

CASE STUDY:

Zio Integrated Care Network

The Netherlands

Partner Authors

Hubertus J.M. Vrijhoef, PhD, MSc, Professor, Maastricht University Medical Center
Anna R. Huizing, PhD MSc, Zio Maastricht and Maastricht University

Duke Authors

Krishna Udayakumar, MD, MBA
Jonathan Gonzalez-Smith, MPAFF
Kushal Kadakia
Andrea Thoumi, MSc, MPP

Reviewer

Jeroen Struijs, PhD, MSc

Series Editor

Mark McClellan, MD, PhD, Director, Duke-Margolis Center for Health Policy



The
COMMONWEALTH
FUND

This case study is part of the **Accountable Care in Practice: Global Perspectives** series produced by Duke University's Robert J. Margolis, MD, Center for Health Policy and supported by the Commonwealth Fund. The series explores how organizations across the world have taken steps to improve health outcomes by adopting accountable care policy reforms within diverse organizational and environmental contexts. The aim is to assist US stakeholders to apply the results of these reforms. We consider the critical success factors with each organization's implementation process that could be translated in the US. Additional resources, including an explanation of the accountable care framework, can be found at the Duke-Margolis website.

Case Study: Zio Integrated Care Network, The Netherlands

Overview

Zorg In Ontwikkeling (Zio) is an integrated care network in the Netherlands that organizes primary care for patients with non-communicable diseases (NCDs, also known as chronic diseases in the United States) through disease-specific bundled payments with downside risk. Zio’s care delivery model for disease management has helped guide national policy reforms for NCD delivery implemented by the Dutch Ministry of Health.

Table 1: Overview of Zio

Model	Health System	Innovations in Care	Key Outcomes
<ul style="list-style-type: none"> Integrated primary care group targeting patients with specific NCDs Built off pilot in 1997, formalized in 2007 24,500 patients enrolled 	<ul style="list-style-type: none"> Universally-mandated private insurance, regulated and subsidized by government Primary care delivered through private sector GPs act as gatekeepers to secondary care Physicians remunerated through a combination of capitation and FFS 	<ul style="list-style-type: none"> Task shifting to specialty nurses Bundled payment contract for defined package of care Stratification of patients based on condition specific parameters 	<ul style="list-style-type: none"> 54% decrease in hospital admission costs for patients assigned to specialty nurses¹⁵ 15% decrease in proportion of patients with poor glycemic control¹⁵

Program goals: To transition away from hospital care and provide long-term management of NCDs.

How this is achieved: Zio emphasizes primary care and shifts tasks from general practitioners (GPs) and endocrinologists to nurse specialists. As part of national payment reforms, Zio also negotiates a single bundled payment from insurers to providers that covers a comprehensive range of health services for a disease-specific patient population. Payments are linked to quality measures to create an incentive to improve health outcomes, with 10 percent of provider contracts allocated for performance-based financing. Zio’s model strengthens the role of health insurers as purchasing agents and shifts care away from the hospital towards the community.

Results: Improvements in health outcomes and patient experiences, reduction in the cost of care.

Factors that supported reforms:

- National legislation that provided financial incentives for investment in primary care.
- A bundled payment model that integrates care across providers.
- Investment in health information technology to track performance.

Relevance for US context:

- Similar challenges and implementation gaps, such as high burden of NCDs, fragmented payment system that relies predominantly on a fee-for-service model, and multiple payers.
- The Zio case study describes reforms to address these issues at both the provider and national level that could be transferred to a US context, particularly disease management programs (DMPs) for NCDs.

Case Study: Zio Integrated Care Network, The Netherlands

Figure 1: Translation Opportunities

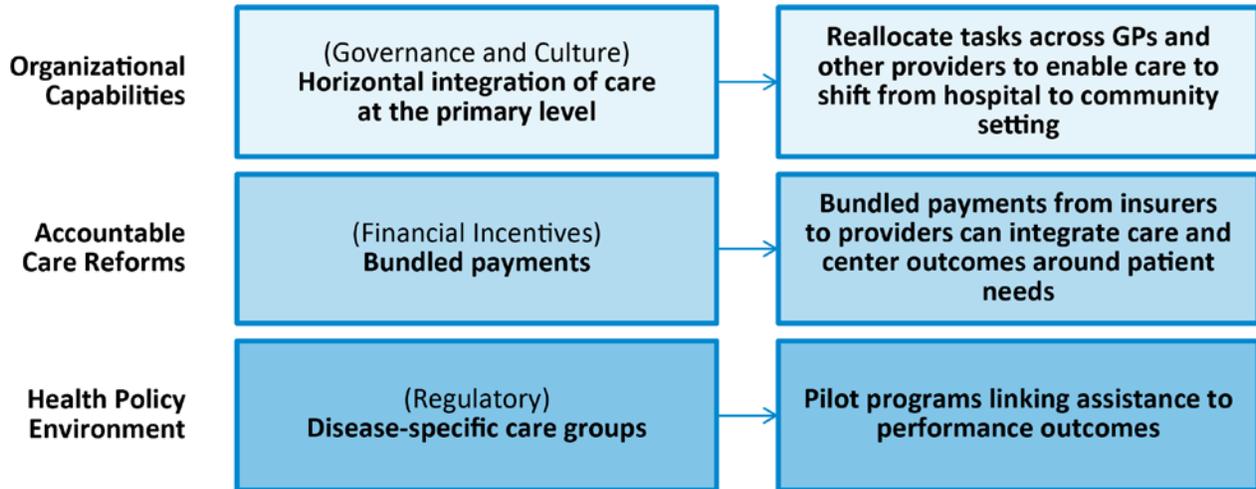


Figure 1 illustrates components of Zio’s accountable care implementation process that are relevant for US stakeholders. These include environmental factors (bottom tier) and organizational capabilities (top tier) that influence the success of Zio’s accountable care reforms (middle tier). The last column translates these lessons to a US context. Figure 2 in Part IV provides additional translation opportunities.

Part 1 provides an overview of the Netherlands health system context; Part II discusses Zio’s care plan using the Accountable Care Framework; Part III discusses the results of Zio’s reforms; Part IV analyzes the internal and organizational factors (in addition to those in Figure 1) that supported or hindered these reforms.

Part I: Health System Context

NATIONAL CONTEXT

The Netherlands' population of 16.8 million people receive health care through a system of managed competition. All citizens are required to purchase insurance, which is regulated by the government but delivered by the private sector. Money from payroll taxes is pooled into a regulatory fund and covers half the cost of insurance. Premiums pay for the other half. Private, primarily non-profit, insurers set premiums, which include basic benefits like primary care and prescription drugs. The majority of the population (84 percent) chooses to supplement this statutory insurance with additional private insurance, typically from the same insurer, which covers broader health services and products like contraceptives.¹ Through this compulsory system, the Netherlands has achieved universal health coverage.

Like many industrialized countries, the Netherlands continues to face the challenge of delivering high quality care at a low cost for a population with a high burden of NCDs (which account for an estimated 89 percent of deaths in 2014).² Decentralized primary care is one challenge. General practitioners (GP) are the focal point of care delivery in the Netherlands. Until about 10 years ago, GPs mainly operated in individual or small group practices that had insufficient resources to manage patients living with a NCD. The system was primarily a fee-for-service (FFS) payment structure.

To bridge separation between primary and long-term care, the Netherlands piloted a bundled payment model for Type 2 diabetes in 2007 and expanded the model in 2010 for chronic obstructive pulmonary disease, asthma, and vascular-risk management. Under this framework, insurers make a single bundled payment to "care groups"—newly created independent entities—to cover all primary care needs for patients with NCDs.³ Care groups assume clinical and financial accountability for all diabetes patients in their program. These services, called "Care Standards," are set at the national level by organizations like the Netherlands Diabetes Federation (NDF), which brings together different bodies representing care providers, industry partners, insurers and patients.⁴

The Netherlands designed the 2007 initiative to encourage competition between care groups who freely negotiate with insurers and providers over the range and price of services covered by the contracts.⁴⁻⁶ Although there are no restrictions on contract prices, care groups are obligated to deliver the standards of care established by the NDF.⁷ Contracts with providers are annual and limited to NCD management and risk reduction, which requires a greater investment in primary care. Contracts also include performance measurements as an incentive to deliver high-quality care.⁸ The Dutch national health insurance covers all services, so patients do not incur additional premiums.⁵

The care group model remains the same today. As of 2014, there were approximately 115 care groups throughout the Netherlands.⁹ Most are GP-led.¹⁰

ZIO BACKGROUND

In 1996, Maastricht University began a disease management program (DMP) in the Maastricht Region as a research project focused on improving outcomes for patients with good metabolic control of diabetes. The project pioneered a new model to disease management by shifting tasks from medical doctors towards specialized nurses and from the hospital to GPs.¹¹ Maastricht University began the DMP with

Case Study: Zio Integrated Care Network, The Netherlands

funding from the Netherlands Organisation for Health Research and Development (ZonMw), a national organization commissioned by the Ministry of Health, Welfare and Sport and the Netherlands Organisation for Scientific Research to fund healthcare research. Beginning in 2001, Maastricht implemented the “Matador” program, which sought to address the comprehensive needs of patients with diabetes. In 2007, Zio expanded Matador into a primary care program based on the principles of the chronic care model that sought to shift care from the hospital to the community. The national bundled payment reforms in 2006 facilitated this expansion, which eventually encompassed 100 percent of GPs in the region.¹² In 2010, the Netherlands formally codified Zio’s disease management model as the national model for managing NCDs.¹³ Zio has since developed additional NCD management programs for patients that suffer from asthma, chronic obstructive pulmonary disease (COPD), cardiovascular diseases, and mental health problems and for the frail elderly.¹⁴

The Maastricht region has 168,660 residents and more than 12 percent (over 20,000) are enrolled in a disease management program. Other programs serve people diagnosed with cardiovascular disease (12,996, 7.7 percent), diabetes (7,473, 4.4 percent), chronic obstructive pulmonary disease (2,166, 1.3 percent), asthma (829, 0.5 percent) and frail elderly (220, 0.1 percent).

ZIO ORGANIZATIONAL STRUCTURE

Zio coordinates between the health insurer VGZ, which has the largest market share in the Maastricht region, and multiple providers (81 GPs and primary care professionals from 55 general practices and one academic hospital). Zio also subcontracts with other care providers individually.

Boards of the regional associations of GPs, physiotherapists, and dieticians advise Zio’s Executive Board. Zio has 10 divisions including primary care, quality and training, mental health care, research and development. Zio also has an independent control board that monitors and advises Zio in carrying out their tasks. Although patients are not represented in the organizational structure, they are invited regularly for feedback as part of project teams and evaluations.

Case Study: Zio Integrated Care Network, The Netherlands

Part II: Accountable Care Reforms

This case study uses the accountable care framework to assess Zio’s reforms. The framework consists of five accountable care policy pillars: identifying and **stratifying target populations**, implementing **performance measures** related to quality and experience of care, providing data and other mechanisms to help providers identify opportunities to **continuously improve**, restructure **financial and non-financial incentives** to align payments with target outcomes, and **coordinating and transforming care** to improve delivery.

STRATIFICATION OF PATIENT POPULATION

GPs in Zio’s DMP stratify individuals based on the severity of their disease using condition-specific parameters in accordance with Dutch guidelines for diabetes.¹⁵ Zio groups patients into four categories based on disease condition: patients one-year post-diagnosis, patients using only oral medications and/or dietary advice, patients using insulin no longer than 12 months, and patients using insulin for more than 12 months.¹⁴ Intensity of care depends on each patient’s level of need. The bundled payment scheme focuses on managing, not preventing, an NCD.

Zio is currently involved in testing a more comprehensive approach to patient stratification that accounts for both biomedical and demographic information. The project, known as PROFILE, runs from 2014 to 2017 and aims to develop a set of patient profiles that can be used to tailor NCD management to the needs of individual patients.¹⁶

MEASURING HEALTH SYSTEM PERFORMANCE

Zio uses a combination of internal and external measures adopted by NDF and InEen, a national organization representing care groups in the Netherlands. The NDF metrics were put forward in the Dutch Diabetes Federation Health Care Standard (DFHCS) and provided a general framework for the components of diabetes care, including treatment goals and tools to evaluate the quality of care.^{4,10} InEen then adapted a set of specific performance metrics to reflect the standards of care in the DFHCS. These include metrics for processes, like the percentage of patients receiving annual foot examinations, and outcomes, like the rate of patients with controlled blood cholesterol levels (see additional metrics in side box).⁵ InEen shares these metrics with health insurance companies like VGZ and they are incorporated into the bundled payment contracts with care groups such as Zio.

InEen 2015 DIABETES PERFORMANCE METRICS

1. Prevalence of DM2
2. Patient division between GP’s and specialists
3. Percentage of patients not included in disease management program
4. Percentage of patients less than 80 years of age who had an LDL cholesterol (less than 2.5 mmol/L) test in previous 5 years
5. Percentage of patients using lipid lowering medications
6. Percentage of patients tested for late stage chronic kidney disease
7. Percentage of patients that have been tested for kidney disease using urine test
8. Percentage of diabetes patients with known smoking behavior
9. Percentage of patients that smoke
10. Percentage of patients with fundus examination in previous two years
11. Percentage of patients that had a foot examination

Case Study: Zio Integrated Care Network, The Netherlands

Zio also developed additional metrics such as the percentage of patients provided with self-management support and the percentage of patients experiencing integrated care. These are assessed through the Dutch version of the Patient Assessment of Chronic Illness Care (PACIC) survey, which measures patient perspectives of chronic care delivery.¹⁷

MECHANISMS FOR CONTINUOUS IMPROVEMENT

Performance benchmarks from region-wide care groups (e.g. InEen, VGZ) provide targets for improvements in care delivery. Care groups then develop their own quality policies and provide consultants to support the efforts of individual practices to improve care delivery. Health insurance companies also drive efforts at improvement, both through pay-for-performance mechanisms and longitudinal tracking of clinical data. Data are collected and shared continuously with GPs and nurses, shared annually with health insurance companies and InEen, and made available publicly.¹⁴

FINANCIAL AND NON-FINANCIAL SUPPORTS

The bundled payment scheme consists of four components:

- Fixed base payment;
- Flexible payment tied to performance (accounts for 10 percent of total payment);
- Payment for additional services (i.e. dietary advice, fundus photography);
- Payment for operating costs.

To receive financing from Zio, providers must comply with the contract terms or face sanctions ranging from restitution of bundled payment to exclusion from the care group.¹⁴

Additional payment incentives are defined at the national level. To control costs, the government established ceilings for physician remuneration. In 2015, the government began to introduce a three-part payment model for GPs. **Segment 1** (75 percent of spending) is determined by the Dutch Health Care Authority and funds the core of primary care. It consists of a capitated fee per registered patient and a consultation fee for GPs. GPs negotiate with care groups over the price and volume of care for **Segment 2** (15 percent of spending), which funds multidisciplinary care for NCDs (e.g. diabetes). **Segment 3** (10 percent of spending) offers GPs and insurers the flexibility to negotiate additional contracts for pay-for-performance and innovations in care.

CARE COORDINATION AND TRANSFORMATION

Zio gives nurses and supportive staff a central role, assigning them tasks traditionally reserved for GPs, specialists, and other providers. Within the diabetic care model there are two types of nurses: "Practice Nurses" that assist with primary care and "Diabetic Nurse Specialists" (DNS) that offer advanced care and act as consultants to GPs.^{5,14} Nurses are responsible for patients with low and medium intensity care, while specialists like endocrinologists attend to patients with high intensity needs.¹⁸ GPs are responsible for the care of the

DIABETIC NURSE SPECIALIST ROLES

1. Function as liaison between endocrinologists, hospitals and GPs
2. Conduct diagnostic and therapeutic tasks
3. Promote patient self-education, self-efficacy, and medication adherence

Case Study: Zio Integrated Care Network, The Netherlands

patients with low and medium intensity care. This allows for comprehensive and flexible care.¹⁹ Distributing labor in this way reduces the number of patients seen by specialists in outpatient settings and has been shown to be a good alternative to standard care by a GP.^{4,19,20}

Maastricht University pioneered this care model in 1996, which was adopted as a national standard for disease management programs. Legislation in 2011 authorized nurse practitioners and physician assistants to independently perform specified medical procedures and prescribe certain medicines which were previously restricted to physicians, dentists and midwives.¹³ While providers have viewed the task shifting positively, some expressed concern that nurses were insufficiently trained.^{5,21}

Zio has a clear clinical decision support system based on nationally defined standards for diabetes care. The primary care unit is responsible for coordinating care across multiple provider settings, and engages in regular patient follow-up and case management. This ensures continuity of care between providers of care.

Zio also employs a disease-specific electronic patient record, which contains check-up and referral data, drives information sharing and protocol standardization, links laboratory data and clinical measurements, and allows for systematic collection of service user feedback.¹⁴

Part III: Results of Accountable Care Innovations

Since 1996, improvements have been reported for clinical outcomes (e.g. LDL levels), care quality (based on process measures such as foot examinations), patient satisfaction scores (based on focus group interviews and surveys such as the Patient Assessment of Care for Chronic Conditions (PACIC), and costs.

CLINICAL OUTCOMES

A 2007 study by Steuten et al. tracked patients before and two years after entering the DMP as developed by Maastricht University. They found a decrease in patients' total cholesterol, high-density lipoprotein, and systolic and diastolic blood pressure levels. The proportion of patients with poor glycemic control decreased by 15 percent and the proportion of patients with moderate control increased by 40 percent.¹⁵

Elissen et al. (2012) similarly found improved health outcomes in patients in DMPs. They compared care groups with bundled payments, which included Zio and nine other Dutch care groups, to care groups without bundled payments. They found glycemic control improved in the vast majority of patients and diabetes was brought under control in 68 percent of these patients. DMPs benefited patients with poorly controlled diabetes, preventing severe complications associated with deteriorating glycemic levels.²²

CARE QUALITY

Arts et al. (2012) conducted a randomized, non-blinded, clinical trial with diabetic patients who were treated in Maastricht's University Medical Center. They found that fewer patients were hospitalized and fewer side effects from drugs were reported compared to those in the control group. Diabetes related referrals to medical specialists decreased, indicating that DNS provided sufficient quality of care.¹⁹

According to Steuten et al., patients in the Maastricht DMP program improved their self-management behaviors, including medication and dietary adherence, controlling glucose levels and foot control (examination and exercise) by a mean of 15 percent. Overall, the number of diabetes-related consultations with GPs and endocrinologists decreased while more (routine) consultations with the DNS took place.¹⁵

PATIENT SATISFACTION SCORES

Vrijhoef et al. (2001) found high satisfaction with patients in the Maastricht DMP model, with 89 percent of patients saying they would recommend the model.²³

COSTS

Task Shifting

According to Arts et al., placing nurses as central providers of care is a cost-effective alternative to physicians in providing hospital-based diabetes care.¹⁹ They found task shifting generates a modest

Case Study: Zio Integrated Care Network, The Netherlands

reduction in costs per quality adjusted life year gained compared to usual care. Nurse specialists also provide quantitatively more care while using fewer financial resources.

Steuten et al. found a 54 percent decrease in hospital admission costs with patients assigned to the DNS. While total costs did not change significantly they maintain that the Maastricht DMP model is the cost-effective when incorporating quality of life measures.¹⁵

Bundled Payments

While cost savings from the national 2010 payment reforms have varied across care groups, studies demonstrate an increase in overall costs for diabetes-specific bundled payment care groups. A longitudinal-retrospective study compared diabetes DMPs funded by bundled payments with alternative payment structures and traditional fee-for-service care and found an increase of €287 (\$366, USD 2015) per patient enrolled in bundled payment DMPs from the first to the second year after implementation.²⁴ The study attributed the increase in part to start-up costs. Another study also found an €142 (\$175 USD 2012) increase in specialist costs per bundled patient diabetes patients, compared to the control group.³

Case Study: Zio Integrated Care Network, The Netherlands

Part IV: Translation Opportunities and Implementation Barriers

This section identifies key components of Zio’s reforms, including internal and external factors that facilitated Zio’s implementation of their model, and offers translation opportunities that could support further reforms in the US (provided in Figure 2). This section also discusses some of the challenges that Zio faced.

Table 2: Translation Opportunities

	Component	Success Factor	Translation Opportunity
Organizational Competencies (from provider perspective)	Care Coordination	Horizontal integration of care at the primary level	Reallocate tasks across GPs and other providers to enable care to shift from hospital to community
	Governance and Culture	Tradition of multidisciplinary cooperation facilitated integration	Distribute labor to nurses and physician assistants to expand clinical bandwidth
Accountable Care Policies (from multi-stakeholder perspective)	Population	Stratification based on patient characteristics	Leverage clinical records, biomedical, and demographic records to identify and stratify patients based on care needs
	Performance Measures	Bundled payment tied to processes and outcomes metrics	Include indicators that link both process and outcome measures
	Continuous Improvements	Data collected and shared continuously with GPs and nurses	Provide real-time feedback loops
	Financial & Non-Financial Incentives	Physician remuneration conditional on achieving metrics in bundled-payment contract	<ul style="list-style-type: none"> Set outcome milestones and focus on aligning cost and care incentives Where appropriate, design models that prioritize collaboration over competition to achieve buy in from multiple stakeholders¹⁴
	Care Coordination and Transformation	Shifting lower-level tasks to nurses to disburden physicians	Train non-physicians providers to fill gaps in primary care, where appropriate
Health Policy Environment (from policymaker perspective)	Regulatory	Legislation authorizing nurses and physician assistants to provide some prescriptions and medical operations	Re-evaluate legal barriers to distribution of clinical labor to expand care capacity
	Political	<ul style="list-style-type: none"> Bundled payments united diverse stakeholders Innovators facilitated the implementation of pilot models in their regions 	<ul style="list-style-type: none"> Involve different stakeholders in designing and implementing the model to secure buy-in from partners Implement reforms gradually through pilot project to overcome hesitation from providers or other stakeholders

CHALLENGES

Provider Resistance to Adoption

Some GPs initially resisted the transition to integrated care due to a perceived loss of autonomy from increased transparency requirements, strict protocols, and nurses taking over a large portion of diabetes care. Providers overcame this hesitation after initial results showed integrated care supported GPs by shifting routine tasks to nurses. A tradition of collaboration across GPs and specialists also facilitated the

Case Study: Zio Integrated Care Network, The Netherlands

uptake. Additionally, specialists employed at the university hospital received a regular salary independent of the number of patients treated. This removed competition between providers when patients increasingly used primary instead of secondary care.⁸

Negotiating with GPs and Insurers

Zio found it challenging to mediate between the goal of insurers to lower costs and the goal of health professionals to deliver high quality care. However, financial pressures in the Dutch health sector facilitated cooperation. Care groups also benefited GPs by representing and focusing their interests in negotiations with other parties.^{8,14}

Balancing Standardization and Personalized Care

Many diabetes patients suffered from multiple co-morbidities, which complicated a disease-specific approach to care. A strict, protocol-based intervention led to an ineffective one-size-fits-all approach, and failed to improve quality or outcomes. However, standardization of protocols was necessary to properly implement and evaluate innovations in care. To balance the need for improvement with patient diversity, the roles of the Practice Nurse and Specialist Nurse were expanded to supplement provider personnel. Additional solutions that are currently in progress include integrating databases to better coordinate care.

Dr. Huizing and Dr. Vrijhoef provided the source data for this document and are responsible for the accuracy of the content. Please contact Bert Vrijhoef (b.vrijhoef@mumc.nl) for further questions or comments.

References

1. Wammes J, Jeurissen P, Wester G. The Dutch Health Care System, 2015. *The Commonwealth Fund*. 2015 (2015 International Profiles of Health Care Systems):115-122.
2. Netherlands. World Health Organization. *World Health Organization Noncommunicable Diseases (NCD) Country Profiles 2014*; http://www.who.int/nmh/countries/nld_en.pdf?ua=1. Accessed August 15, 2016.
3. Struijs J, Mohnen S, Molema C, De Jong-van Til J, Baan C. *Effects of bundled payment on curative health care costs in the Netherlands: An analysis for diabetes care and vascular risk management based on nationwide claim data, 2007–2010*. RIVM rapport 260013001. 2012.
4. Raaijmakers LGM, Kremers SPJ, Schaper NC, et al. The implementation of national action program diabetes in the Netherlands: lessons learned. *BMC Health Serv Res*. 2015;15(1):1-8.
5. De Bakker DH, Struijs JN, Baan CA, et al. Early Results From Adoption Of Bundled Payment For Diabetes Care In The Netherlands Show Improvement In Care Coordination. *Health Aff (Millwood)*. 2012;31(2):426-433.
6. Struijs JN. How Bundled Health Care Payments Are Working in the Netherlands. *New Marketplace*. Vol 2016: New England Journal of Medicine; 2016.
7. Tsiachristas A, Hipple-Walters B, Lemmens KM, Nieboer AP, Rutten-van Molken MP. Towards integrated care for chronic conditions: Dutch policy developments to overcome the (financial) barriers. *Health Policy*. 2011;101(2):122-132.
8. Busetto L, Luijckx K, Huizing A, Vrijhoef B. Implementation of integrated care for diabetes mellitus type 2 by two Dutch care groups: a case study. *BMC Fam Pract*. 2015;16(1):1-10.
9. Lienhardt C, Lönnroth K, Menzies D, et al. Translational Research for Tuberculosis Elimination: Priorities, Challenges, and Actions. *PLoS Med*. 2016;13(3):e1001965.
10. Struijs JN, Baan CA. Integrating Care through Bundled Payments — Lessons from the Netherlands. *N Engl J Med*. 2011;364(11):990-991.
11. Vrijhoef HJM, Spreeuwenberg C, Eijkelberg IMJG, Wolffenbuttel BHR, van Merode GG. Adoption of disease management model for diabetes in region of Maastricht. *BMJ : British Medical Journal*. 2001;323(7319): 983-985.
12. Assessing chronic disease management in European health systems: concepts and approaches. In: Nolte E, Knai C, Saltman RB, eds. Vol 1. United Kingdom: European Observatory on Health Systems and Policies; 2014.
13. De Bruijn-Geraets DP, Van Eijk-Hustings YJ, Vrijhoef HJ. Evaluating newly acquired authority of nurse practitioners and physician assistants for reserved medical procedures in the Netherlands: a study protocol. *J Adv Nurs*. 2014;70(11):2673-2682.
14. Nolte E, Frølich A, Hildebrandt H, Pimperl A, Schulpen GJ, Vrijhoef HJ. Implementing integrated care: A synthesis of experiences in three European countries. *International Journal of Care Coordination*. 2016;0(0): 1-15.
15. Steuten LMG, Vrijhoef HJM, Landewé-Cleuren S, Schaper N, Van Merode GG, Spreeuwenberg C. A disease management programme for patients with diabetes mellitus is associated with improved quality of care within existing budgets. *Diabet Med*. 2007;24(10):1112-1120.

Case Study: Zio Integrated Care Network, The Netherlands

16. Elissen AM, Hertroijs DF, Schaper NC, Vrijhoef HJ, Ruwaard D. Profiling Patients' Healthcare Needs to Support Integrated, Person-Centered Models for Long-Term Disease Management (Profile): Research Design. *International Journal of Integrated Care*. 12(2):1-11.
17. Wensing M, van Lieshout J, Jung HP, Hermsen J, Rosemann T. The Patients Assessment Chronic Illness Care (PACIC) questionnaire in The Netherlands: a validation study in rural general practice. *BMC Health Serv Res*. 2008;8(1):1-6.
18. Vrijhoef HJM, Spreeuwenberg C, Eijkelberg I, Wolffenbuttel BHR, van Merode GG. Adoption of disease management model for diabetes in region of Maastricht. (Education and debate). *British Medical Journal*. Vol 3232001:983+.
19. Arts EE, Landewe-Cleuren SA, Schaper NC, Vrijhoef HJ. The cost-effectiveness of substituting physicians with diabetes nurse specialists: a randomized controlled trial with 2-year follow-up. *J Adv Nurs*. 2012;68(6): 1224-1234.
20. Vrijhoef HJM, Diederiks JPM, Spreeuwenberg C. Effects on quality of care for patients with NIDDM or COPD when the specialised nurse has a central role: a literature review. *Patient Educ Couns*. 2000;41(3):243-250.
21. Struijs J, De Jong-van TJ, Lemmens L, Drewes H, de Bruin S, Baan C. Three years of bundled payment for diabetes care in the Netherlands : Impact on health care delivery process and the quality of care. RIVM; 2012: [https://www.researchgate.net/publication/233407675 Three years of bundled payment for diabetes care in the Netherlands Effect on health care delivery process and the quality of care](https://www.researchgate.net/publication/233407675_Three_years_of_bundled_payment_for_diabetes_care_in_the_Netherlands_Effect_on_health_care_delivery_process_and_the_quality_of_care). Accessed 1/9/2017.
22. Elissen AM, Duimel-Peeters IG, Spreeuwenberg C, Spreeuwenberg M, Vrijhoef HJ. Toward tailored disease management for type 2 diabetes. *Am J Manag Care*. 2012;18(10):619-630.
23. Vrijhoef HJ, Diederiks JP, Spreeuwenberg C, Wolffenbuttel BH. Substitution model with central role for nurse specialist is justified in the care for stable type 2 diabetic outpatients. *J Adv Nurs*. 2001;36(4):546-555.
24. Mohnen S, Baan C, Struijs J. Bundled Payments for Diabetes Care and Healthcare Costs Growth: A 2-Year Follow-up Study. *Am J Manag Care*. 2015;3(4).