



# Impact and outcome evaluation of HealthPathways: a scoping review of published methodologies

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## ABSTRACT

**INTRODUCTION:** The HealthPathways programme is an online health information system used mainly in primary health care to promote a consistent and integrated approach to patient care.

**AIM:** The aim of this study is to perform a scoping review of the methodologies used in published impact and outcomes evaluations of HealthPathways programmes.

**METHODS:** The review included qualitative, quantitative or mixed-methods evaluations of the impact or outcome of HealthPathways. MEDLINE, Embase, CINAHL and Web of Science databases were searched. Seven programme aims were identified in the impact and outcome evaluation: (1) increased awareness and use of HealthPathways; (2) general practitioners are supported to adopt best practice, patient-centred care; (3) increased appropriate use of resources and services; (4) improved quality of referrals; (5) enhanced consistent care and management of health conditions; (6) improved patient journeys through the local health system; and (7) reduction in health-care cost and increased value for money.

**RESULTS:** Twenty-one studies were included in the final review; 15 were research papers and six were reports. 'Increased awareness and use of HealthPathways' was the most frequent programme aim evaluated ( $n = 12$ ). Quantitative and qualitative research methodologies, as well as prospective and retrospective data collections, have been adopted to evaluate the impact and outcome of HealthPathways.

**DISCUSSION:** Assessing the impacts and outcomes of HealthPathways may be challenging due to limitations in primary data and the interconnectedness of change across the measured aims. Each aim may therefore require specific methodologies sensitive enough to capture the impact that HealthPathways are making over time.

**KEYWORDS:** HealthPathways; evaluation; care pathways.

## Introduction

All health systems aim to integrate care provision across the boundaries of primary, community, hospital, and social care. This ensures people receive

a continuum of care including health promotion, primary prevention, disease treatment and rehabilitation within the health system in accordance with their needs. Successful health outcomes for

patients depend on ensuring they receive the best, evidence-based, appropriate care. However, there is evidence from Australia that appropriate care is received in only 57% of health encounters, and that local clinical guidelines may have an important role in increasing the number of patients receiving appropriate care.<sup>1</sup> Even so, health-care providers' access and use of available clinical guidelines have, to date, been unsatisfactory, due to factors such as duplication, differing recommendations, and inconsistent communication structure.<sup>2</sup> Incorporating local guidelines into online-based localised clinical decision support tools has the potential to improve patient care by improving the appropriateness of referrals, decreasing wait times and improving pre-referral investigation and treatment.<sup>3,4</sup> This in turn may improve patient outcomes, improve quality of life, and produce savings for health systems, resulting in high-value care.

The HealthPathways programme is an online health information system used mainly in primary health care that ensures a consistent and integrated approach to patient care within a local health region. HealthPathways originated in Canterbury, New Zealand, in 2008, and have since been adopted by various health systems in New Zealand, Australia and the UK.<sup>5</sup> Currently, online resources called 'pathways' have been developed for over 550 disease conditions. These 'pathways' are localised to particular health regions by multidisciplinary teams of health professionals before their operationalisation. This ensures consistency of care according to the guidelines and standards agreed by local experts. Pathways are used in primary health-care settings as support during patient assessment and care, as well as providing clear referral pathways to secondary care services and alternative models of care available within each region. There has been a steady increase in both local health regions using HealthPathways and the number of primary health-care physicians accessing HealthPathways since its inception.<sup>6</sup>

After a programme is implemented, it is important for periodic evaluations to be conducted to assess its effectiveness. Programme evaluation involves systematically collecting and analysing data to assess the effectiveness and efficiency of the programme.<sup>7</sup> Several attempts have been made to evaluate the HealthPathways at various stages after implementation.<sup>8,9</sup> A three-staged process has been proposed

## WHAT GAP THIS FILLS

**What is already known:** The HealthPathways programme is an online health information system used mainly in primary health-care settings to promote a consistent and integrated approach to patient care and ensure appropriate referral. Once a programme is implemented, it is important that periodic evaluations are conducted to assess its effectiveness; however, there is no evidence that HealthPathways evaluation methodologies have been reviewed.

**What this study adds:** Quantitative and qualitative research methodologies, as well as prospective and retrospective data collections, have been adopted to evaluate the impact and outcome of HealthPathways. Assessing the impacts and outcomes of HealthPathways may be challenging due to limitations in primary data and the interconnectedness of change across the measured aims. Each aim of HealthPathways may therefore require specific methodologies sensitive enough to capture the impact that HealthPathways are making over time.

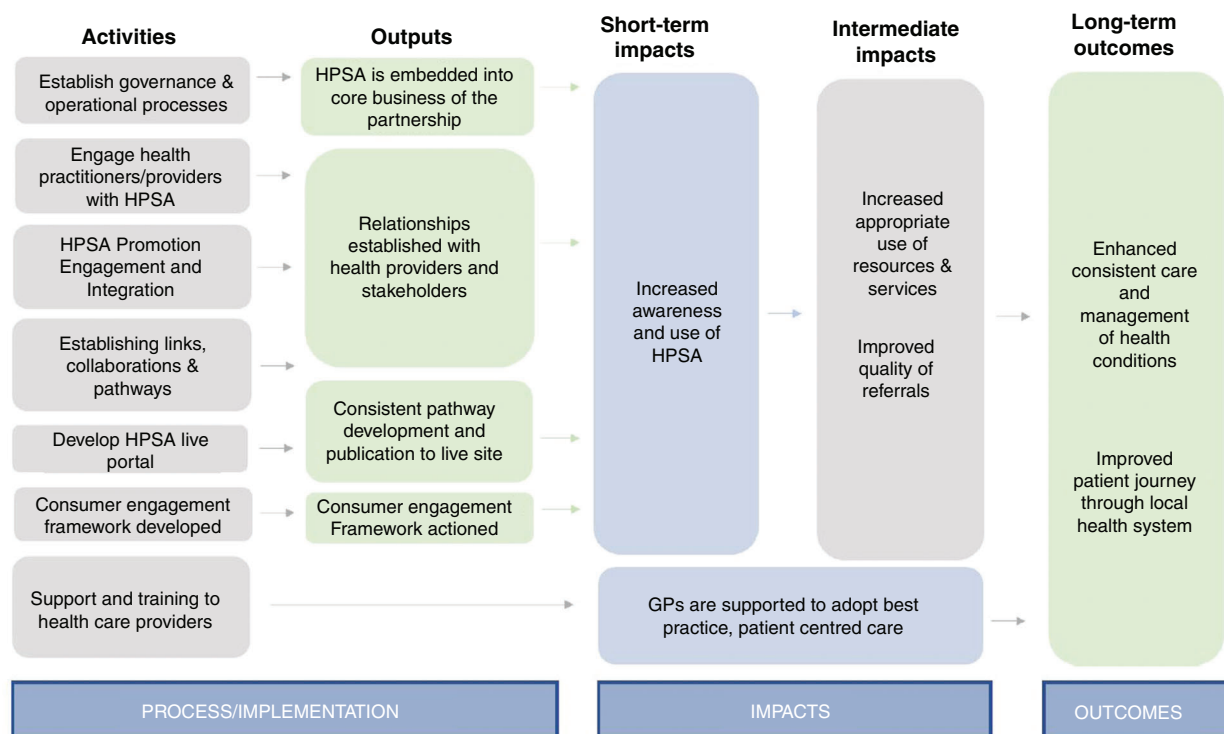
by several evaluators, which includes assessment of the implementation's evaluation, impact evaluation, and outcome evaluation (Fig. 1).<sup>8,10</sup> Implementation (process) evaluation considers the effectiveness of implementation with respect to the pathway's outputs, whereas impact evaluation assesses the use, behaviour and perceptions of HealthPathways by primary health-care professionals. Outcome evaluation assesses the effectiveness of HealthPathways in enhancing consistent care or treatment of health conditions and improving patients' journeys.

The current lack of publications reviewing HealthPathways evaluation methodologies and synthesising evidence suggests that a scoping review would be useful to systematically map the work done in this area and identify gaps in knowledge and methodology. The aim of this study, therefore, was to perform a scoping review of the methodologies used in impact and outcomes evaluations of HealthPathways programmes. This review develops an evidence base for effective methodology to perform impact and outcome evaluations of these programmes in the future.

## Methods

This review was performed in accordance with the Preferred Reporting Items for Systematic Reviews

Figure 1. Three staged process of HealthPathways evaluation.



and Meta-Analyses (PRISMA) extension for scoping reviews.<sup>11</sup>

### Eligibility criteria

This review was restricted to impact and outcome evaluations of HealthPathways and included only original research papers and published reports. Implementation evaluations and journal articles not presenting original research (opinions, editorials, protocols conference abstracts, and points of view) were excluded from the review. Research reporting the evaluation of HealthPathways as a secondary outcome were also excluded. To capture the full range of existing methodologies, evaluations could be quantitative, qualitative or mixed-methods in nature. No restrictions were placed on publication language, but we considered only records published after the inception of HealthPathways in 2008.

### Information sources and search

MEDLINE, Embase, CINAHL and Web of Science databases were searched using the keywords

‘HealthPathways’ OR ‘HealthPathway’. We searched for research published before 31 October 2020. We expected that some evaluations of HealthPathways may not be published in traditional academic sources, so we also searched grey literature for records, using a snowball method.

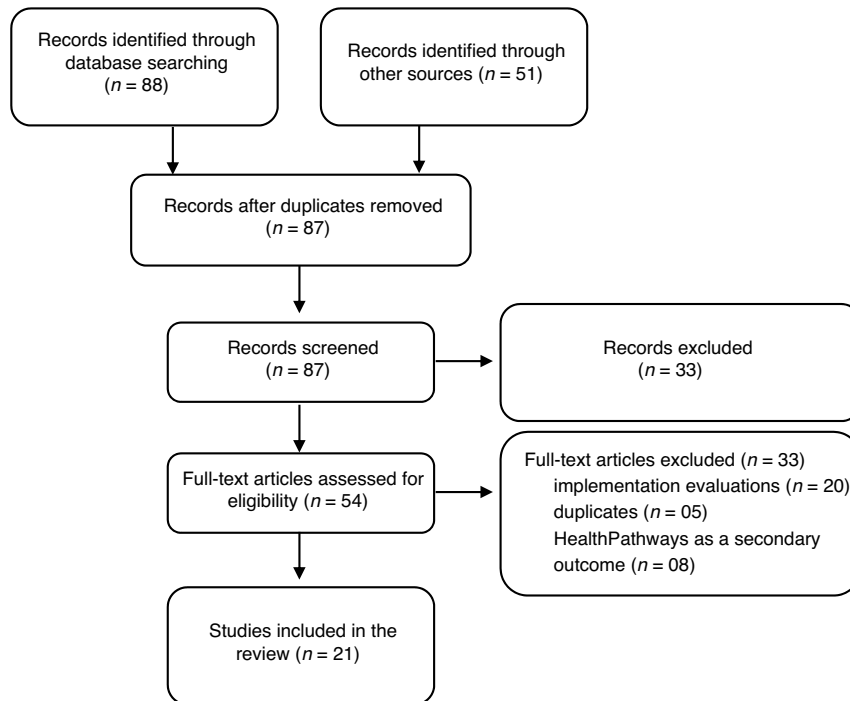
### Selection of evidence sources

Titles, abstracts, and full-text of all potentially eligible records from the search were independently screened by two co-authors against the inclusion and exclusion criteria.

### Data items and extraction

The lead author (SS) extracted all data for this review into an Excel spreadsheet (Microsoft Corporation). Year of publication, study population, study setting, study design, data collection (prospective, retrospective, or both), data source, programme aims evaluated, indicators, analytical method, and results were extracted for each included publication or report.

Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram for the scoping literature search performed.



## Data synthesis

Based on the stages outlined in Figure 1, six programme aims were identified:<sup>10</sup> (1) increased awareness and use of HealthPathways; (2) general practitioners are supported to adopt best practice, patient-centred care; (3) increased appropriate use of resources and services; (4) improved quality of referrals; (5) enhanced consistent care and management of health conditions; and (6) improved patient journey through the local health system. The study team decided to add 'reduction in health-care cost and increase value for money' as a long-term outcome, resulting in seven programme aims. We grouped publications by each aim to investigate the methods used to evaluate each.

## Results

A total of 139 articles and reports were identified from the initial search, including 66 duplicate records. Twenty-one studies were identified for the final review; 15 were research papers and six were reports (Fig. 2).

## Characteristics of included evaluations

Characteristics of the 21 articles and reports included in the review are shown in Table 1. Although HealthPathways were initiated in 2008, the first recorded evaluation was in 2013. Since then, an increasing number of evaluations has been conducted, with the highest number reported in 2018. A large proportion of studies were conducted in Australia (52.4%, 11/21). More than half the studies (57.1%, 12/21) used multiple study settings (eg general practice centres and hospital). General practice centres and hospitals were each used as settings in an almost equal number of studies.

## Methodologies used to evaluate each programme aim

Table 2 shows the number of studies evaluating each programme aim. 'Increased awareness and use of HealthPathways' was the most frequent programme aim evaluated ( $n = 12$ ), followed by an equal number of studies ( $n = 8$ ) evaluating

Table 1. Characteristics of the studies included in the review

Characteristic	Number of studies (N = 21)	References
Record type		
Journal article	15	(2, 15–17, 19–29)
Evaluation report	6	(9, 12–14, 30, 31)
Year of publication		
Before 2016	4	(12, 13, 17, 28)
2016	2	(25, 29)
2017	2	(20, 26)
2018	7	(2, 14, 23, 24, 27, 30, 31)
2019	4	(9, 15, 19, 22)
2020	2	(16, 21)
Country		
Australia	11	(2, 9, 12–16, 21, 22, 29, 31)
New Zealand	9	(17, 19–21, 25–28, 30)
UK	1	(23)
Study setting		
General Practice centres	16	(2, 9, 12–17, 21–26, 30, 31)
Hospital	15	(2, 9, 13, 14, 17, 19–21, 23, 25–28, 30, 31)
HealthPathways working group	3	(14, 22, 29)
Community	1	(14)

Table 2. Number of studies evaluating each programme aim

Programme aim		Number of studies (N = 21)	References
Impact evaluation	Increased awareness and use of HealthPathways	12	(2, 12–17, 21–23, 30, 31)
	General practitioners are supported to adopt best practice, patient-centred care	5	(9, 22, 24, 29, 30)
	Increased appropriate use of resources and services	0	
	Improved quality of referrals	8	(2, 9, 13, 14, 23, 26, 30, 31)
Outcome evaluation	Enhanced consistent care and management of health conditions	8	(9, 12, 14, 19, 25, 27, 29, 30)
	Improved patient journey through local health system	8	(2, 13–15, 20, 25, 26, 28)
	Reduction in health-care cost and increased value for money	1	(9)

‘improved quality of referrals’, ‘enhanced consistent care and management of health conditions’ and ‘improved patient journey through local health system’. One study evaluated the economic impact of HealthPathways<sup>9</sup> and no identified research had

assessed ‘increased appropriate use of resources and services’.

All included evaluations and their aims, indicators, settings, study designs, populations, data sources,

data collection, and analysis methods are provided in Table 3.

### Increased awareness and use of HealthPathways

Of the 12 studies evaluating awareness of use of HealthPathways, one compared pre- and post-data to evaluate the significance of changes over time,<sup>2</sup> and one other study used a mixed-methods approach (qualitative and quantitative methods).<sup>12</sup> Google analytics was the most common data source ( $n = 9$ ) to analyse usage patterns. The most common indicators used in Google analytics were number of users per month, number of pages viewed per session, number of views per month for each page and clinical stream, and 'often viewed' pages. Apart from Google analytics, prospective data collection methods such as online surveys ( $n = 4$ ) and telephone surveys ( $n = 2$ ) were used to evaluate the awareness and use of HealthPathways. Only five studies used a combination of retrospective (eg Google analytics) and prospective data sources (eg online surveys and telephone surveys) to describe a wider scope of activity. Participants in the studies were mainly general practitioners (GPs) ( $n = 8$ ), with the remainder comprising a balance of other stakeholders, including hospital staff and practice managers.

### General practitioners are supported to adopt best practice, patient-centred care

This programme aim focused mostly on evaluation of barriers and facilitators to HealthPathways use. Of the five studies evaluating this aim, four used qualitative methodologies to identify barriers and facilitators. Qualitative inquiry was carried out among GPs, the members of the HealthPathways workgroups and hospital staff, through face-to-face interviews and focus group discussions. Apart from identifying barriers and facilitators, other important indicators used to evaluate this aim were: HealthPathways as a learning platform for GPs (assessed using a qualitative study) and improvement in the capacity of GPs (indicated by a reduction in referral rates).

### Improved quality of referrals

The quality and completeness of referrals are two indicators used to evaluate this aim. Evaluators of

the Hunter and New England HealthPathways used an audit tool adopted from the Royal Australian College of General Practitioners (RACGP) Standards for general practices (4th edition) referral documents, to demonstrate change in quality and completeness of referrals after implementing HealthPathways.<sup>2,13</sup> In five studies (out of eight), pre-post study design was used to demonstrate improvement in the quality and completeness of referrals. These studies used hospital records to extract data from a random sample of pre-implementation and post-implementation referrals (eg 50 referrals each). They used referrals from several selected patient groups (eg patients attending antenatal care, radiology service, haematology clinic) rather than referrals from a general patient population. Other indicators used by different studies were appropriateness of the referrals, acceptance rate of referrals from primary health-care settings, and proportion of urgent referrals requested.

### Enhanced consistent care and management of health conditions

Of the eight studies evaluating this aim, four were conducted among specific patient populations, such as patients with acute pancreatitis, post-menopausal bleeding, cardiovascular disease, diabetes, urological disease, and respiratory disease. Qualitative inquiries (focus group discussions and face-to-face interviews) were conducted with GPs, members of the HealthPathways workgroup, and hospital staff to assess their subjective perceptions of the impact of HealthPathways on patient care.

### Improved patient journey through the local health system

With the exception of one report addressing this aim,<sup>14</sup> all studies assessed the wait time for specific patient groups (eg patients with diabetes mellitus, hospital referrals in antenatal care, persistent non-cancer pain, and suicide risk). Retrospective analysis of hospital records was the most frequent method of measuring this outcome ( $n = 6/8$ ). In addition, Chow *et al.* used a patient survey to assess wait time for an appointment at their diabetes clinic.<sup>15</sup> Apart from wait time, Huckel Schneider used qualitative methods to measure acceptability

Table 3. Different methodologies used to evaluate the programme aims

Study reference	Aim evaluated <sup>#</sup>	Indicators (themes in qualitative studies)	Study populations	Evaluation design	Data collection	Data source	Methods of analysis
Goddard-Nash <i>et al.</i> (2020) <sup>21</sup>	Aim 1	Experiences or perceived benefits and facilitators to using HealthPathways Number of users per month	GPs and hospital stakeholders involved in HealthPathways	Descriptive	Prospective	Online survey	Chi-squared test; Fisher's exact test; Logistic Regression
Chow <i>et al.</i> (2019) <sup>15</sup>	Aim 1	Usage pattern in GP centres and by GPs Subjective perception of ease of use	GPs	Descriptive	Prospective	Online survey	Descriptive statistics
	Aim 6	Use of HealthPathways related to diabetes patients	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
		Waiting time for an appointment at diabetes clinic	Patients with diabetes mellitus	Descriptive	Prospective	Patient survey	Descriptive statistics
Gill <i>et al.</i> (2019) <sup>22</sup>	Aim 1	Frequency GPs accessed HealthPathways	GPs	Descriptive	Prospective	Survey: Postal, email, in-person	Chi-squared test
	Aim 2	Barriers and benefits of HealthPathways	GPs	Descriptive	Prospective	Survey: Postal, email, in-person	Descriptive statistics
		Barriers and facilitators to use, and the strengths and weaknesses of HealthPathways	HealthPathways work groups	Qualitative	Prospective	Focus group	Thematic analysis
Lind <i>et al.</i> (2020) <sup>16</sup>	Aim 1	Number of new, return, and total users per month Number of pages viewed per session Number of views per month for each page and each clinical stream Number of sessions that started on each page Time spent on the site Time spent on specific pages Time of day when page views occurred % of sessions involving $\geq 1$ interaction with the site Number of times specific pages or features accessed Frequencies of search term use (stratified by search success in producing results within the portal)	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics

(Continued)



Table 3. (Continued)

Study reference	Aim evaluated <sup>#</sup>	Indicators (themes in qualitative studies)	Study populations	Evaluation design	Data collection	Data source	Methods of analysis
Gray <i>et al.</i> (2018), <sup>2</sup> Wiggers <i>et al.</i> (2013) <sup>13</sup>	Aim 1	Number of monthly HealthPathways sessions	GPs	Pre-post study	Retrospective	Google analytics	Descriptive statistics
		Number of users per month					
		Average number of pages viewed per session					
	Aim 4	Most viewed pages	General practices	Pre-post study	Prospective & Retrospective	Telephone survey	Chi-squared test
		Number of general practices using HealthPathways	Hospital referrals in antenatal care, persistent non-cancer pain and suicide risk, assessed using a standard audit tool	Pre-post study	Retrospective	Hospital records	Descriptive statistics
		Time taken from receipt of the referral and time of care provided	Hospital referrals in antenatal care, persistent non-cancer pain and suicide risk	Pre-post study	Retrospective	Hospital records	Descriptive statistics
Akehurst <i>et al.</i> (2018) <sup>23</sup>	Aim 1	Number of HealthPathways sessions	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
	Aim 4	Number of page views over the time					
		Number of users over the time					
		Quality and appropriateness of referrals	GPs and hospital stakeholders in HealthPathways	Qualitative	Prospective	Focus group	Thematic analysis
McGeoch <i>et al.</i> (2015) <sup>17</sup>	Aim 1	Effectiveness of two-way communication					
		Effectiveness of task transfer					
		Usage pattern of HealthPathways	GPs	Descriptive	Prospective	Online survey	Descriptive statistics
		Perceived clinical effectiveness					
		Perceived ease of use					
		Perceived experience in using HealthPathways					
		Usage pattern of HealthPathways	Practice nurses	Descriptive	Prospective	Online survey	Descriptive statistics
		Perceived clinical effectiveness					
		Perceived ease of use					
		Perceived experience in using HealthPathways					
			Hospital clinicians	Descriptive	Prospective	Online survey	Descriptive statistics

(Continued)



Table 3. (Continued)

Study reference	Aim evaluated#	Indicators (themes in qualitative studies)	Study populations	Evaluation design	Data collection	Data source	Methods of analysis
Huckel Schneider (2018) <sup>14</sup>	Aim 1	% of GPs who were aware of the HealthPathways	GPs	Descriptive	Retrospective	Retrospective surveys	Descriptive statistics
		% of GPs who were users of HealthPathways					
		Frequency of users' use of HealthPathways					
		Estimated number of users per week					
	Aim 4	Number of sessions per user in a 1-month period	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
		Pages viewed most often, and length of view					
		HealthPathways use by different professional groups					
		Association between geographical location and awareness of HealthPathways					
	Aim 5	Completeness of referrals	HealthPathways newsletter subscribers, HealthPathways workgroups, community review groups	Descriptive	Retrospective	Geographical mapping	Geo-spatial analysis
		% of appropriate referrals					
		Number of patients referred to little-known clinics mentioned in relevant HealthPathways					
		Reasons for HealthPathways making or not making a difference to referrals					
	Aim 6	Quality of patient assessment and treatment	GP referrals to renal and haematology clinics	Pre-post study	Retrospective & Prospective	Hospital records	Descriptive statistics
		Acceptability of HealthPathways to patients					
	Aim 6	Acceptability of HealthPathways to patients	Patients referred to little-known public hospital and community clinics	Pre-post study	Retrospective	Hospital records	Descriptive statistics
	Aim 6	Acceptability of HealthPathways to patients	GP referrals to renal and haematology clinics	Pre-post study	Retrospective	Hospital records	Descriptive statistics

(Continued)

Table 3. (Continued)

Study reference	Aim evaluated <sup>#</sup>	Indicators (themes in qualitative studies)	Study populations	Evaluation design	Data collection	Data source	Methods of analysis
Andrews <i>et al.</i> (2018) <sup>30</sup>	Aim 1	Number of page views per month Total number of users Average number of pages viewed per session Average number of searches per user Most viewed pages	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
	Aim 2	Indicator as a learning platform for the GPs Barriers and facilitators to HealthPathways use	GPs and hospital stakeholders involved in HealthPathways	Qualitative	Prospective	Focus group	Thematic analysis
	Aim 4	Quality of referrals to secondary care	GPs and hospital stakeholders involved in HealthPathways	Qualitative	Prospective	Face-to-face interviews	Thematic analysis
	Aim 5	Quality of patient assessment and treatment	GPs and hospital stakeholders involved in HealthPathways	Qualitative	Prospective	Face-to-face interviews	Thematic analysis
Illawarra Shoalhaven Local Health District <sup>31</sup>	Aim 1	Number of monthly HealthPathways sessions	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
	Aim 4	% of referrals with blood and urine results	Renal patients referred to hospitals	Pre-post study	Retrospective	Hospital records	Descriptive statistics
	Aim 1	Average page views per day Pages viewed most often	GPs	Descriptive	Retrospective	Google analytics	Descriptive statistics
		% of respondents aware of HealthPathways	GPs	Mixed method	Prospective	Online survey and Interviews	Descriptive and Thematic analyses
	Aim 5	% of respondents who have used HealthPathways Improved collaboration between hospital staff Improved care of patients	GPs	Mixed method	Prospective	Online survey, interviews	Descriptive and thematic analyses
Reynke <i>et al.</i> (2018) <sup>24</sup>	Aim 2	Barriers and facilitators to HealthPathways use	GPs	Qualitative	Prospective	Interviews	Thematic analysis
Mansfield <i>et al.</i> (2018) <sup>29</sup>	Aim 2	Barriers and facilitators to HealthPathways use	HealthPathways workgroups	Qualitative	Prospective	Focus group	Thematic analysis
	Aim 5	Effect to patient care	HealthPathways work groups	Qualitative	Prospective	Focus group	Thematic analysis

(Continued)

Table 3. (Continued)

Study reference	Aim evaluated <sup>#</sup>	Indicators (themes in qualitative studies)	Study populations	Evaluation design	Data collection	Data source	Methods of analysis
Blythe <i>et al.</i> (2019) <sup>9</sup>	Aim 2	Increased capacity of GPs with reduction in referral rates	Patients admitted to hospital or referred to outpatient facilities from primary care for cardiovascular disease, diabetes, neurological disease, and respiratory disease	Pre-post study	Retrospective	Hospital records	Descriptive statistics
	Aim 4	Proportion of appropriate referrals (referrals resulting in multiple specialist appointments)		Pre-post study	Retrospective	Hospital records	Descriptive statistics
	Aim 5	% of patients with good control in TC <sup>*</sup> and HDL <sup>##</sup> , HbA1c <sup>§</sup> , FEV1 <sup>**</sup> and FVC <sup>®</sup> , smoking		Pre-post study	Retrospective	Hospital records	Descriptive statistics
	Aim 7	Annual cost savings of inappropriate specialist visit avoidance per patient		Cost analysis	Retrospective	Hospital records	Descriptive statistics
Holland <i>et al.</i> (2016) <sup>26</sup>	Aim 4	Acceptance rate of referrals from primary care	Primary care patients awaiting radiology	Descriptive	Retrospective	Hospital records	Descriptive statistics
	Aim 6	% of referrals requested urgently Time from receipt of referral to time of care	Primary care patients awaiting radiology	Descriptive	Retrospective	Hospital records	Descriptive statistics
Maidlow <i>et al.</i> (2019) <sup>19</sup>	Aim 5	Adherence to the serum amylase assessment guideline for patients with acute pancreatitis	Patients with acute pancreatitis	Pre-post study	Retrospective	Hospital records	Z test
Stravens <i>et al.</i> (2016) <sup>25</sup>	Aim 5	Number of endometrial cancer cases missed by HealthPathways	Women with post-menopausal bleeding	Descriptive	Retrospective	Hospital records	Descriptive statistics
	Aim 6	Time from receipt of referral to time of care	Women with post-menopausal bleeding	Descriptive	Retrospective	Hospital records	Descriptive statistics
Dixon <i>et al.</i> (2018) <sup>27</sup>	Aim 5	Avoidance of unnecessary frenotomy for infants with tongue-tie. Assessed using frenotomy rate	Infants with tongue-tie	Audit	Retrospective	Hospital records	Descriptive statistics
Epton <i>et al.</i> (2017) <sup>20</sup>	Aim 6	Patients' waiting time after implementing a primary care-based sleep assessment in HealthPathways	Patients awaiting sleep assessment	Descriptive	Retrospective	Hospital records	Descriptive statistics
Sanders <i>et al.</i> (2013) <sup>28</sup>	Aim 6	Time from receipt of referral to time of care	Patients with colorectal symptoms	Descriptive	Retrospective	Hospital records	Descriptive statistics

<sup>#</sup>Programme aims: (1) increased awareness and use of HealthPathways; (2) general practitioners are supported to adopt best practice, patient-centred care; (3) increased appropriate use of resources and services; (4) improved quality of referrals; (5) enhanced consistent care and management of health conditions; (6) improved patient journey through the local health system; (7) reduction in health-care cost and increase value for money.

<sup>\*</sup>TC: Total cholesterol; <sup>##</sup>HDL: High-density lipoproteins; <sup>§</sup>HbA1c: Glycated hemoglobin; <sup>\*\*</sup>FEV1: Forced expiratory volume; <sup>®</sup>FVC: Forced vital capacity

of HealthPathways among patients as an indicator of improved patient journeys.<sup>14</sup>

### Reduction in health-care cost and increased value for money

Only one study evaluated this programme aim. Blythe *et al.* estimated the annual cost savings of inappropriate specialist visit avoidance per patient among patients admitted or referred from primary care for cardiovascular disease, diabetes, urological disease, and respiratory disease.<sup>9</sup>

## Discussion

This scoping review assessed 21 published HealthPathways evaluations, describing the methodologies used to determine impact and outcomes across a variety of programmes. The impact and outcomes framework for this scoping review was developed using the six aims identified in a South Australian HealthPathways report,<sup>10</sup> with one additional aim identified during the process of this review. These seven aims included components related to awareness, usage, improvement in patient care and patient experience, and providing best value for money. Much of the previous focus in the evaluation literature has been on measuring increased awareness and use of HealthPathways, but several evaluations have also assessed improvements in care consistency, better care of health conditions, improved patient journey, and the impact on GPs. A wide variety of quantitative, qualitative, and mixed methodologies have been used for evaluation, and overlap has occurred in many data sources and analytic methods. There are benefits and limitations to each of these evaluation approaches.

Google analytics data, a service provided by Google that tracks and reports website traffic, was the most common data source used to analyse usage patterns. The use of HealthPathways is best described by tracking individual users over time. However, because Google analytics track users by using cookies, it limits tracking of individuals as it is specific to devices and browsers. Therefore, the number of unique users could be an overestimation, whereas the number of return users is likely an underestimation.<sup>16</sup> This is a well-documented limitation of Google analytics data. An alternative data source to overcome this limitation is individual user

surveys. Most user surveys included in the review had used online surveys, which also have limitations. Poor response to online surveys is common among GPs, potentially introducing non-response bias, and could lead to erroneous conclusions. Furthermore, GPs who are more engaged with HealthPathways could respond more often to these surveys, introducing selection bias.<sup>17</sup> Mixed-method approaches using quantitative methods such as Google analytics and user surveys, complemented with qualitative methods, could be the ideal way of evaluating the aim '*increased awareness and use of HealthPathways*' while addressing some of these limitations.

Qualitative research methods are also best placed to gather the in-depth insights required to understand the barriers and facilitators to HealthPathways use, as this information is currently not well understood by other means.<sup>18</sup> This was demonstrated by the fact that most of the evaluations in this review applied this methodology to describe context-specific HealthPathways barriers and facilitators. However, data collection and analysis of qualitative studies requires expertise and can be time-consuming, and findings may not be transferable to other contexts. Furthermore, the perspectives of all relevant stakeholders may not be adequately captured during qualitative inquiries.

Evaluations of the aims '*improved quality of referrals*', '*enhanced consistent care and management of health conditions*' and '*improved patient journey through local health system*' were conducted among specific patient groups and specific HealthPathways, such as patients with acute pancreatitis, postmenopausal bleeding, cardiovascular disease, diabetes, urological disease, and respiratory disease. Attention must be given in selecting disease conditions or HealthPathways, as inappropriate selections could result in a skewed representation of the evaluated aim. The Hunter and New England HealthPathways evaluation team used routine antenatal care, persistent non-cancer pain and suicide risk based on the criteria that HealthPathways had been complete and in operation for  $\geq 12$  months; the HealthPathways addressed conditions of high prevalence in the community and had highest utilisation among all Hunter and New England HealthPathways; there were no major changes to the pathway in the previous 6 months;

and they had been developed according to the Hunter and New England HealthPathways model. Although the quality and completeness of the referrals has been evaluated, the accuracy of the information in the referrals has not been evaluated in any of the reviews, which may be due to the difficulties in the practicality of collecting these data.

Blythe *et al.* assessed the cost implications of HealthPathways by estimating the cost saving due to avoiding inappropriate specialist referrals.<sup>9</sup> This is the only evaluation we found that assessed the cost implications of HealthPathways; however, the authors had made many assumptions in calculating cost savings, signalling the challenges in conducting such a study. None of the studies had conducted a standard cost-effectiveness analysis to evaluate whether HealthPathways produce best value for money. A high-quality cost-effectiveness analysis would require data linkage between primary care and hospital admissions using patient-level data. In countries like Australia, economic analyses should include patient-level general practice and hospital utilisation data, patient-level clinical data (at both general practice and hospital level), and individual GPs' adherence to HealthPathways, all of which are not readily accessible to researchers, even after necessary ethics approvals. However, in countries like Australia, appropriate data linkages with necessary administrative willingness, policy changes and changes to privacy laws could improve the possibility of comprehensive evaluations in the future.

## Conclusion

This review describes the strengths, limitations, and gaps of the current HealthPathways evaluation literature. Although some impact and outcome aims have been evaluated extensively, aims such as increased appropriate use of resources and services, reduction in health-care cost and increased value for money have rarely been evaluated for HealthPathways. Assessing the impact or the outcome of HealthPathways independent of all other interconnected factors is challenging and may not be achievable. However, comprehensive HealthPathways evaluation should attempt to evaluate as many of the aims presented in this review as possible. Each aim may require specific methodologies sensitive

enough to capture the impact the HealthPathways are making over time in a specific area.

## Competing interests

The authors declare no competing interests.

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## Availability of data

The data that support this study are available in the article.

## References

1. Runciman WB, Hunt TD, Hannaford NA, et al. CareTrack: assessing the appropriateness of health care delivery in Australia. *Med J Aust.* 2012;197(2):100–5. doi:10.5694/mja12.10510
2. Gray JS, Swan JR, Lynch MA, et al. Hunter and New England HealthPathways: a 4-year journey of integrated care. *Aust Health Rev.* 2018;42(1):66–71. doi:10.1071/AH16197
3. Clarke A, Blundell N, Forde I, et al. Can guidelines improve referral to elective surgical specialties for adults? A systematic review. *BMJ Qual Saf.* 2010;19(3):187–94. doi:10.1136/qshc.2008.029918
4. Brennan N, Mattick K, Ellis T. The Map of Medicine: a review of evidence for its impact on healthcare. *Health Info Libr J.* 2011;28(2):93–100. doi:10.1111/j.1471-1842.2011.00940.x
5. Lee XJ, Blythe R, Choudhury AAK, et al. Review of methods and study designs of evaluations related to clinical pathways. *Aust Health Rev.* 2019;43(4):448–56. doi:10.1071/AH17276
6. HealthPathways Community. What is HealthPathways? New Zealand: HealthPathways Community, Canterbury District Health Board, and Streamliners NZ. Christchurch: Streamliners NZ Ltd; 2020. [cited 2020 October 5]. Available from: <https://www.healthpathwayscommunity.org/About>
7. Scriven M. Minimalist theory: The least theory that practice requires. *Am J Eval.* 1998;19(1):57–70. doi:10.1177/109821409801900105
8. Hunter & New England HealthPathways Evaluation Steering Committee. Evaluation of Hunter & New England HealthPathways Australia: Hunter New England Local Health District. Hunter New England: Hunter & New England HealthPathways Evaluation Steering Committee; 2014 [cited 2020 October 5]. Available from: <https://researchbibliography.streamliners.co.nz/bibliography/PZT2A2BQ/download/2GG94CYU>
9. Blythe R, Lee X, Kularatna S. HealthPathways: An economic analysis of the impact of primary care pathways in Mackay,

- Queensland. Brisbane: Australian Centre for Health Services Innovation (AusHSI); 2019. [cited 2020 October 10]. Available from: <http://www.aushsi.org.au/wp-content/uploads/2019/05/Mackay-HealthPathways-Final-Report.pdf>
10. HealthPathways South Australia. Evaluation Phase 1: Implementation. Mile End: HealthPathways South Australia; 2019.
  11. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–73. doi:10.7326/M18-0850
  12. Alison Boughey Consulting. HealthPathways: An evaluation of its implementation in five Australian Medicare Locals. Forrester: Alison Boughey Consulting; 2014. [cited 2020 October 10]. Available from: <http://www.alisonbougheyconsulting.com.au/wordpress/wp-content/uploads/2013/01/Alison-Boughey-Consulting-AML-Alliance-HealthPathways-evaluation-final-report.pdf>
  13. Wiggers J, O'Dea I, Gray J, et al. Evaluation of Hunter & New England HealthPathways Phase 2 Report. Hunter New England: Hunter & New England HealthPathways Evaluation Steering Committee; 2015. [cited 2020 October 10]. Available from: <https://researchbibliography.streamliners.co.nz/bibliography/PZT2A2BQ/download/2GG94CYU>
  14. Huckel Schneider C. Evaluating HealthPathways Sydney: adopting a system-wide perspective to capture the complexity of development, implementation and impact. Camperdown: University of Sydney; 2018. [cited 2020 October 11]. Available from: <http://hdl.handle.net/2123/18139>
  15. Chow JS, Gonzalez-Arce VE, Tam CWM, et al. HealthPathways implementation on type 2 diabetes. *J Integr Care*. 2019;27:153–62. doi:10.1108/JICA-07-2018-0047
  16. Lind KE, Jorgensen M, Stowers C, Brookes M. HealthPathways: a detailed analysis of utilisation trends in the northern Sydney region. *Aust J Prim Health*. 2020;26(4):338–43. doi:10.1071/PY20010
  17. McGeoch G, McGeoch P, Shand B. Is HealthPathways effective? An online survey of hospital clinicians, general practitioners and practice nurses. *N Z Med J*. 2015;128(1408):36–46.
  18. Rahman MS. The advantages and disadvantages of using qualitative and quantitative approaches and methods in language “testing and assessment” research: a literature review. *J Educ Learn*. 2017;6(1):102–12. doi:10.5539/jel.v6n1p102
  19. Maidlow SC, Ardagh M, Callender R, Thomas O. Addition of explicit guidance to acute pancreatitis guidelines increases compliance with amylase measurement recommendations. *N Z Med J*. 2019;132(1489):81–8.
  20. Epton MJ, Kelly PT, Shand BI, et al. Development and outcomes of a primary care-based sleep assessment service in Canterbury, New Zealand. *NPJ Prim Care Respir Med*. 2017;27(1):26. doi:10.1038/s41533-017-0030-1
  21. Goddard-Nash A, Makate M, Varhol R, et al. Evaluation of HealthPathways: An appraisal of usage, experiences and opinions of health care professionals in Australia and New Zealand. *Aust Health Rev*. 2020;44(4):590–600.
  22. Gill SD, Mansfield S, McLeod M, et al. HealthPathways improving access to care. *Aust Health Rev*. 2019;43(2):207–16. doi:10.1071/AH17090
  23. Akehurst J, Sattar Z, Gordon I, Ling J. Implementing online evidence-based care pathways: A mixed-methods study across primary and secondary care. *BMJ Open*. 2018;8(12):e022991. doi:10.1136/bmjopen-2018-022991
  24. Reyneke A, Jaye C, Stokes T. Local clinical pathways: from ‘good ideas’ to ‘practicality’ for general practitioners. *J Prim Health Care*. 2018;10(3):215–23. doi:10.1071/HC18023
  25. Stravens M, Short J, Johnson K, et al. Management of postmenopausal bleeding by general practitioners in a community setting: an observational study. *N Z Med J*. 2016;129(1434):59–68.
  26. Holland K, McGeoch G, Gullery C. A multifaceted intervention to improve primary care radiology referral quality and value in Canterbury. *N Z Med J*. 2017;130:55–64.
  27. Dixon B, Gray J, Elliot N, et al. A multifaceted programme to reduce the rate of tongue-tie release surgery in newborn infants: observational study. *Int J Pediatr Otorhinolaryngol*. 2018;113:156–63. doi:10.1016/j.ijporl.2018.07.045
  28. Sanders AD, Stevenson C, Pearson J, et al. A novel pathway for investigation of colorectal symptoms with colonoscopy or computed tomography colonography. *N Z Med J*. 2013;126(1382):45–57.
  29. Mansfield SJ, Quirk F, von Treuer K, Gill G. On the right path? Exploring the experiences and opinions of clinicians involved in developing and implementing HealthPathways Barwon. *Aust Health Rev*. 2016;40(2):129–35. doi:10.1071/AH15009
  30. Andrews S, Appleton-Dyer S, Henderson G. Evaluation of 3D HealthPathways. Auckland: SYNERGIA; 2018. [cited 2020 October 12]. Available from: <https://www.ccdhb.org.nz/about-us/integrated-care-collaborative-alliance/3d-hb-health-pathways/healthpathways-report-final-26-june-2018.pdf>
  31. Illawarra Shoalhaven Local Health District. COORDINARE, South Eastern NSW PHN. HealthPathways Illawarra Shoalhaven Short Term Evaluation. Warrawong: HealthPathways Illawarra Shoalhaven; 2018. [cited 2020 October 12]. Available from: <https://illawarrashoalhavenproject.healthpathways.org.au/Portals/32/HPWIS%20Docs/HPW%20Evaluations,%20Surveys%20&%20Papers/HPWIS%20Short%20Term%20Evaluation%20Report%20-%20FINAL%20070918.pdf>