The Triple Aim framework in the context of primary healthcare: A systematic literature review

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Abstract

The Triple Aim framework is an increasingly popular tool for designing and assessing quality improvements in the health care sector. We systematically reviewed the empirical evidence on the application of the Triple Aim framework within primary healthcare settings since its inception almost a decade ago. Results show that primary healthcare providers varied in their interpretation of the Triple Aim framework and generally struggled with a lack of guidance and an absence of composite sets of measures for performance assessment. Greater clarity around application of the Triple Aim framework in primary healthcare is needed, especially around the selection and implementation of purposeful measures from locally available data. This review highlights areas for improvement and makes recommendations intended to guide future applications of the Triple Aim in the context of primary healthcare.

Keywords: health policy; health system reforms; healthcare innovation; healthcare quality; redesigning healthcare organisations; Triple Aim

\textit{JEL codes:} I10, I18, I19

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1. Introduction

Modern healthcare organisations are increasingly looking for innovative ways to redesign complex and dated systems in order to achieve effective, efficient and sustainable healthcare delivery (Agrawal & Conway, 2014; Bergevin et al., 2016; Glazman, 2017). There is a pressing need to balance rising costs of medical care with public expectations for delivery of high-quality care. In 2008, the Institute for Healthcare Improvement (IHI) introduced the Triple Aim framework, with the primary goal of “improving the experience of care; improving the health of population; and reducing per capita costs” (Berwick, Nolan & Whittington, 2008, p. 760). The original intent was to provide a consolidated framework in order to guide systematic improvement initiatives associated with high quality healthcare services. Berwick and colleagues (2008) stressed that a strategic change, focused on all three dimensions simultaneously, at a system level, was needed in order to deliver desired outcomes. The authors believed that gains achieved in one dimension should not be at the expense of another and argued that a balanced and concurrent pursuit of all Triple Aim dimensions would ensure equity and high-quality care delivery (Berwick, Nolan & Whittington, 2008, p.760).

The importance of the Triple Aim was recognised and adopted as the means of addressing deficits in the healthcare delivery system in the USA (Calman, Golub & Shuman, 2012), by providing a holistic multi-faceted approach. This followed the Affordable Care Act (labelled ‘Obamacare’) in 2010, and Triple Aim’s subsequent adoption as the National Strategy for Quality Improvements in Healthcare (Tanenbaum 2016; US Department of Health & Human Services, 2017). Various other developed nations have embraced the principles of the Triple Aim and sought to apply them in healthcare redesign (Hendrikx et al., 2016).

Since its inception almost a decade ago, the definition of the Triple Aim has remained consistent (Mery, Majumder, Brown, & Dobrow, 2017). Within its individual dimensions, there have been significant refinements to the way in which this framework has been implemented and operationalized globally. In particular, the dimension “health of population” (referred to as population health hereafter) has been increasingly focused on improved health outcomes and equity of care; experience of care concentrated on clinical quality rather than patient satisfaction; and focus on higher efficiency and control of cost (Mery et al., 2017). Organisations appear to have consistently modified the Triple Aim framework in order to fit their own strategic objectives and local priorities or fulfil specific quality improvement aims (Whittington, Nolan, Lewis & Torres, 2015). Further to this, some
scholars identified that the original Triple Aim framework did not consider the experience of providers, advocating for inclusion of the critical role played by people tasked with delivery of care, and calling for the extension of the framework into a Quadruple Aim (Bodenheimer & Sinsky, 2014; Sikka, Morath & Leape, 2015).

Previous attempts to operationalise the Triple Aim framework have proven challenging, despite IHI publishing an authoritative guide on an informed approach to Triple Aim framework implementation and measures selection (Stiefel & Nolan, 2012); and additional scholarly work on framework design and its operationalisation (Beasley, 2009; Verma & Bhatia, 2016). Most commonly, healthcare organisations have struggled with identifying, in practical terms, what initiatives to pursue and measure within the Triple Aim framework, which essential processes and evaluation tools to implement and track over time, which project and programs to invest in, and how to scale the framework to different levels of care provision (McNells, Genevro, & Meyers, 2013; Ellison, 2012).

Healthcare organisations need guidance to successfully structure their practice environments in order to deliver quality patient care (Calman et al., 2012; Mery et al., 2017). However, little is known about the utility and the operationalisation of the Triple Aim framework, in particular the selection of guiding systems and specific measures that organisations used to deliver desired improvement initiatives.

This paper presents a systematic literature review on the operationalisation and application of the Triple Aim framework within the context of primary healthcare. The review answers the question: What is the evidence of the application of the Triple Aim within primary healthcare since its introduction in 2008? The aim was to investigate: 1) how was Triple Aim defined and operationalised in primary healthcare as primary improvement initiative and 2) how applicable is the Triple Aim within the primary healthcare system context. Addressing this aim allowed researchers to explore what is currently known about the Triple Aim framework as it has been reported within the primary healthcare context, draw conclusions on its usefulness, and consider what recommendations can be made for the future.

2. Method

The PRISMA statement guided this systematic literature review, by providing an outcome oriented methodological approach that is clear, transparent and reliable; a structured process that could be generalised and replicated in future studies (Liberati et al., 2009).
2.1 Literature Review protocol

The review protocol was developed by the research team including Griffith University and Gold Coast Primary Health Network researchers located in a regional area of the Australian coast. Methods, aims and the scoping criteria were detailed in advance in order to capture the maximum number of published articles. Of particular interest were manuscripts that provided insights on the interpretation of the Triple Aim framework, its concept designs, selection of parameters and formation of the essential criteria for each of the dimensions (e.g. how was population health defined and measured, what types of indicators were selected and why, and which types of data sets were collected).

Primary Health Networks have been established with the key objectives of increasing the efficiency and effectiveness of medical services for patients, particularly those at risk of poor health outcomes, and improving coordination of care to ensure patients receive the right care in the right place at the right time (Australian Government, Department of Health 2016). The objectives of primary healthcare networks closely align with the Triple Aim framework. This framework can act as a guide to assist these organisations in meeting their objectives. This context was considered appropriate, given that the pivotal role of primary healthcare systems in delivering effective health outcomes has been widely acknowledged (Macinko, Starfield & Shi, 2003; Starfield & Macinko, 2005).

2.2 Eligibility criteria

Types of studies: studies detailing implementation of the Triple Aim within the primary healthcare setting and articles discussing conceptualisation and application of the Triple Aim framework were included. No date limit was applied.

Type of interventions: Eligible papers had to describe the practical application of the Triple Aim in the primary healthcare context, including references to specific measures and indicators selected for the Triple Aim dimensions. This distinction was needed because numerous manuscripts made in-text reference to the overarching governance of the Triple Aim in their recommendations for system redesign, but provided little or no information on the actual framework or measures themselves.

The review process undertaken to narrow the search included early screening of the titles, abstracts and key words. In the instances where the use of the Triple Aim could not be determined from the abstract, a brief scan of the manuscript was undertaken to ascertain
suitability. Most commonly this was the case with North American papers where the Triple Aim was adopted as part of a national health strategy and referred to often.

Studies published in English: Only work published in the English language was eligible for inclusion. While the review considered the Triple Aim framework application on an international level, there was no capacity to analyse texts in other languages.

2.3 Search strategy

Four electronic databases were searched: Medline (Ovid); Embase; Cinahl; and Healthcare Management Database (Proquest). A team of health sciences librarians were consulted in the search process, identification of suitable key words and the appropriate database selection. Final search terms were approved by the principal investigators. The search ran from 29 May 2017, with last update being completed on 12 June 2017. All identified articles were exported to EndNote for categorisation. To complement the search strategy, the reference lists in the identified papers were reviewed in order to identify other suitable articles.

The initial search was performed in the Medline(Ovid) database using the term ‘triple aim’ and pairing it with phrases such as ‘primary healthcare’, ‘measures’, ‘value based’ or ‘trade-offs’ in order to identify potentially suitable studies (See Appendix A for full search items list). Such terms were considered broad, yet sufficient enough to allow for consideration of the Triple Aim Framework’s application in the primary care by means of suitable measures. Moreover, all three dimensions of the Triple Aim, namely ‘population health’, ‘experience of care’ and ‘per capita cost’ were also used in the search process to identify articles discussing the frameworks components but not explicitly mentioning Triple Aim. The search was open to terms appearing anywhere in the abstract, title or full text. Embase, Cinahl and Healthcare Management Database (Proquest) databases were searched next in order to yield further papers. All identified papers were exported to EndNote for further consideration.

2.4 Study selection

In order to minimise individual bias, the principal study investigator oversaw the article selection process where article screening was performed by one researcher and nominated articles were subsequently reviewed by two other research members.

Following the title and abstract screening, text manuscripts that met the selection criteria for full assessment were analysed. A brief statement was produced for each paper on the rationale for its inclusion or exclusion (see Appendix B). All papers presenting the Triple Aim implementation and listing specific framework measures were included. Identified
measures were categorised according to their alignment with the Triple Aim dimensions, applying a framework proposed by Stiefel and Nolan (2012) (see Appendix C). The sample size and scientific quality of the articles was not evaluated, because the primary interest of the review was to explore how the Triple Aim framework was applied, therefore all eligible studies were considered as equally important.

Additionally, content analysis included the use of thematic synthesis (Thomas & Harden, 2008), where Triple Aim concepts identified in one study when compared to similar concepts in another study. This methodological approach was adopted in order to answer the underlying question of 'what works' in practice.

3. Results

3.1 General studies description

The collective search of the four databases produced an initial total of 983 items (Figure 1). After duplicate records were removed, a total of 265 articles were examined in order to determine suitability and alignment to the primary study aims, with 17 full-text papers deemed eligible for inclusion, and a total of 6 papers fully analysed.
Of the 6 papers included in the analysis, 3 were published in 2015 or later, indicating that publication of evidence on the application of the Triple Aim by primary healthcare providers is recent. Evidence on the specific Triple Aim measures was found in the selected articles, with strong focus on the evaluation of the impact of the interventions at a practice level. An overview of the studies and the aggregate Triple Aim measures used are listed in Table 1.
<table>
<thead>
<tr>
<th>No</th>
<th>Author</th>
<th>year</th>
<th>Level of application</th>
<th>Experience of Care Measures</th>
<th>Population Health Measures</th>
<th>Cost Measures</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Donahue et al.</td>
<td>2015</td>
<td>27 single site primary care providers delivering family, internal and pediatric medicine in USA</td>
<td>Provider continuity of care; variety of in-house patient satisfaction surveys; timely access measure to the next available appointment</td>
<td>Health outcome measures: preventative colorectal cancer screening, nephropathy screening, mammography screening, flu shot, immunization rates in children</td>
<td>Disease burden measures: any two of chronic disease measures - diabetes, hypertension, cognitive heart failure, aspirin use, asthma, obesity, ADHD</td>
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<td></td>
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<td></td>
<td>Utilisation rates: Hospitalisation rate per 10000; ED visit rate; readmission rate; subspecialty referral rate; high end radiology referral rate (CT, MRI, PET scans per 1000).</td>
<td>Other: workforce retention rates</td>
</tr>
<tr>
<td>2</td>
<td>Doolan-Noble, et al.</td>
<td>2015</td>
<td>1 district health board providing hospital care, integrated care and primary healthcare services in New Zealand</td>
<td>Patient experience of care survey Institute of medicine quality of care measures: hospital standardized mortality ratios, adverse events, patient health service utilisation rates, access and waiting times, acute hospital readmission rates</td>
<td>Health outcome measures: mortality rates, life expectancy at birth, hospital days during last 6 months of life</td>
<td>Disease burden measures: childhood immunization status, long term health condition risk assessment</td>
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<td></td>
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<td>Utilisation rates: ED length of stay rates; total healthcare cost per capita; ambulatory services hospitalisation rates</td>
<td>Other: un-enrolled, waitlist for elective surgery, timely access to diagnostic services</td>
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<tr>
<td>3</td>
<td>Farmanova et al.</td>
<td>2017</td>
<td>9 Canadian sites delivering a mix of primary and secondary healthcare - district health services, individual hospitals, integrated care and community services</td>
<td>Surveys: likelihood of recommendation; global experience of care questions Institute of medicine quality of care measures: best practice, rates of infection, access to primary care, readmission rates, equitable (by race)</td>
<td>Health outcomes measures: mortality rates, years of potential life lost, life expectancy, standard mortality, crude death rate, infant mortality, neonatal mortality, self-reported health status, health related quality of life, health life expectancy rates</td>
<td>Disease burden: yearly rate of onset, average age of onset, prevalence of major condition, incidence and prevalence rates, % of population</td>
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<td>Per capita cost measures: expenditure per capita, age adjusted spending per person, total monthly cost per member</td>
<td>Utilisation rates: hospitalisation rate, readmission rate, length of stay, number of beds per 1000 people, ED visits per 1000</td>
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<td>No</td>
<td>Author</td>
<td>Year</td>
<td>Level of application</td>
<td>Experience of Care Measures</td>
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<td>4</td>
<td>Hendrikx et al.</td>
<td>2016</td>
<td>International comparative study consisting of 20 population management initiatives by government led and private healthcare providers; delivering care to a mix of national, state and local populations. Studies done in USA, England, Canada, New Zealand, Germany, Scotland &amp; Spain.</td>
<td>Various patient satisfaction and reporting surveys, complaints about care rates; Institute of medicine quality of care - various measures most commonly on effective care, follow up care, preventive screening rates; patient safety measures on infection and complication rates, responsiveness, communication; timeliness, accessibility to medical care</td>
<td>Health outcome measures: most commonly included mortality rates, overall health status, life expectancy rates, quality of life, dependent patient prevalence rate % of population with multi-medication use; Disease burden: rates of disease prevalence, illness burden measures, comorbidities, care utilisation rates</td>
<td>Per capita cost measures: average cost of care, volume of care expenditure, substitution rates, organisational cost of population management, financial performance</td>
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<td>5</td>
<td>Hildebrandt et al.</td>
<td>2012</td>
<td>1 regional integrated healthcare insurer in Germany</td>
<td>Experience of care surveys by independent researchers looking at the overall satisfaction with quality of care</td>
<td>Health outcomes measures: numerous prevention and health promotion programs including rate of fracture for patients with osteoporosis;</td>
<td>utilisation rates: Charlson score (co-morbidity) assessment by German risk structure compensation, overall costs per patient, contribution margins,</td>
</tr>
<tr>
<td>No</td>
<td>Author</td>
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<td>6.</td>
<td>Ryan et al</td>
<td>2016</td>
<td>17 single and multi-site primary healthcare providers in Canada</td>
<td>Care experience rates for patient centeredness, after-hours access, timely access-next available appointment. Sourced via survey</td>
<td>Disease burden measures: rates of chronic coronary heart disease, heart failure survival, diabetes, affective disorders, dementia and chronic back pain, rates of unspecified and specified diagnosis, rate of recommended prescription drugs.</td>
<td>hospitalisation rates and hospital cost rates per 1000 patients</td>
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A total of 75 individual healthcare providers were included across the 6 studies and the extent of Triple Aim application varied in size from initiatives at a single site level to a whole of province health authority, but most commonly conducted at multiple sites at the district health service level. Considering the uptake of the Triple Aim at the global level, two papers reported on studies conducted in Canada (Table 1, studies 3,6), with the remaining studies being from USA, New Zealand and Germany (Table 1, studies 1,2,5). One study presented an international comparative analysis of Triple Aim across 20 providers in USA, Canada, England, New Zealand, Germany, Scotland and Spain (Table 1, study 4).

3.2 Rationale for the Triple Aim application

All studies consistently documented conceptual frameworks based on the Triple Aim dimensions – population health, experience of care and cost per capita. After this point, consistency and alignment across studies was limited with papers reporting operationalisation of the Triple Aim differently, by aligning the dimensions based on their own strategic organisational principles or participating in larger improvement initiatives and collaborations. For instance in the studies reviewed, population health was defined by geographic location, disadvantaged group or health condition/episode. The USA study of 27 primary healthcare providers (Donahue et al., 2015) participated in a larger collaboration aimed at improving the care of health population, by using the Triple Aim framework, where the three dimensions, core measures, and specific indicators were determined in advance and aligned to the national reporting standards. Individual practices sought to achieve baseline reporting targets on at least one of the Triple Aim dimensions. On the other hand, the New Zealand study (Doolan-Noble et al., 2015) sought to develop a meaningful set of system level measures for the purpose of performance benchmarking and data comparison between health systems at the national and international scale. Different still, among the two Canadian studies, one study sought to assess the extent of alignment between the Triple Aim framework and existent performance indicators utilised by the primary healthcare providers (Ryan et al., 2016); whereas the other study involved purposeful selection by IHI as part of a larger initiative supporting the pursuit of the Triple Aim (Farmanova et al., 2017). In the international comparison study (Hendrikx et al., 2016), 8 out of 20 initiatives had the primary goal of achieving the Triple Aim, instead desiring to accomplish better quality of care or achieve integration of services. Integration of care as a cost effective, higher quality business model was the primary objective of the German study (Hildebrandt et al., 2012).
3.3 Selecting meaningful Triple Aim measures

Measuring healthcare performance in a complex healthcare setting was challenging for primary healthcare providers in the studies, and organisations tended to use readily available indicators for practical reasons such as cost and availability. Intervention measures utilised were diverse and varied in detail and complexity, spread across different sub-groups within the population of various compositions. Single paper by Hendrikx et al. (2016) reported on the specific measures used by the providers when applying the Triple Aim framework. In this study the evidence was based on information from various research institution websites and consultations with health population experts. The lack of academic guidance and direction to select meaningful Triple Aim measures is a major challenge to health care providers in planning and achievement of the improved quality of care by means of the Triple Aim framework.

3.4 Defining measures for the Population Health

The population health dimension of Triple Aim has been previously defined as the ‘health outcomes of a group of individuals, including the distribution of such outcomes within the group’ (Kindig & Stoddart, 2003). These groups are often geographically defined populations but can also be other groups such as ethnic groups, employees or disabled persons. Of the six studies included in the review, two had clearly defined geographically bounded populations (Doolan-Noble et al., 2015; Hildebrandt et al., 2012). In the study by Hildebrandt et al. in Germany, the population was additionally defined by the membership with the specified healthcare insurer. The remainder of the studies had the population consisting of the publicly funded health insurance patients, private health insurance patients, insured workers and other general population with government subsidised insurance (Donahue et al., 2015; Farmanova et al., 2017; Hendryxk et al., 2016). One paper reported major challenges in defining the target population and subsequently a very narrow sub population was used (Ryan et al., 2016).

Population measures most commonly used in the reviewed studies were categorised according to Stiefel and Nolan’s (2012) Triple Aim framework balanced set of measures. Most frequently, population measures included indicators on disease specific outcomes and definitive chronic conditions. Specifically, studies selected indicators on health outcome measures such as mortality and life expectancy rates (Doolan-Noble et al., 2015; Farmanova et al., 2017; Hendrikx et al., 2012; Hildebrandt et al., 2012), preventive measures such as cancer screening and immunisation (Donahue et al., 2015; Doolan-Noble et al., 2015;
Hildebrandt et al., 2012) and behavioural and physiological factor indicators such as smoking, alcohol consumption and obesity rates (Donahue et al., 2015; Farmanova et al., 2017; Hendrikx et al., 2012). All of the studies used some form of measures from the mandatory data reporting sets that were readily available at either regional or national level.

There was limited intention in the reviewed literature to define the Triple Aim dimensions. Thus, not operationally defining the population health construct from the outset resulted in studies reporting different outcomes, potentially because the definition of population health has not been clarified in the Triple Aim literature. From a theoretical perspective, primary healthcare providers need to invest in the careful consideration of the choice of measures as the means to operationally define each of the Triple Aim dimensions (Stiefel & Nolan, 2012). Seeking alignment with the nationally available indicators is recommended, and inclusion of instruments that capture both population outcome measures as well as the activity-based measures is highly desirable.

3.5 Defining measures for the Experience of Care

Since patient experience is often more than perception of the satisfaction alone, the Triple Aim scholars have proposed and subsequently used measures for both the quality of care and patient experiences in their research (Whittington et al., 2015). Studies included in this review predominantly used survey measures to evaluate experiences of care, such as collecting in-house survey feedbacks on self-reported patient satisfaction levels (Donahue et al, 2015). Two studies reported the use of indicators to represent quality of care (Faramnova et al., 2017; Hendrikx et al., 2016), however, the measures from both papers were not comparable with one another due to differences in measures. Additionally, barriers to care were also measured, being assessed by the indicators capturing waiting times until the next available appointments (Donahue et al., 2015; Ryan et al., 2016). However, due to lack of operational definition on the experience of care, all studies predominantly focused on the quality of care rather than experience of care. This led to inconsistencies across studies in reported outcomes and varying indicators used to measure them. In one study, no evidence was found of any indicators used in assessing patient experience of care (Hildebrandt, 2012).

3.6 Defining measures for the Per Capita Cost

Operationally, per capita cost was recognised by scholars as complicated to measure in the Triple Aim framework because of the difficulty in identifying targeted population size and lack of data detail needed for the calculations (Stiefel & Nolan, 2012). Within the literature
reviewed, costs measured were most often reported in terms of resource utilisation or cost avoidance, most frequently being number of emergency department presentations and hospital admission rates. Half of the studies used utilisation measures to capture the cost (Donahue et al., 2015; Doolan-Noble et al., 2015; Ryan et al., 2016) Difficulties obtaining data needed for the calculation of per capita costs were reported and included. Of the three studies that reported application of both per capita cost and utilisation rates measures, two reported limitations in data aggregation and data integrity, stating difficulties in accurate head-counting due to patients switching providers or seeking treatments in other practices (Donahue et al., 2015; Hendrikx et al., 2016).

4. Discussion

The purpose of this literature review was to report on the evidence of the application of the Triple Aim framework and the extent to which it has been effectively adopted globally within the context of primary healthcare. The review found major differences across studies in the manner in which Triple Aim dimensions were defined and operationalised. These differences are likely to explain much of the variances in the findings presented in the literature, and therefore limit the comparability of these findings globally. While the Triple Aim framework is still evolving, firming up the operational definitions for each dimension would allow researchers and policy makers to determine suitable measurements that can then be used. Organisations seeking to implement the Triple Aim should produce succinct and clear definitions for each of the dimensions at an early stage of implementation. These definitions need to consider current best practice guidelines from the literature and apply them effectively to their operating context. For this reason, it is essential for organisations to invest in capacity building and ensure they have a comprehensive understanding of the framework before proceeding to the implementation phase.

Our results have shown that, almost a decade since its inception, the overall value of the Triple Aim framework in the context of primary healthcare is unclear. Because the pursuit of Triple Aim requires organisations to simultaneously pursue three different dimensions (Berwick et al., 2008) this requires substantial strategic planning and consideration of the potential trade-offs between meeting each of the dimensions in the local context. Our results suggest that the majority of studies were unable to implement Triple Aim, which is a major shortcoming in the framework’s uptake. There were several reasons why this was the case. First, challenges in defining the population or selecting a narrow sub population led to limited success in the desired outcomes of quality improvements (Farmanova et al., 2017; Hendrykx
et al., 2016; Ryan et al., 2016). Second, without available data, it is difficult to pursue Triple Aim in primary healthcare, because the availability of relevant data was deemed crucial in informing strategies to further improve primary care (Donahue et al., 2015). Last, there was a positive correlation between the provider’s ability to implement Triple Aim framework and having dedicated data management personnel (Donahue et al., 2015; Farmanova et al., 2017).

Findings suggest a key criterion for selecting indicators to measure and track performance and progress over time was data availability. Most of the studies chose to select individual indicators based on the primary data collection outputs readily available to them that carried minimal disruption to previously established processes. Implementing change in order to achieve Triple Aim was deemed essential but a challenging process, partly due to organisational, contextual and procedural factors such as the lack of understanding of how to best integrate a new framework within the existing organisational aims, strategic directions and visions, or how to extract needed data in order to effectively measure the impact of the Triple Aim framework on the provision of high quality care. This underlines our original point that before organizations choose to implement the framework, appropriate investment needs to be made into capacity building to ensure they have selected appropriate indicators, have access to the right data that tracks these indicators, as well as a comprehensive understanding of the framework before the implementation phase.

Across the three dimensions, assessing patient experience of care was perceived in the studies as the easiest data to collect, followed by the population health measures. Per capita cost dimension predominantly concentrated on cost avoidance (i.e. ED utilisation rates) rather than cost reduction. In most cases, a modified approach to data and dimensions alignment was needed in order to produce meaningful outcomes. Calls for major investment in infrastructure for primary data collection, analysis and reporting within primary care context were repeatedly made (Whittington et al., 2015; Ryan et al., 2016, Hendrikx et al., 2016) and a lack of such investment seen as detrimental for the ongoing future application of the framework.

How is Triple Aim defined and operationalised? The information and evidence acquired from the literature identified a major shortfall in the definitions of the three Triple Aim dimensions. For example, what is meant by population health, experience of care, or cost per capita? While a useful guideline for the balanced set of Triple Aim measures exists (Stiefel & Nolan, 2015), a single study referred to it in the findings with limited success in the application of the framework (Ryan et al. 2016). Furthermore, no uniformity was found
across papers regarding how the Triple Aim was implemented with some studies reporting on a "cluster' of individual practices and others reporting on organisations with several practice sites ( i.e. Hildebrandt et al., 2016; Farmanova et al., 2017). This lack of clarity in definitions and measures was carried through the evolution of the framework and its varied application, because organisations interpreted and framed each of the dimensions differently. While these differences are attributed to different constraining factors such as policy, organisational resources or level of intervention, it can be argued that flexibility created by the lack of rigid definitions is both a strength as well as a weakness of the framework and the need for more explicit directive is needed.

When considering defining Population Health, a description used by Kindig and Stoddart (2003) should prove a strong starting point, namely being described as the health outcomes of a group of individuals, including the distribution of such outcomes within the group. Some questions to consider in this approach would be potential implications in adopting this definition. For example, will a population’s health be made up of a geographical location or a sub group of individuals with particular comorbidities? Who would benefit from a particular approach and would there be a potential downside? Would any changes in the population impact the rate of improvement and would they be significant enough to create an impact on health?

It is expected that a primary healthcare provider with a higher concentration of young families is likely to define their population by such group and focus on preventive measures, whereas a health provider that attracts retirees may scope the priorities according to health conditions/comorbidities of the older population. Consideration would also be needed on whether the selected approach could be easily replicated in similar conditions elsewhere. Considering potential variances in the design will assist in consistency across the measurements and potential ease of use in future interventions.

For the Experience of Care measures, half of the identified studies utilised both quality of care and patient satisfaction measures. While the clinical quality of care is clearly defined by the Institute of Medicine as being safe, timely, patient centred, equitable, effective and accessible (Berwick, 2002), patient’s perspective in receiving the treatment is often overlooked. Definition of patient experience as proposed by Wolf and colleagues (2014) which includes explaining usual practice and then measuring the expectations of patients in comparison to their actual experience of care afterwards is recommended as useful in the process. Wolf and others argued that patient experience reflects the occurrences and events
that happen across the continuum of care where the patient experience becomes more than satisfaction of a single event, thus being strongly tied to a patient’s expectations and whether they are positively realised (beyond clinical outcomes or health status).

Scholars have also called for the adaptation of the strategic approach to patient experience of care that moves beyond irregular episodic care to a holistic approach that incorporates both patient feedback and continuous patient engagement (Luxford & Sutton, 2014). Studies going forward would benefit from broadening to a holistic approach that includes both of the measures as core elements of equal bearing. This would allow the experience of care measurement to include the quality of care outcomes and perceptions of how this is delivered, against the expectations.

For Costs per Capita, our research found that studies reported varied measurements consisting of both directly observable costs, such as specific program per capita costs or indirect costs, measured in terms of cost avoidance or cost control, such as the percent of the reduction in the hospital emergency presentations. However, no commonality was observed between them, and the difficulty in obtaining suitable data was most commonly stated as the hindering factor. Therefore, it is recommended that future studies consider measuring the direct costs as mandatory, and include measuring indirect costs where possible, in order to ensure that the costings presented remain transparent and easily replicated.

Triple Aim guidelines identified that cost per capita is preferable over total expenditure measures (Stiefel & Nolan, 2012). This is particularly useful because defined populations may change over time for a number of reasons. A disadvantage of using total expenditure is that it is difficult to determine if changes have occurred because of changes in costs or changes in inputs. For example, whether increases in costs are associated with an increased pricing for services/resources or due to change in the size of the defined population. Additionally, when choosing cost measures, primary healthcare providers need to consider the availability of the actionable data sets available at their disposal, and at the sufficient detail, in order to accurately capture costs.

**Considering local context**

In some instances, primary care acts as a gateway to other care that exists outside the defined population. Consequently, the dimensions may be limited in capturing the full impact. Future research that provides a better understanding of the patient experience is recommended. Possibly the framework is better suited to a definition of population based on health condition
rather than geographic location. This is particularly relevant in the Australian context where patients from regional and remote areas must travel long distances for their treatment.

Also evident were the organisational environment challenges faced in the implementation of the Triple Aim framework (Whittington et al., 2015; Hildebrandt et al., 2016; Farmanova et al., 2017; Ryan et al., 2016). They included lack of leadership support, difficulty in creating partnerships, engagement and communication, limited time and resources, scoping of the improvement projects and lack of meaningful data. Recommendations for overcoming such barriers include starting small, and gradually expanding the scope of redesign, by seeking projects that naturally align with Triple Aim and are manageable within available resources. Also considered important is the need to include key stakeholders from the outset and invest in the team capacity building to ensure sustainability of new interventions is achieved.

Our review has also found that the dimensions of the Triple Aim framework may not be linked. Ryan et al. study (2016) provided evidence that performance in one area of the Triple Aim was not necessarily associated with performance in another area. Similarly, Donahue and colleagues (2015) stated that some USA case studies reported difficulty by individual practices in matching data reporting with the Triple Aim national benchmarks, due to essential data sets being housed in different databases. Inevitably these practices gravitated towards Triple Aim dimensions where ease of reporting was established, and neglecting those indicators deemed difficult to measure.

It is difficult to ascertain why the dimensions of the framework may not correlate. Perhaps, given the limited resources, an increase in performance in one dimension may come at the expense of performance in another dimension. Or it is possible that certain sub-sections within the broader health services systems have priorities that are considered unique. Additionally, different measures may motivate managers to change evaluations to suit their own interests by heavily promoting high performing areas at the expense of areas needing improvement. No other study discusses weightings on specific measures, and therefore it can be concluded that healthcare organisations consider weightings on a case by case basis, usually aligning them to organisational purpose, objective and goals.

All of the studies in this review called for the development of a more consistent and robust set of measures to guide Triple Aim implementation. We recognise, however, that given the different goals and strategies of organisations, along with various ways that populations are defined in each context, it is unrealistic to expect such a complete consistent set of measures
be implemented across different locations, populations and/or organisations. It is our hope however, that by improving the operational definitions of each of the three dimensions and providing stronger guidance around the measurement of each, that some consistency can be achieved which will allow for global comparisons and assist policy makers to use the framework more productively in the future. Further to this, it is important to note that several countries have begun to use Triple Aim concepts in their healthcare redesign with findings published in languages other than English (De Ridder, Bourgeois, Van den Bogaert, & Van der Brempt, 2017; Lasmarías et al., 2016; Meyer et al., 2017), and future consideration of such studies may be beneficial for establishing global utilisation of the Triple Aim framework in localised contexts.

On a broader level, we note that in terms of successfully implementing Triple Aim in the primary healthcare context, a key ingredient for developing a meaningful performance benchmarking system are clear governance structures (Farmanova et al., 2016). Often, governance structures in the primary healthcare system are less clear due to this sector being composed of various disparate groups that possess limited funding (Scott 2000). Where there is no overarching organization that can enforce compliance and select an appropriate framework, the likelihood of Triple Aim implementation is low without appropriate buy-in from relevant stakeholders. In addition, it should be noted that the framework has ongoing administration and resource costs as it is inevitable that the required measures need to be periodically updated as new technologies shift primary healthcare cost structures and the health needs of the population evolve.

5. Conclusions

A decade since its inception, the implementation of the Triple Aim framework in the context of primary healthcare has been challenging. For its utility to be realised globally, more work is needed to clarify a number of operational issues. Uniformity is especially necessary in the context of primary healthcare delivery where the organisations that are pursuing quality improvement interventions require readily available and widely applicable measures in order to evaluate population health, experience of care and per capita costs.

Having clear operational definitions of these constructs going forward will reduce the weaknesses that exist in the literature to date and increase the quality of comparisons across projects. This is particularly important for those policy makers who are considering adopting the framework in order to ensure they have reliable benchmarks to measure their outcomes.
Thus, with stronger and more consistent measurement tools and definitions, the literature underpinning the Triple Aim framework will continue to be of utility to policy makers globally.
References


Appendix A

Electronic database search strategy

Example search - Medline (Ovid) Database - June 2017

| Search query terms                                                                 | Initial results | Exported to EndNote |...
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>1. “triple aim” OR “quadruple aim”</td>
<td>1873</td>
<td>No</td>
</tr>
<tr>
<td>2. “triple aim” OR “quadruple aim” AND measure*</td>
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<td>Yes</td>
</tr>
<tr>
<td>3. “triple aim” OR “quadruple aim” AND dimensions</td>
<td>165</td>
<td>Yes</td>
</tr>
<tr>
<td>4. “triple aim” OR “quadruple aim” AND trade-offs</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>5. “triple aim” OR “quadruple aim” AND value OR “value-based”</td>
<td>49</td>
<td>Yes</td>
</tr>
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<td>6. “triple aim” OR “quadruple aim” AND ‘primary health care’ OR ‘primary healthcare’</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>7. “population health” AND “experience of care” AND “per capita cost”</td>
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<td>Yes</td>
</tr>
<tr>
<td>8. “population health” AND “experience of care”</td>
<td>19</td>
<td>Yes</td>
</tr>
<tr>
<td>9. “population health” AND “per capita cost”</td>
<td>7</td>
<td>Yes</td>
</tr>
<tr>
<td>10. “experience of care” AND “per capita cost”</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>11. “population health” AND measure*</td>
<td>17379</td>
<td>No</td>
</tr>
<tr>
<td>12. “experience of care” AND measures*</td>
<td>2643</td>
<td>No</td>
</tr>
<tr>
<td>13. “per capita cost” AND measure*</td>
<td>735</td>
<td>No</td>
</tr>
<tr>
<td>14. (population health) OR (experience of care) OR (per capita cost) AND (quality improve*)</td>
<td>285</td>
<td>No</td>
</tr>
<tr>
<td>15. (population health) OR (experience of care) OR (per capita cost) AND (quality measure*)</td>
<td>74</td>
<td>Yes</td>
</tr>
<tr>
<td>16. (population health) AND (experience of care) AND (per capita cost) AND (evaluation framework)</td>
<td>0</td>
<td>n/a</td>
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</tbody>
</table>

Total exported articles 427

Note: Limits applied to all searches: “Results in English”. Phrases could appear anywhere including in the title, keywords, abstract or in-text so as to be all inclusive. Symbol * used for truncation.
## Appendix B

### Triple Aim Systematic Review - paper inclusion justification

<table>
<thead>
<tr>
<th>Citation</th>
<th>Title &amp; purpose of the paper (as stated in abstract)</th>
<th>Meets TA/QA inclusion criteria?</th>
<th>Include for review?</th>
<th>Justification/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aston, G. (2015)</td>
<td>What the EVOLUTION of one medical home can teach us all Carlton Clinic, a medical home model facility pilot tested Triple aim with “focus on patient education, patient engagement and lifestyle changes to address chronic diseases. They began using technology to track patients.</td>
<td>Yes</td>
<td>No</td>
<td>No- does not list any particular framework or model in detail-just describes the benefits</td>
</tr>
<tr>
<td>Bossaert, A. De Ridder, R (2017)</td>
<td>Integrated care in Belgium: A co-creative process National Plan: &quot;Integrated Care for a better health&quot; was approved by all ministers of public health. This Plan is based on the principles of Triple Aim, and complementary principles of improving equity and job satisfaction for the care providers</td>
<td>Yes</td>
<td>No</td>
<td>No-original article not in English</td>
</tr>
<tr>
<td>Bradbury, H. Lifvergren, S. (2016)</td>
<td>Action research healthcare: Focus on patients, improve quality, drive down costs Discuss action research in healthcare as a transformative approach … in alignment to the “quadruple” aim. Insights from objective quantitative studies are balanced with personal and inter-subjective dialogue that aligns different parts of a system in a movement towards improvement. Evidence in Sweden.</td>
<td>Yes</td>
<td>No</td>
<td>No – no specific framework/model discussed</td>
</tr>
<tr>
<td>Calman, N.; Golub, M.; Shuman, S. (2012)</td>
<td>Primary care and health reform “This article provides an overview of models supported by the Affordable Care Act that address one or more goals of the “Triple Aim”</td>
<td>Yes</td>
<td>No</td>
<td>No – provides general overview of different primary health care models in USA, in line with recent reforms</td>
</tr>
<tr>
<td>Callander &amp; Lindsay, 2016</td>
<td>A performance framework for the North Queensland Primary Healthcare Network, based upon the Quadruple Aims Theory. Quadruple Aim evaluation framework design for an Australian Primary Heath Network. Proposed measures include Australia specific outcome indicators based on readily available nationally collected data sets</td>
<td>Yes</td>
<td>No</td>
<td>No-research report intended to guide implementation process, but was not operationalized</td>
</tr>
<tr>
<td>Donahue, K. et al (2015)</td>
<td>Tackling the triple aim in primary care residencies: the I3 POP Collaborative We examine residency baseline triple aim measures, compare with national benchmarks, and identify practice characteristics associated with data reporting</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Doolan-Noble, F. et al (2015)</td>
<td>How well does your healthcare system perform? Tracking progress toward the triple aim using system level measures Tracking progress toward the triple aim using system level measures. The measurements adopted inform quality improvement activity and compare performance nationally and internationally</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Title &amp; purpose of the paper (as stated in abstract)</td>
<td>Meets TA/QA inclusion criteria?</td>
<td>Include for review?</td>
<td>Justification/Comments</td>
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<tr>
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</tr>
<tr>
<td>Farmanova, E. et al (2016)</td>
<td>Triple Aim in Canada: developing capacity to lead to better health, care and cost</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Canadian Foundation for Healthcare Improvement supported enrolment of nine Canadian teams to participate in the Institute for Healthcare Improvement's TA Improvement Community. Structured support for TA design, implementation, evaluation and sustainability was addressed in a collaborative program.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hendrikx, R. et al (2016)</td>
<td>Which Triple Aim related measures are being used to evaluate population management initiatives? An international comparative analysis</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This study explores how PM initiatives measure the Triple Aim in practice.</td>
<td></td>
<td></td>
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<td></td>
<td>Emerging evidence about the qualitative and economic benefits of integrating care, based on an innovative population-based approach across a small region of Germany</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levine, J. et al 2011</td>
<td>Use of the Triple Aim to improve population health</td>
<td>Yes</td>
<td>No- Not in primary healthcare context.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CaroMont Health has embraced the Triple Aim initiative to implement its core vision and competencies of delivering health care, promoting individual wellness, and creating vibrant communities.</td>
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<tr>
<td></td>
<td>This organisational case study used multiple data sources and methods in a pragmatic and reflexive manner to build a picture of the organisational development over a 4-year period, based on Triple Aim Framework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robertson-Preidler, et al. (2017)</td>
<td>We conceptualized system appropriateness by identifying policies that aim to achieve the Triple Aim and their consequent trade-offs for financing, clinical practice, and the individual patient”.</td>
<td>Yes</td>
<td>No- states appropriateness of different approaches at the health-care system level.</td>
<td></td>
</tr>
<tr>
<td>Ryan, B. et al. (2016)</td>
<td>Examining Primary Healthcare Performance through a Triple Aim Lens</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This study sought to apply a Triple Aim framework to the measurement and evaluation of primary healthcare (PHC) team performance</td>
<td></td>
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</tr>
<tr>
<td>Citation</td>
<td>Title &amp; purpose of the paper (as stated in abstract)</td>
<td>Meets TA/QA inclusion criteria?</td>
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<td>Justification/Comments</td>
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<tr>
<td>Shuker, K et al, (2015)</td>
<td>The Health Quality and Safety Commission: making good health care better The New Zealand Triple Aim has been defined as: improved quality, safety and experience of care; improved health and equity for all populations; and best value for public health system resources.</td>
<td>Yes</td>
<td></td>
<td>focusing on patient engagement</td>
</tr>
<tr>
<td>Whittington, J. W., Nolan, K., Lewis, N. &amp; Torres, T. (2015)</td>
<td>Pursuing the triple aim: the first 7 years Original coauthors of Triple Aim consider how the implementation of the Triple Aim progressed over the first 7 years -with two detailed case studies presented on the Framework implementation</td>
<td>Yes</td>
<td></td>
<td>No-article discusses major principles and lessons learned</td>
</tr>
</tbody>
</table>
## Appendix C

Triple Aim Framework – proposed balanced measures

<table>
<thead>
<tr>
<th>Dimension of the IHI Triple Aim</th>
<th>Outcome Measures</th>
</tr>
</thead>
</table>
| **Population Health** | **Health Outcomes:**  
  - Mortality: Years of potential life lost; life expectancy; standardized mortality ratio  
  - Health and Functional Status: Single-question assessment (e.g., from CDC HRQOL-4) or multi-domain assessment (e.g., VR-12, PROMIS Global-10)  
  - Healthy Life Expectancy (HLE): Combines life expectancy and health status into a single measure, reflecting remaining years of life in good health  
  **Disease Burden:**  
  Incidence (yearly rate of onset, average age of onset) and/or prevalence of major chronic conditions  
  **Behavioral and Physiological Factors:**  
  - Behavioral factors include smoking, alcohol consumption, physical activity, and diet  
  - Physiological factors include blood pressure, body mass index (BMI), cholesterol, and blood glucose  
  (Possible measure: A composite health risk assessment [HRA] score) |
| **Experience of Care** | Standard questions from patient surveys, for example:  
  - Global questions from Consumer Assessment of Healthcare Providers and Systems (CAHPS) or How’s Your Health surveys  
  - Likelihood to recommend  
  Set of measures based on key dimensions (e.g., Institute of Medicine’s six aims for improvement: safe, effective, timely, efficient, equitable, and patient-centered) |
| **Per Capita Cost** | **Total cost** per member of the population per month  
  **Hospital and emergency department (ED) utilization rate and/or cost** |

Source: (Stiefel & Nolan, 2012).