

Volume 15, 27 May 2015

Publisher: Uopen Journals

URL: <http://www.ijic.org>

Cite this as: Int J Integr Care 2015; Annual Conf Suppl; [URN:NBN:NL:UI:10-1-117092](https://nbn-resolving.org/urn:nbn:nl:ui:10-1-117092)

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Poster Abstract

## Integrated health care delivery in Oncology using ‘Comprehensive Cancer Networks’

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## Abstract

**Introduction:** In late 2013, 9 stakeholders, including the Dutch Federation of University Hospitals (NFU), the Dutch Hospital Federation (NVZ), and Top Clinical Hospitals (STZ), announced their plan to optimize delivery of oncology care in the Netherlands. In order to do so, cooperation among hospitals and between hospitals and primary care practices, in so-called ‘Comprehensive Cancer Networks’ (CCN), is to be intensified. The goal is to offer patient centered, high quality, efficient care, under increasingly cost-sensitive (e.g. competitive) circumstances. These networks should be fully functional by the end of 2015 and the NFU is said to invest an annual 2 million euro’s in their realization.

In a practical sense, the CCN’s are advised to organize their care delivery based on existing regional situations. Health care providers are to agree on division of labor, standardization, diagnostics, follow-up, and referrals. However, these existing regional situations, especially in terms of division of labor among organizations and referral patterns, are unclear. Therefore, we seek to contribute to the question how oncology care is currently, informally, organized, by exploring organizational relations through patient referral networks in the Netherlands.

**Methods:** We use over 1.3 million medical claims to build patient referral networks among secondary care providers of roughly 385 thousand oncology patients between 2008 and 2011 in the Netherlands. Using Social Network Analysis techniques, we built networks of referrals within 3,

6, and 9 months after initial diagnosis. We focus on four different tumor types, namely breast tumors, prostate tumors, colon tumors, and gynecological tumors. We characterize these patient referral networks based on network level characteristics such as the existence or absence of price competition and the types of organizations active in the network, and node level (i.e. organizational level) measures such as centrality, density, reciprocity, and the number of cliques. Next, we statistically compare these characteristics across and within each tumor type to explore differences, and the development of referral networks over time.

**Results and Conclusions:** We find that structures of the referral networks for oncology care differ between tumor types. Although academic medical centers play a central role across all tumor types, the role of top-clinical hospitals, general hospitals, and independent treatment centers differs depending on the tumor type. For most tumor types referrals predominantly flow towards university hospitals, for others, most notably prostate tumors, referrals are more equally distributed between different organization types. It is noteworthy that referrals can occur up to 9 months after the initial diagnosis and that most referrals are unreciprocated. That is, when a patient is referred to another medical center, they are seldom referred back to the original hospital (for example for post-surgical care). Especially the lack of such reciprocated ties shows potential for improvement through constructing CCN's. We conclude that the existing care situation does not always match the CCN goals and we therefore advise that these networks should be critically assessed during the formalization of network structures.

## **Keywords**

**oncology care; health care networks; the netherlands; oncology networks; division of labor**

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