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Use of social network analysis in maternity care to identify the profession most suited for case manager role

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ABSTRACT

Objective: To improve Dutch maternity care, professionals start working in interdisciplinary patient-centred networks, which includes the patients as a member. The introduction of the case manager is expected to work positively on both the individual and the network level. However, case management is new in Dutch maternity care. The present study aims to define the profession that would be most suitable to fulfil the role of case manager.
Design: The maternal care network in the Nijmegen region was determined by using Social Network Analysis (SNA). SNA is a quantitative methodology that measures and analyses patient-related connections between different professionals working in a network. To identify the case manager we focused on the position, reach, and connections in the network of the maternal care professionals.
Setting: Maternity healthcare professionals in a single region of the Netherlands with an average of 4,500 births/year.
Participants: The participants were 214 individual healthcare workers from eight different professions.
Measurements and Findings: The total network showed 3948 connections between 214 maternity healthcare professionals with a density of 0.08. Each profession had some central individuals in the network. The 52 community-based midwives were responsible for 51% of all measured connections. The youth health doctors and nurses were mostly situated on the periphery and less connected. The betweenness centrality had the highest score in obstetricians and community-based midwives. Only the community-based midwives had connections with all other groups of professions. Almost all professionals in the network could reach other professionals in two steps.

Introduction

A patient-centred network approach in health care has growing interest because, of the reported positive effects (Cunningham et al. 2012). The key element of a patient-centred network approach is that the involved healthcare professionals work together with the patient as a team member (Ekman et al. 2011). A patient's satisfaction regarding their care and the patient's perception of control are shown to increase through active patient participation (Van Royen et al. 2010; Ekman et al. 2011; Den Breejen et al. 2014; de Labrusse et al. 2016). A patient-centred network approach is debated in Dutch maternity care; it is explicitly mentioned in leading Dutch reports as an important strategic component to improve Dutch maternity care (Zwangerschap en geboorte 2009, Nederland and Zorg 2016). Maternity care in the Netherlands has midwifery care as a standard, with in addition specialised secondary and tertiary obstetric care (Amelink-Verburg and Buitendijk 2010; Geerts et al. 2014; Perdok et al. 2015; Perined 2016).The involvement of secondary and tertiary care (for advice or referral) for pregnant women has recently risen to 58% (Perined 2016). After birth, maternity assistants take care of the mother and child for

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up to ten days, mainly at the home of the newborn. Afterwards, the youth health department doctors and nurses take over. All of these professionals work autonomously, which implies that Dutch maternity care is fragmented and poorly coordinated (Geerts et al. 2014; Scholmerich et al. 2014; Perdok et al. 2015). To improve maternity care, the goal is to work, with an interdisciplinary approach in patient-centred networks, together with the pregnant women. The network would be coordinated by a case manager. Working in well-coordinated health professional networks is associated with improved quality of care, increased patient satisfaction, improved efficiency and decreased care costs (Minkman et al. 2009; Tahan and Campagna 2010; Wensing et al. 2010; Novelli et al. 2012; Wynia et al. 2012; Den Breejen et al. 2014; Scholmerich et al. 2014; CMSUK 2015; Kroll-Desrosiers et al. 2016). A case manager's role when coordinating a network is internationally emphasised (Tahan and Campagna 2010). Case management is a method that works on two complementary levels. On an individual level, the case manager provides advice or a referral and works in partnership with the healthcare professionals and the pregnant woman to refine the care plan and process. At a network level, the case manager has a central position and collaborates with multiple healthcare professionals, which provides continuity between professionals and organisations (Minkman et al. 2009). Case management is used in different healthcare settings (Minkman et al. 2009; Tahan and Campagna 2010), but would be new in Dutch maternity care. However, it has not yet been defined which profession should fulfil this role of case manager.

Social Network Analysis (SNA) is a study method used to quantitatively measure the connectedness between professionals in a healthcare network. With SNA techniques you can empirically describe, graph, and analyse the structure of the network (Scott et al. 2005). Because case management is expected to work on the levels of the pregnant women and the maternity network, we hypothesized the case manager needs: to have a central position in the network, to reach each professional within only a few contacts, and to have connections with many professions or organisations. In the present study, we used SNA to explore the profession that would be most suitable to fulfil the role of case manager in Dutch maternity care, which is based on the position, reach and connections in the network. Even though this is a Dutch study, the findings can contribute internationally to the broader themes of patient-centred care, the role of the case manager and the position of midwives in maternity care (Schroeder et al. 2012; National Collaborating Centre for for, W. s., Children's 2014; Vedam et al. 2014; de Labrusse et al. 2016; Kroll-Desrosiers et al. 2016).

Methods

Ethics

The medical ethical committee of the Radboud university medical center, The Netherlands approved the study protocol (CMO No. 2011/381). The study is registered at the Dutch Trial Register (NTR, TC=4063).

Setting

The study was performed in Nijmegen, a single regional collaborative area in the Netherlands with an average of 4500 births a year and over 220 healthcare professionals involved in maternity care. Table 1 lists the different healthcare professionals involved in maternity care in the Nijmegen area. Primary care was provided by: community-based midwives (a), maternity care assistants (b), and youth health doctors and nurses (c). Secondary and tertiary care was provided by obstetricians (d), obstetricians in training (e), hospital-based midwives (f) and paediatricians (g).

Table 1
Healthcare professionals involved in maternity care in the Nijmegen area, the Netherlands.

Profession	N		Work setting
Community-based midwives	52		11 community based midwife practices
Obstetricians	19		2 hospitals [a]
Obstetricians in training	31		2 hospitals [a]
Hospital-based midwives	29		2 hospitals [a]
Paediatricians	21		2 hospitals [a]
Maternity care assistants	5		1 maternity assistants organization
Youth health doctors	24		1 youth health organization [b]
Youth health nurses	45		1 youth health organization [b]
Total	**226**	**%**	

[a] One with only secondary care and one with both secondary and tertiary care
[b] Working in fourteen offices

a. Community-based midwives are qualified to provide full prenatal and perinatal care to all women with uncomplicated pregnancies. In case of risk factors or complications, women are referred to secondary or tertiary care (Perdok et al. 2015).
b. The maternity care assistants support the community-based midwives during childbirth and subsequently take care of the mother and the new born in their home for up to ten days postpartum (van Teijlingen 1990). They collect essential health information and report it to the community-based midwives, who are responsible for medical care.
c. The youth health department doctors and nurses then take over, supporting the parents and screening for any signs of abnormal development in the child.
d. Obstetricians are responsible for secondary and tertiary maternity care.
e. Obstetricians in training work independently but are still under the supervision of obstetricians.
f. Hospital-based midwives are responsible for about half of the births in secondary and tertiary care (Perined 2016) and are supervised by the obstetricians (in training).
g. Paediatricians provide secondary and tertiary care in the hospital.

Every hospital offers secondary care. Tertiary care takes place in centres with a neonatal intensive care unit and an obstetric high care department. In 2014, 86% of all pregnant women started their maternity care in a primary care setting. Of these women, 51% started and 29% eventually ended birth in a primary care setting (Perined 2016). After birth, medical care was under the supervision of a community-based midwife, and 96% of all women received care from a maternity care assistant at home (Perined 2016). The paediatrician was involved in the care of the new born in 31% of cases. Hospitalisation for a new born was necessary in 17% of cases (Perined 2016). Overall, the Dutch system involves numerous referrals during pregnancy or during and after birth. Healthcare professionals in maternity care work in a regional multidisciplinary collaboration within the catchment area of one or more hospitals. Within this organisation, they make joint protocols and distinctive appointments regarding referrals in (acute) situations.

Data collection

All healthcare professionals in maternity care in the area of Nijmegen were invited by a personal e-mail to fill out a questionnaire. The questionnaire contained a list of names of all 226 professionals involved, including their job title and place of work. Participants were asked to indicate the professionals they have had medically orientated contact for at least one patient in the last six months. Nonresponders were -invited again after two weeks. If the response of a health professional was missing, it was in some cases substituted by the

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