-quality digital teaching resources in the health sciences.

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Resources are submitted by individual authors and peer reviewed before publication in HEAL” (Holzer and Kokemueller).

CCNP functionality is highly interactive. The system allows clinicians to discuss cases and research, download and annotate images, collaboratively write documents and papers, and develop test practice modules with colleagues. The presence of polls and surveys codify and quantify experience and opinion, and new computer adaptation technology is beginning to afford the ability to create and tailor questions based on prior responses.

In the near future, the Web will become even more intelligent and interoperable, and will reach a new level of potency with Web 3.0 technology. Web 3.0 is thought to include the development of separately siloed applications and content repositories to a more seamless and interoperable whole. There will be ubiquitous connectivity, open identities, and intelligent applications (natural language processing, machine learning, machine reasoning, autonomous agents), among other things. This technology will enable CCNPs automatically to facilitate knowledge generation by synthesizing data across diverse sources and information types (Web 3.0 wiki).

Advancing Cardiovascular and Endovascular Care with a CCNP

A CCNP designed for cardiovascular and endovascular clinicians serves as a virtual, experiential learning engine that facilitates clinical performance improvement and offers new opportunities to cardiovascular institutions and product manufacturers. For the professional clinicians who comprise the CCNP community, it offers a needed and superior means for learning throughout one’s career: “We must consider that the next evolution in learning enterprise is a live, real-time interventional

radiology procedure (IRP) environment that provides collaborators with flow of information support as they perform their work” (Gortzis).

Using these new technologies, Gortzis has developed a system, called NetAngio, which operates simultaneously in synchronous and asynchronous mode supporting “on the fly” multi-node collaboration during real-world IRP. Supported functions include (1) ceiling camera remote controlling (focus, position, and zoom), (2) multipoint conferencing, and (3) captured image forwarding. The image forwarding function is based on a “snap and forward” module able to post a suspect still image to a remote medical physicist instantly. Following the data enhancement, a viewer - viewing a Web module - grabs and displays them in a pop-up window on the main interface. Via a similar interface, at the same time, remote learners (students or less experienced interventional radiologists) are able to study the techniques performed and the collaborative consultation (Gortzis).

The CCNP’s user-generated, open sharing ecosystem can draw from clinical experience around the world, across specialties such as interventional radiology, vascular surgery, and interventional cardiology, and thus collect an unsurpassed body of experience and evidence. This then translates to better treatment decisions and better care. For example, “The value of SOMNet for the majority of participants is access to external expertise and, in the end, better care for patients, in addition to a means of continuing education. Interviewees brought up concrete examples of when they benefited from diagnosis and treatment discussions at meetings, both for cases they presented themselves and from discussions of others’ cases... Apart from probably saving both time and effort, it is obvious that less experienced clini-

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cians are learning from both submitting their own cases and from participating in discussions of cases presented by more experienced colleagues, who often practise at an academic institution. The opportunity within SOMWeb to agree on various treatment modalities and to evaluate the outcome of these suggested therapies are cornerstones of the learning process” (Falkman et al).

CCNP endows cardiovascular centers with the ability to broaden their influence and impact as a virtual community of teachers and leaders. CCNP provides industry (medical device makers, pharma, etc.) a virtual window into how clinicians are using and thinking about industry products' effectiveness, unmet needs regarding their products, new interventions being developed, and more. This advances the industry's ability to understand real world experience and apply that to product development.

Industry needs a way to credibly participate in clinicians' Internet activities. This endeavor is essential because, “according to Manhattan Research, approximately 25% of physicians are accessing the Internet during patient consultations; typically, these physicians are in group practices with an electronic health record system and spend more than 10 hours online per week” (Holzer and Kokemueller). In a

way unlike any other medium, the Internet, and now CCNP, challenges clinicians to share, critique, support, learn, and grow in a community of like-minded individuals who are working for each other, their patients, and society.

As CCNP develops further and clinicians start to have a better understanding of how it can revolutionize not only their practice, but care in general, it will become a primary forum for advancing professional medicine. Its collaborative, forward-reaching nature has the potential to bring positive impact to providers, cardiovascular centers, and industry alike, and to move us powerfully into the next generation of healthcare.

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