Introducing a method for implementing value based health care principles in the full cycle of care: Using atrial fibrillation as a proof of concept


To link to this article: https://doi.org/10.1080/20479700.2020.1810464

Published online: 25 Aug 2020.
Introducing a method for implementing value based health care principles in the full cycle of care: Using atrial fibrillation as a proof of concept

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\textbf{ABSTRACT}

\textbf{Background:} Value Based Health Care (VBHC) is a well-known strategy in most countries, amongst whom the Netherlands, to improve patient-relevant outcomes and reduce healthcare costs. However, a methodology to implement VBHC principles in the full care cycle is lacking. This study describes a stepwise approach to implement and continuously improve patient-relevant outcomes in the total care delivery value chain.

\textbf{Methods:} Key principles of VBHC are used to develop a stepwise methodology in which healthcare providers of primary, secondary, and tertiary care collaborate in a physician-driven initiative called the Netherlands Heart Network. The methodology incorporates the Plan-Do-Study-Act cycle to ensure continuous improvement of patient-relevant outcomes. To outline the presented methodology, the medical condition atrial fibrillation is used as a proof of concept.

\textbf{Results:} Using the stepwise methodology results in an adequate registration of patient-relevant outcomes and a structured evaluation of adherence to prevailing guidelines. Based on the followed methodology, detailed improvements are defined in order to optimize patient-relevant outcomes.

\textbf{Conclusions:} The presented methodology provides a description how to implement VBHC principles in the full cycle of care. Since this methodology is a first concept, future research should apply and assess the stepwise methodology in other fields and for different medical conditions.

\textbf{Introduction}

Value Based Health Care (VBHC) is a well-known strategy in healthcare [1–4] that aims to improve patient value, which is defined as outcomes that matter most to patients divided by the costs of healthcare delivery [1,3]. According to Porter's outcome measurement landscape [1,5], organizing processes and structures within the healthcare setting is a precondition to realizing the best patient-relevant outcomes. To structurally measure and improve the patient value for specific medical conditions, researchers and/or healthcare providers must apply the key components of the VBHC strategy as defined by Porter (i.e. organize into integrated practice units; measure outcomes and costs for every patient; move to bundled payments for care cycles; integrate care delivery across separate facilities; expand excellent services across geography and build an enabling information technology platform) [2–4,6]. Healthcare providers are advised to start the shift towards a more value-driven system by measuring and improving outcomes [6]. Although various best practices are mentioned in the literature regarding some elements of the VBHC strategy, so far the focus has mostly been on measuring and improving outcomes within institutions [7–9]. This leaves important parts of the total care delivery value chain unexamined. Moreover, other elements of the VBHC strategy have not been implemented and the order in which the various components will be implemented is still unclear in several healthcare systems, amongst whom the Netherlands. This lack of clarity may also be related to the diversity of healthcare systems. Currently, this limits the impact of VBHC because all dimensions of the VBHC strategy are expected to be mutually reinforcing, and should thus be examined [6].

One of the components introduced by Porter is ‘integrate care delivery across separate facilities’ [6]. The purpose of this component is to strengthen the collaboration between healthcare professionals in primary, secondary, and tertiary care, as all involved healthcare providers contribute to the outcomes...
achieved and costs incurred in the treatment of all patients with the same medical condition [4,6]. In such a multi-institutional network, other crucial aspects in VBHC become increasingly challenging. Valid and reliable registration of outcomes in accordance with the quality measures that matter most to patients, as well as using process and structure indicators that are interrelated to these outcomes [1] and are in accordance with (inter)national guidelines, is essential for making VBHC work in a care network. Numerous studies have indicated that adherence to guidelines within institutions has a positive impact on improving patient-relevant outcomes [10–14]; such data are lacking for care networks. In addition, until now, there has been no information regarding which steps should be taken in order to improve outcomes of the full cycle of care (i.e. involving all relevant stakeholders in primary, secondary, and tertiary care) in an active multidisciplinary quality network of healthcare providers.

Atrial fibrillation is a frequently diagnosed arrhythmia in Europe [15] and it is often treated by multiple healthcare providers. Prior research by Porter [6] suggests that extensive collaboration between healthcare providers in primary, secondary, and tertiary care may enable improvements in patient-relevant outcomes and reduce healthcare costs. However, until now such a multi-institutional quality network for atrial fibrillation care for measuring and continuously improving patient-relevant outcomes and reducing health care costs has not been initiated.

Continuous improvement of patient value using quality indicators and interrelated process and structure indicators is crucial in VBHC [1]. The cycle of Deming (i.e. Plan-Do-Study-Act cycle (PDSA cycle)) may be a helpful framework to continuously update indicators in quality research [16]. Integrating an outcome-based improvement cycle into VBHC has already proven to be of added value [17]. Furthermore, integrating the continuous improvement of patient-relevant outcomes and related costs into a PDSA cycle, covering a multi-provider regional network, creates a unique, reproducible and structured instrument with the potential to continuously increase the patient value in the full cycle of care.

Although there are several quality models for single institutions, innovative and structured procedures to continuously improve VBHC principles in the full cycle of care are still lacking in several countries, amongst whom the Netherlands. Therefore, the goal of the present study is to introduce a stepwise methodology that is doctor driven and patient centered to implement and continuously improve patient-relevant outcomes in the total care delivery value chain. In addition, completeness of data collection on outcomes and adherence to process and structure indicators will be shown for atrial fibrillation to outline the presented methodology.

**Methods**

**Design and setting**

In the present study, a stepwise methodology is introduced using key principles of the VBHC strategy to define, implement, evaluate, and continuously improve patient-relevant outcomes and costs in the full cycle of care. This stepwise methodology is developed within a clinician driven network initiative, involving four hospitals (i.e. one heart center and three referring hospitals) and four general practitioner (GP) organizations in a suburban region in the Netherlands (i.e. South East Brabant region), called the Netherlands Heart Network (NHN) [18]. The NHN is an example of an organization that facilitates the integration of care delivery facilities and aims to contribute to the continuous improvement of value for patients with a heart disease. In order to develop a VBHC network, NHN develops transmural standards of care for highly prevalent medical conditions associated with high costs and a strong need for multi-provider collaboration. The NHN provides a platform for healthcare providers to collaborate and to increase the patient value by defining transmural quality standards using VBHC principles as well as a shared PDSA cycle, in the total care delivery value chain. The participating multidisciplinary healthcare providers, consisting of providers in primary, secondary, and tertiary care (i.e. cardiologists, nurses, GPs, pharmacists, ambulance service, home care organizations, etc.), remain responsible for the implementation of the quality standards and improvement projects within their own professional field.

In order to outline the results of this stepwise methodology, an elaboration of one highly prevalent medical condition in the field of cardiology will be illustrated in this paper, namely atrial fibrillation (i.e. arrhythmic disorder) [19].

**Stepwise methodology**

To be able to improve patient-relevant outcomes in the full cycle of care through a stepwise approach, a transmural standard of care is developed by healthcare providers in primary, secondary, and tertiary care. Support for the development and implementation of the transmural standard of care is increased by giving multidisciplinary healthcare providers the lead in this procedure, following a predefined roadmap concerning the following elements (Figure 1):

STEP 1: A multidisciplinary network team is formed with a delegation of multidisciplinary healthcare providers from primary (i.e. GPs and primary care nurses), secondary (i.e. cardiologists and nurses),
and tertiary care (i.e. electrophysiologists and cardiac surgeons).

STEP 2: The medical condition is defined in which a uniform definition is described for the primary, secondary, and tertiary care process (i.e. based on prevailing medical standards and guidelines).

Subsequently, a selection is made of the most relevant outcomes and initial conditions for the medical condition. For this procedure the validated indicator sets of the Netherlands Heart Registration [20] are used.

STEP 3: A description is made of the care delivery value chain (CDVC) of the medical condition in which the pathway of the patient is described in the full cycle of care.

STEP 4: A description is made of the required protocols of essential elements in the CDVC that contribute the most to outcomes and costs.

STEP 5: A selection of process and structure indicators regarding elements that contribute most to managing outcomes [1] and costs is made to be able to measure the adherence to the regional standard.

STEP 6: In order to assess whether the implementation is performed as intended, an audit is conducted based on the quality indicators (i.e. patient-relevant outcomes, process and structure measures). In establishing the audit criteria, healthcare providers determine the norm of implementation of the various indicators. Finally, a Regional Transmural Agreement (RTA) is developed as a summary of the relevant steps in the transmural standard of care.

Plan – do – study – act cycle

The stepwise methodology incorporates the PDSA cycle [16] in order to facilitate continuous (e.g. yearly) improvement of outcomes and costs. After the finalization of the RTA this continuous improvement cycle is started and includes the following elements (Figure 2):

1. The first step after the development is the implementation of the transmural standard of care in the full care cycle.

2a. Within six months after the implementation, an audit is performed by an audit team of healthcare providers. In every organization, at least two auditors assess whether the implementation is performed as intended. During the audit, amongst others, the adherence to process- and structure indicators is assessed. Afterwards, an audit report is composed with the findings and advice for the specific organization.

2b. Healthcare organizations register the patient-relevant outcome measures in the Electronic Medical Records (EMR) of the healthcare organizations. Every year the outcomes are extracted by data analysts in order to analyze the outcomes so that the most relevant findings can be included in the revised standard of care. To assess the most relevant findings statistical software packages are used.

2c. To include the opinion of patients, focus group interviews are annually organized for every medical condition. The main findings are analyzed using qualitative research techniques in order to update the current standard of care.

2d. Subsequently the guidelines and national standards are reviewed and renewals are taken into account to update the current standard of care.

2e. In addition, leading medical industry organizations are invited to pitch potential innovations for the medical condition. Suitable innovations have the potential to increase patient-relevant outcomes and reduce healthcare costs.

3. Based on all the input the multidisciplinary network team decides, supplemented with the quantitative analyses regarding the patient relevant outcomes, which improvements of the transmural standard of care are needed to improve the relevant outcomes and reduce the healthcare costs. The main improvements are selected based on criteria relating to increasing patient value and assessing the feasibility and capacity change:

a. The improvement must concern a large group of patients;

b. The improvement needs to have an impact on the (reduction of) healthcare costs;

c. A maximum of three improvements are suggested per cycle (for every medical condition). By restricting the number of improvements, the effects can be evaluated and the implementation is more feasible;

d. At least one improvement needs to be implemented regarding the patients’ perspective;

e. The improvement has to have an impact on patients’ satisfaction;
f. The improvement must have an impact on the healthcare providers in primary, secondary, and tertiary care.

4. Thereafter, adaptations to the standard of care are made and the standard of care is re-implemented in practice. Healthcare providers are responsible for these adaptations and the re-implementation of the standard of care.

To illustrate the relationship between the stepwise methodology and the embedded VBHC principles in Table 1 the outline is presented.

**Results**

Based on the PDSA cycle (Figure 2), an outline is provided below of the application of the stepwise methodology in the NHN for atrial fibrillation. Subsequently, the results of the registration density of the patient-relevant outcomes (N > 450 newly diagnosed atrial fibrillation patients) and the adherence to guidelines and protocols (i.e. based on the process and structure indicators) are illustrated in Table 2.

**Stepwise methodology for atrial fibrillation**

**PLAN**

To create a high-expertise multidisciplinary setting for atrial fibrillation, a network team is formed consisting of four cardiologists (from four different hospitals), two GPs (with special knowledge and interest in heart conditions), four nurses from the outpatient atrial fibrillation clinic, and a delegation from the diagnostic center. This network team has regular meetings (i.e. every six to eight weeks) and develops the transmural standard of care for atrial fibrillation. After the development and implementation, the network team is responsible for the continuous improvement of the developed care standard. In Table 2 the main elements of the transmural standard of care are outlined. Subsequently, the RTA is developed as a final element of the transmural standard of care.

**DO**

The healthcare providers themselves are responsible for the implementation of the transmural standard of care. The healthcare providers need to adjust their procedures (i.e. in accordance with the process and structure indicators).
Table 1. Relationship between the stepwise methodology and the embedded VBHC principles.

<table>
<thead>
<tr>
<th>PDSA CYCLE</th>
<th>OPERATIONALIZATION NHN</th>
<th>EMBEDDED VBHC PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN</td>
<td>Organizing multidisciplinary network team</td>
<td>Organize healthcare for patient groups with the same medical condition</td>
</tr>
<tr>
<td></td>
<td>Defining medical condition</td>
<td>Measure and improve outcomes for each patient covering:</td>
</tr>
<tr>
<td></td>
<td>Indicating most relevant outcomes and initial conditions</td>
<td>o All tiers of the outcome measure hierarchy</td>
</tr>
<tr>
<td></td>
<td>Defining protocols</td>
<td>o The care delivery value chain in the full cycle of care</td>
</tr>
<tr>
<td></td>
<td>Indicating process-and structure indicators</td>
<td>o Measure and improve relevant process-and structure indicators contributing to the outcomes that matter most to patients</td>
</tr>
<tr>
<td></td>
<td>Defining RTA (see Figure 1)</td>
<td>o Measure and improve costs related to healthcare delivery</td>
</tr>
<tr>
<td>DO</td>
<td>Implementation of standard of care (see Figure 2)</td>
<td>Integrate care delivery systems</td>
</tr>
<tr>
<td>STUDY</td>
<td>Performing audit</td>
<td>Use a patient centered approach, involve patients in deciding what matters most</td>
</tr>
<tr>
<td></td>
<td>Analyzing patient relevant outcomes</td>
<td>Let physicians lead the change</td>
</tr>
<tr>
<td></td>
<td>Organizing focus group interviews</td>
<td>o Adaptations towards the standard of care</td>
</tr>
<tr>
<td></td>
<td>Evaluating potential innovations (see Figure 2)</td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>Defining improvements to the standard of care (see Figure 2)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Main elements of the transmural standard of care for atrial fibrillation and the norm- and audit scores of the outcome-, process- and structural indicators.

<table>
<thead>
<tr>
<th>ATRIAL FIBRILLATION</th>
<th>NORM SCORE</th>
<th>AUDIT SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Definition [19]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerns an arrhythmic disorder characterized by (1) irregular RR interval (without the presence of a repetitive pattern), (2) absence of P-waves on the surface ECG, and (3) variable atrial cycle length (if visible). In addition, also an arrhythmic disorder is present when atrial fibrillation for at least 30 s is observed by cavitation or rhythm recording. AF is categorized into: • First diagnosed AF (i.e. AF that has not been diagnosed before, irrespective of the duration of the arrhythmia or the presence and severity of AF-related symptoms) • Paroxysmal AF (i.e. self-terminating, in most cases within 48 h. Some AF paroxysms may continue for up to 7 days) • Persistent AF (i.e. AF that lasts longer than 7 days, including episodes that are terminated by cardioversion, either with drugs or by direct current cardioversion, after 7 days or more) • Long-standing persistent AF (i.e. continuous AF lasting for ≥1 year when it is decided to adopt a rhythm control strategy) • Permanent AF (i.e. AF that is accepted by the patient and physician)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2. Outcome measures* [21]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHRa score (i.e. measured by EHRa I = No symptoms; EHRa II = Mild symptoms, normal daily activities not affected; EHRa III = Severe symptoms, normal daily activity affected; EHRa IV = Disabling symptoms, normal daily activity discontinued)</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>CVA or TIA (i.e. amount of CVAs or TIs)</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>Major bleedings (i.e. measured with the BARC-index)</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>Adverse effects of medication (i.e. percentage of patients that report serious adverse events due to rate or rhythm control medication)</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>3. Initial conditions [21]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of AF (i.e. first diagnosed AF, paroxysmal AF, persistent AF, long-standing persistent AF, permanent AF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comorbidities (i.e. hypertension, coronary artery disease, heart failure, peripheral artery disease, CVA, diabetes mellitus, Chronic Obstructive Pulmonary Disease, thyroid disease, obesity, valvular heart disease, OSAS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHA2DS2-VASc score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAS-BLED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Process indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of AF is documented</td>
<td>95%</td>
<td>98.8%</td>
</tr>
<tr>
<td>AF is established using ECG registration/rhythm recording</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>Choice for rate/rhythm control is documented</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Echocardiogram is performed within 6 months after diagnosis</td>
<td>95%</td>
<td>98.8%</td>
</tr>
<tr>
<td>Results of laboratory research are documented</td>
<td>95%</td>
<td>98.8%</td>
</tr>
<tr>
<td>The CHA2DS2-VASc-score is documented</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>Stable AF-patients are referred to GP</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>For instable AF-patients the reason for outpatient follow-up is documented</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>AF-patients with persistent complaints are referred to a tertiary center</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>For all AF-patients who are registered for an ablation regarding AF, the referring hospital is informed within 7 days about the decision of the heart team</td>
<td>90%</td>
<td>96.7%</td>
</tr>
<tr>
<td>Time between setting the indication and the ablation is not more than 12 weeks</td>
<td>90%</td>
<td>96.7%</td>
</tr>
<tr>
<td>5. Structure indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the hospital an outpatient AF clinic is operational for newly diagnosed AF-patients</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>The outpatient AF clinic is operated by an AF-nurse and supervised by a cardiologist</td>
<td>90%</td>
<td>97.5%</td>
</tr>
<tr>
<td>In the outpatient clinic the needed facilities are arranged to inform and physically examine AF-patients</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>A referral system is designed to refer new AF-patients by the GP</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Registrations in the outpatient AF clinic are performed in an EMR</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>In the tertiary center the EP-team meets at least once a week to discuss AF-patients</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>The ECG with AF has been received from the GP</td>
<td>100%</td>
<td>90%</td>
</tr>
</tbody>
</table>

AF = atrial fibrillation; RR = Riva-Rocci (blood pressure); ECG = electrocardiogram; EHRA = European Heart Rhythm Association; CVA = cerebrovascular accident; TIA = transient ischemic attack; BARC = Bleeding Academic Research Consortium; AFEQT = Atrial Fibrillation Effect on QualiTy of Life; OSAS = obstructive sleep apnea syndrome; CHA2DS2-VASc = score for atrial fibrillation stroke risk; HAS-BLED = score for major bleeding risk; GP = general practitioner; EMR = Electronic Medical Record; EP= Electro Physiologists.

*Detailed information regarding the definition of the outcome measures can be found elsewhere [19–21].

for patients diagnosed with this specific medical condition. To be able to select the most relevant improvement project, the healthcare providers within the network team used their expert opinion and statistical analyses of the outcome measures and initial conditions to assess the potential impact of improvements on the patient value of patients diagnosed with atrial fibrillation. Since the multidisciplinary network team includes the main expertise from primary, secondary, and tertiary care for a specific heart condition (i.e. in this case atrial fibrillation), the healthcare providers in the network team are mandated to select the most relevant improvements. During the selection of the most relevant improvements, the feasibility and change
capacity is also taken into account, to enlarge the potential effects of the improvement. Based on the results and the criteria for selecting improvement projects for atrial fibrillation, the following improvements were defined:

- Update of the patient information folder for atrial fibrillation patients;
- Adaptations of the referral system in order to receive all ECGs of patients who were diagnosed with atrial fibrillation and referred to the hospital;
- In the diagnostic centers, other relevant healthcare providers now have the possibility to view the needed information;
- Atrial fibrillation nurses were instructed to call and remind patients to complete and send the quality of life questionnaire back to the outpatient clinic;
- Strategy to screen for undiagnosed atrial fibrillation by GPs with an innovative instrument.

The PDSA cycle is repeated annually. Therefore, during the following audit procedure it will be evaluated whether the improvement projects have resulted in better patient-relevant outcomes and reduced healthcare costs.

Discussion

In this study, a first concept of a stepwise methodology to implement and continuously increase the patient value in the full cycle of care using key principles of VBHC is presented and outlined for atrial fibrillation as a proof of concept. Based on the qualitative and quantitative audit information and the first positive results, it appears the stepwise approach is feasible for implementing VBHC principles in the total care delivery value chain when a multi-institutional network is used. Furthermore, the PDSA cycle was applied in order to continuously improve patient-relevant outcomes and to define improvement projects to increase value for cardiac patients.

The results obtained from using this stepwise methodology for atrial fibrillation suggest that it is feasible to implement VBHC principles in a network organization. Using the methodology, healthcare providers in primary, secondary, and tertiary care involved in the NHN succeeded in defining patient value in terms of outcomes and costs as a shared goal. Subsequently, they agreed on standards of care, directly eliminating cases of inefficiency and improving several parts of the care pathway, e.g. by improving communication between healthcare providers. The results show a high registration completeness of patient-relevant outcomes and a structured evaluation of adherence to prevailing guidelines (i.e. process and structure indicators). These findings are in accordance with the results presented in a study by Hendriks et al. [24] in which adherence to guidelines, by introducing a protocol-driven outpatient atrial fibrillation clinic, resulted in improved patient-relevant outcomes and reduced healthcare costs. In addition, conditions that potentially result in improved healthcare quality in the total care delivery value chain (i.e. transmural agreements, registration of main patient-relevant outcomes, adherence to guidelines, following a PDSA cycle) are included in the presented stepwise methodology, which increases the potential of improved patient-relevant outcomes. Additionally, based on Porter’s outcome measurement landscape [1,5], process and structure indicators are interrelated and supportive of patient-relevant outcomes. This suggests that measuring and improving process and structure indicators in a structured manner supports the improvement of outcomes, which is the main component of the presented stepwise methodology. The implementation of the methodology in practice has already resulted in improved patient-relevant outcomes in the field of atrial fibrillation in a suburban region in the Netherlands [25] and in the assessment of the quality of care of atrial fibrillation patients [26]. However, a solid methodology in which outcomes are used for improvement projects in the full care cycle within a PDSA cycle is still lacking [27].

A crucial aspect in VBHC is that (multidisciplinary) healthcare providers are important drivers of initiatives [6]. The presented stepwise methodology to implement VBHC principles in the full cycle of care focusses on the medical conditions in which healthcare providers in primary care (i.e. GPs, ambulance service, thrombosis service, pharmacists, and diagnostic centers), secondary care (i.e. cardiologists and nurses), and tertiary care (i.e. electrophysiologists and thorax surgeons) are in the lead. With this approach, the responsibility and support for both the development and implementation of the transmural standard of care stays among the healthcare providers and is free of institutional interests. It is to be expected that administrative interference in healthcare organizations enables discussions in which institutional interests (i.e. budgets or substitution of care) may be more central than the perspectives of patients.

The VBHC strategy is defined in six interrelated domains [6]. Five domains support the main principle in VBHC, namely measuring and improving outcomes and related costs. In VBHC, increasing patient value should become the overarching goal for all stakeholders involved [1]. As a consequence, a different line of thoughts is crucial for developing reimbursement or purchasing models that focus on value instead of volume. In the United States the MACRA legislation is introduced as a methodology to reshape the healthcare delivery, by eliminating the fee-for-service payments into a value-based payment system [28–30]. Other countries, amongst whom the Netherlands,
may learn from those disruptive innovations since their experiments regarding value-driven financial models are still on a basal level [31,32]. Reasons may be that the implementation of VBHC principles differ due to diverse healthcare systems. As there is no hard evidence available regarding the optimal overall healthcare system, the best route for implementing VBHC principles needs to be determined. Some healthcare systems, for example in the Netherlands, lend themselves more to a doctor-driven and patient-centered approach to build a multidisciplinary value-driven network, while other healthcare systems may be better for the introduction of payment models as a first step. The best approach is still unidentified and needs to be assessed in future research.

Limitations

Despite the fact that the presented stepwise methodology has been shown to be successfully implemented, it may also have suffered from some limitations. However, in the PDSA cycle the outcomes will be evaluated and differences in outcomes may lead to improvement projects. The first focus is on the process of healthcare delivery. By focusing first on improving the care pathway, measuring and improving compliance with process and structure indicators – all of which were selected because of their proven relation with the selected outcomes that matter most to patients – it is expected that providers will be able to increase the patient value. Although the stepwise methodology seems promising [25], the exact relationship between process, structure, and outcomes needs to be assessed in future research. As a consequence of improved outcomes, healthcare providers are also expected to be able to reduce costs, as improving the quality of care may be related to a reduction of costs [33,34].

A second limitation of the presented methodology may be that currently only patient-relevant outcomes are included. In the patient value equation, both outcomes and costs are the main aspects of VBHC. Since improving outcomes is most relevant for patients and most interesting for healthcare providers, it may be advisable to focus on outcomes first. Nevertheless, after the effectiveness of the stepwise methodology is shown regarding outcomes, healthcare costs will be assessed and become a part of the PDSA cycle in the near future.

The presented methodology seems to be an effective approach; however, it may be that the lack of support of participating organizations decreases the strength of the implementation of the transmural standards of care. Prior initiatives, such as the Children’s Hospital of Philadelphia [35], have already shown to be effective with a central management. Therefore, the stepwise methodology may have even more impact in an integrated healthcare system in which other aspects of the VBHC strategy, e.g. building integrated practice units or introducing bundled payment models, can be centrally implemented.

Conclusions

A stepwise methodology is presented in order to implement VBHC principles in the full cycle of care in a cardiac network organization, including first results of implementing the proposed methodology for patients suffering from atrial fibrillation. The methodology was successfully implemented in a Dutch regional network, resulting in a high registration density of patient relevant outcomes, good adherence to the regional transmural standard and selection of first regional projects to improve outcomes and costs. Future research will be conducted to establish the impact of the presented methodology on patient value.

Acknowledgements

The Netherlands Heart Network is supported by various medical industries (i.e. Medtronic, BMS Pfizer, Bayer, Boehringer Ingelheim, Abbott, Roche Diagnostics, Novartis, Servier & Vifor Pharma). However, the sponsors of the Netherlands Heart Network were not in any way involved in the writing of this manuscript.

Disclosure statement

Besides the funding of the medical industries, the authors declare there are no conflicts of interest.

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References

[8] van Veghel HPA, Marteijn M, de Mol B, on behalf of the Measurably Better Study Group (The Netherlands) a Advisory Board. First results of a national initiative to enable quality improvement of cardiovascular care by transparently reporting on
9.


