HealthPathways:
An economic analysis of the impact of primary care pathways in Mackay, Queensland

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Executive Summary

HealthPathways overview

HealthPathways is a clinical pathway portal that enables general practitioners (GPs) to better manage their patients in the primary sector. Pathways for various diseases assist GPs with patient assessment, management, referrals, and best practices tailored to the local context to provide more comprehensive care. AusHSI was contracted to conduct an economic analysis of HealthPathways for four disease groups: cardiology, diabetes, urology, and respiratory conditions. In this paper we sought to analyse the impact of Mackay HealthPathways on patients, providers, and the health system through economic analysis. HealthPathways is designed to improve referral appropriateness, improve GP confidence in managing complex conditions, and reduce unnecessary care. The program is intended to ensure the right care, at the right time, in the right place and delivered to the right person.

Analysis and results

The data included in the analysis were aggregate PenCAT figures across Mackay region, primary care referrals, and all acute and specialist outpatient utilisation from January to March in 2015 and 2017. Diabetes was chosen as the intervention group as it featured comprehensive HealthPathways implementation. Urology was not supported by HealthPathways as of March 2017 and represents the control group. Cardiology and respiratory conditions represent partially implemented HealthPathways conditions. While statistically rigorous conclusions were not possible, we showed that the diabetes pathways could potentially save the health system approximately $74,240 per year in avoidable referrals, while the urology control group showed a 15% increase in unnecessary referrals. There were mixed results for cardiology and respiratory conditions, depending on the availability of referral pathways.

Implications for Mackay and Queensland

While more research is required to show cost-effectiveness and outcomes for patient health, the Mackay Health system could potentially save hundreds of thousands of dollars in avoided unnecessary referrals per Pathway. If HealthPathways is fully integrated across Queensland for every chronic disease requiring referrals, the program could generate even greater cost savings. We believe there is sufficient evidence to continue the HealthPathways program while collecting comprehensive data to determine the health and economic impacts.

Recommendations

AusHSI recommends the continuation of HealthPathways provided that the program is fully implemented as per the diabetes clinical pathway. This includes a developed suite of clinical and referral pathways, however the diabetes pathway's success was likely due in part to the requirement for GPs to consult HealthPathways before making referrals. This is a critical component that should be expanded to other available pathways. AusHSI also recommends that a comprehensive HealthPathways evaluation be conducted using patient-level data to identify whether HealthPathways can be a cost-effective program across the state of Queensland.

Introduction

HealthPathways is a web-based health information system that guides clinicians through complex referral decisions in local health systems. HealthPathways was developed in New Zealand by the Canterbury Initiative in 2008. It was initially developed for 500 clinical pathways, but continues to grow. It reviews and updates core pathways based on current evidence and specialist consultation. The pathways are designed to be used during patient visits and are jointly developed between general practitioners, specialists, nurses, and allied health professionals across all sectors.

HealthPathways is widely used by Primary Health Networks (PHNs) and health departments in Australia due to popularity among general practitioners and ease of use. It is designed for general practitioners, but can also be used by hospital specialists, practice nurses and managers, community health providers, and allied health professionals. HealthPathways is a dynamic collaboration between different providers, and pathways are regularly updated to provide the most accurate diagnostic and referral information when new providers are introduced. As pathway appropriateness depends strongly on local facilities and resource availability, it must be tailored to the local context. General practitioners use pathways during consultations to ensure they are providing the most convenient and appropriate referrals for their patients. This provides better primary care management and reduces the burden on patients when they must seek out specialist care.

The benefits of HealthPathways include adherence to best practice guidelines, reduced unnecessary or inappropriate referrals, and more timely patient care. Integration of best practice frameworks in primary care reduces unnecessary variation and provides patients with care supported by evidence. This would reduce burden of subsequent health service utilisation. Primary care physicians are better placed to judge when a patient should be referred, what specialist would be the best choice to refer to, and when patients should be managed in the primary sector. The most convenient options for patients can be agreed upon with the patients themselves, improving care integration and creating a patient-centred experience.

Evaluations of effectiveness and cost effectiveness of HealthPathways have not yet been conducted in Australia. We conducted a systematic literature review to identify evidence of economic effectiveness of clinical pathways in the literature[1]. In our review we identified only ten studies from Australia and New Zealand evaluating HealthPathways or any of its individual clinical pathways[2-11]. Of these studies, only one included an economic evaluation component[8]. This study found that the clinical pathway being evaluated should no longer be recommended, and it was subsequently removed from HealthPathways. Most HealthPathways evaluations were limited to process evaluations and user surveys[2-4].

Mackay HealthPathways went live in June 2015. A small number of pathways were originally implemented, but this number continues to grow as contributors add to the online portal. It was a joint implementation by the Northern Queensland PHN (NQPHN) and the Mackay Hospital and Health Service (HHS). AusHSI was contracted to evaluate the effectiveness and cost effectiveness of HealthPathways. Using the data available, this evaluation was designed to analyse the differences in costs and service utilisation for patients managed under a HealthPathways-supported diagnostic group compared to patients managed under standard care. We hypothesised that patients in the intervention group would use less secondary and tertiary care without a decline in clinical outcomes.

Methods

We conducted an analysis on the Mackay HHS catchment area including all patients who had been admitted to hospital or referred to outpatient facilities from primary care for the following four conditions: cardiovascular disease, diabetes, urological disease, and respiratory disease. In addition, aggregate yearly GP patient data in the Mackay HHS were obtained for each of the following conditions: diabetes, respiratory, cardiovascular disease, heart failure and hypertension. The GP patient database does not track urological disease conditions. We obtained aggregate primary care data from PenCAT, and secondary/tertiary utilisation data was obtained from a number of different data sources including Hospital Based Corporate Information Systems for demographic and referral data, and Transition 2 for appointment and costing data.

This study was approved by the Townsville Hospital and Health Service Human Research Ethics Committee (HREC) and Queensland University of Technology HREC (approval numbers HREC/17/QTHS/243 and 1700001131, respectively).

Pathways implementation

Pathways for the different conditions considered went live at different dates. The most comprehensive pathway available as of January 2017, the start of the intervention window, was diabetes, including most of the critical information for patient management and featuring a well-defined referral component. Practitioners were strongly encouraged to consult the recommendations within the diabetes section before making a referral. Cardiology pathways were less developed. While they included the modules relevant to appropriate referrals, not all of the pathways were available. The respiratory section featured the lowest number of available pathways and lacked referral guidelines. No urology pathways were available by March 2017.

The availability of different pathways suggests that the strongest indicator of HealthPathways effectiveness was diabetes, while the urology pathway is a suitable control group as it shows the effect of no intervention from pre- to post-implementation. Cardiology and respiratory pathways represent partial project implementation. Pathway availability is summarised in Table 1.

Table 1: Implementation and availability of various HealthPathways portals from 2015 to 2017

Pathway	First go-live date	Pathways available by January 2017	Referral advice available by January 2017
Diabetes	May 2015	19	Yes
Cardiology	March 2015	11	Yes
Respiratory	February 2015	9	No
Urology	May 2017	0	No

Study design

We used a pre-post study design to investigate the impact of HeathPathways. We included all patients referred for the above four conditions from January to March 2015, pre-Pathways, as the control group. We included all referrals from January to March 2017, post-Pathways, as the intervention group. Urology had no pathways in effect by the post-intervention period, and serves as a counterfactual. Patient referral data were retrospectively extracted from HHS databases to match primary care with acute and specialist care.

We analysed the total outpatient specialist care utilised by all referred patients in all four diagnostic groups. On advice from HHS data custodians, we classified referrals resulting in multiple specialist appointments as appropriately referred. This was because single-visit referrals indicated that specialists did not believe an ongoing relationship with the patient was required, and patients could be more appropriately managed in primary care. Due to data availability issues we were only able to obtain total numbers of referrals, removing the capacity for statistical analysis. We compared counts of appropriate and inappropriate specialist appointments by diagnosis. While this method is not statistically rigorous, it included all specialist appointments in Mackay. Thus, provided disease incidence and patient population did not substantially change, we found it likely that any changes in referral numbers indicated a change in practice. Epidemiological consultation with NQPHN on population and disease incidence revealed no meaningful changes in these figures.

Methods

We also analysed the total inpatient service utilisation for the four disease groups for all patients linked to clinics using HealthPathways. We conducted multiple linear regressions for the treatment effect by diagnosis on per-episode and overall log costs and log length of stay (LOS), while adjusting for age, gender and Aboriginal/Torres Strait Islander status.

Economic analysis

Average specialist appointment costs were calculated by adding the direct and overhead costs of each outpatient specialist appointment. This is the total cost to the HHS per patient per visit. We calculated the cost of primary care visits as per the 2016 Medicare Benefits Schedule (MBS). These included the MBS item 721, for the preparation of a general management plan for chronic diseases, and item 23, a standard GP visit[12]. Data provided by Mackay HHS showed that the HealthPathways program cost $282,400 to establish, followed by an annual cost of $369,400 for continually maintaining, updating, and adding Pathways.

We evaluated potential cost savings using avoided inappropriate specialist appointments. Inappropriate referrals were sent back to the referring GP for disease management, so the cost saving was the difference between a specialist appointment and a GP appointment. We multiplied this cost saving by the number of avoided appointments for a total cost savings to the health system over the intervention period. Given the 3-month intervention window, we multiplied by 4 to find the number of inappropriate referrals avoided annually. This may be a conservative estimate, as summer utilisation figures are typically lower.

Cost savings in this context refer to the overall costs saved by the health system; GP visits are paid out of Medicare, while Mackay HHS reduces the number of patients who would have to be seen by specialists. This reduces the waiting list for services and reduces costs in the long term as less patients are treated by secondary and tertiary care over time.

Aggregate GP practices data

Aggregate GP patient summary data were obtained from the NQPHN database, PenCAT. The Mackay HHS is contained within the NQPHN. GP practices in the region submit de-identified data on their patient health conditions to PenCAT routinely. The PenCAT data are used in reporting by NQPHN.

Annual counts of active patient numbers were compared between 2015 and 2017, where each unique GP patient is only counted once in the one year timeframe. Patient level identification was not available to the research team for this data set. Only aggregate data on specific health condition measures were compared (as detailed in Table 2 below).

Table 2: Specific GP data measures evaluated for the health conditions of interest using PenCAT data

Health condition	GP data measure(s)
Cardiovascular disease, hypertension, heart failure	Total cholesterol/HDL ratio
Diabetes	HbA1c levels
Respiratory	FEV1/FVC levels Smoking status

The NQPHN PenCAT dataset was only established in July 2015, and all 2015 data had to be retrospectively sourced from individual GP practices which still had these records available. As such, not all Mackay HHS GP practices were included in the 2015 data, so the 2015 dataset may not have been indicative of the total Mackay patient population. Additionally, there was an ongoing NQPHN initiative from mid-2015 to improve accuracy of patient diagnosis and condition coding in GP practices. This contributed to increases in reported patient numbers with particular health conditions between 2015 and 2017.

For the reasons detailed above, it was not feasible to use the GP patient aggregate data to evaluate changes to the four disease groups reviewed in this evaluation. Instead, the PenCAT data were only used to provide a broad assessment of patient health from 2015 to 2017. We refrained from reporting any statistical comparisons between 2015 and 2017 GP practice data due to the incomplete nature of the 2015 dataset. Any descriptive comparisons between the 2015 and 2017 are only valid if the subset of patient data recorded in 2015 was sufficiently representative of the 2015 Mackay HHS population of each of the health conditions.

Results

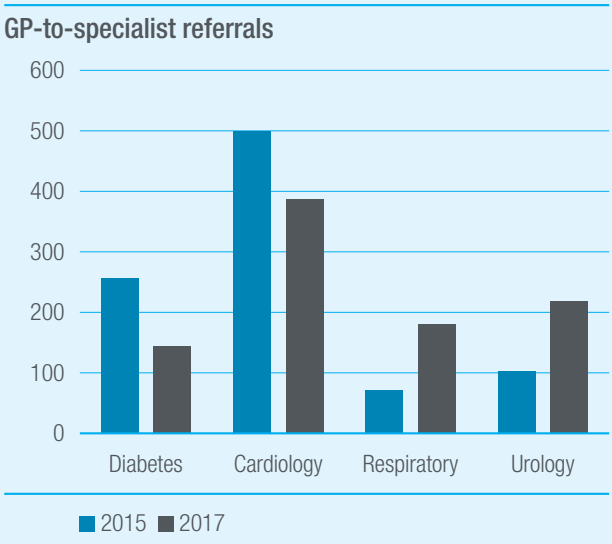
Referrals

We analysed every outpatient specialist appointment referred from the primary care sector between January and March in 2015 (pre-Pathways) and 2017 (post-Pathways). From 2015 to 2017, there was a notable change in outpatient specialist appointments referred from the primary care sector for each disease group. We found declines in GP referrals for cardiology and diabetes, but urology and respiratory referrals from the primary sector increased. Specialist-to-specialist referrals declined for all groups except urology patients. These findings are summarised in Table 3 below, and GP referrals from 2015 to 2017 are displayed in Figure 1.

Table 3: Referral rates before and after the implementation of HealthPathways

Disease group	Referral source	Referrals pre-Pathways (2015)	Referrals post-Pathways (2017)	Change
Diabetes	Primary care	259	149	-42.5%
	Specialist	245	115	-53.1%
Cardiology	Primary care	508	374	-26.4%
	Specialist	834	511	-38.7%
Respiratory	Primary care	69	169	144.9%
	Specialist	179	114	-36.3%
Urology	Primary care	107	246	129.9%
	Specialist	50	62	24.0%

Figure 1: GP-to-specialist referrals from 2015 to 2017 for all four diagnostic groups

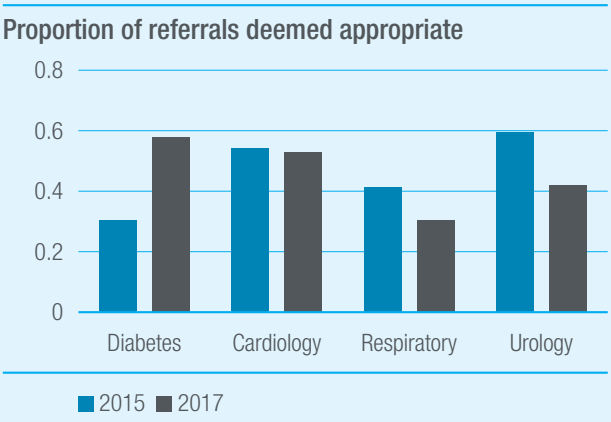


We found that referral appropriateness, defined by single-visit specialist appointments, changed by diagnosis between the pre- and post-Pathways periods. From 2015 to 2017, the change in inappropriate referrals was not statistically significant for cardiology, urology and respiratory patients, but inappropriate referrals significantly declined for diabetes. Inappropriate urology referrals increased, but this increase was not statistically significant. While cardiology referrals declined overall, this decline was not necessarily driven by inappropriate referrals. These figures are summarised in Table 4 below and represented graphically in Figure 2.

Table 4: Referral appropriateness by diagnosis pre- and post-Pathways

Disease group	Proportion of appropriate referrals pre-Pathways	Proportion of appropriate referrals post-Pathways	Change	p-value
Diabetes	0.311	0.578	0.267	0.004
Cardiology	0.519	0.509	-0.011	0.860
Respiratory	0.423	0.308	-0.115	0.319
Urology	0.600	0.451	-0.149	0.097

Figure 2: Changes in referral appropriateness between 2015 and 2017, pre- and post-Pathways



Results

Economic analysis

Attributing costs to GP visits required two MBS items. Item 721, creating a GP management plan, cost $144 and was valid for up to 24 months, so we assigned it a monthly cost of $6. Item 23, a standard appointment, cost $37 per GP visit. Patients are encouraged to visit their GP for diabetes once every 2-3 months, but we used monthly visits as this corresponded to an equivalent level of specialist care. As a result, cost savings may be slightly underestimated. Primary care visits cost $37 for the appointment plus $6 for the GP management plan, or $43 per month. We determined that the average cost of a specialist appointment varied by diagnosis. The average costs per visit were $203 for diabetes, $332 for cardiology, $271 for respiratory and $674 for urology. These reflect the cost to the HHS of each appointment.

Diabetes referrals declined by 110 visits, from 259 to 149, a change of -42.5%. In contrast, urology referrals increased by 139 visits from 107 to 246, a change of 129.9%. Provided each avoided specialist appointment was replaced with a GP appointment, Table 5 below examines the notional cost savings per patient that could be expected for the health system overall by replacing specialist care with primary care.

Table 5: Potential annual cost savings of inappropriate specialist visit avoidance per patient

Visit type	Average visit cost	Cost saving per inappropriate visit avoided
Endocrinologist	$203	$160
Cardiologist	$332	$289
Pulmonologist	$271	$228
Urologist	$674	$631
General Practitioner	$43	-

Aggregate GP practices data

The health condition measures for 2015 and 2017 GP practice data are provided in Table 6. Overall, the distribution of the measurements for each health condition in 2015 are similar to the corresponding 2017 distributions, assuming the 2015 data is sufficiently representative of GP practices in the Mackay HHS.

The distribution of total cholesterol/HDL ratio among the three heart conditions (cardiovascular disease, hypertension and heart failure) were broadly similar with >80% of patients in each year having ratio values of ≤ 5. Total cholesterol/HDL ratio was > 5 in both 2015 and 2017 for 13.7% of cardiovascular disease patients. This was similar to heart failure patients, with 13.7% of patients having total cholesterol/HDL ratio > 5 in 2015 and 14.9% in 2017. The percentages of hypertension patients with total cholesterol/HDL ratio > 5 were slightly larger (16.6% in 2015 and 18.2% in 2017).

HbA1c levels among diabetes patients in 2015 and 2016 appear to be broadly consistent between 2015 and 2017 with slightly higher percentages of patients with HbA1c levels > 7% in 2017 (43.4% in 2017 compared with 39.8% in 2015).

The majority of respiratory patients have FEV1/FVC ratios above the threshold for COPD classification in both years (65.0 % in 2015 and 65.6% in 2017). The distribution of smoking status among respiratory patients was similar in both years with 16.7% of patients still reported to be daily smokers in 2015, and 19.1% in 2017.

Table 6: Diagnostic indicators by disease group between 2015 and 2017

Health condition	GP data measure(s)	Measure categories	Patient percentages (%)	
			2015	2017
Cardiovascular disease	Total cholesterol/HDL* ratio	< 3.5	48.2	47.5
		3.5 – 5.0	38.1	38.8
		> 5.0	13.7	13.7
Hypertension	Total cholesterol/HDL* ratio	< 3.5	39.5	38.1
		3.5 – 5.0	43.8	43.7
		> 5.0	16.6	18.2
Heart failure	Total cholesterol/HDL* ratio	< 3.5	46.3	43.5
		3.5 – 5.0	40.0	41.6
		> 5.0	13.7	14.9
Diabetes	HbA1c† levels	≤ 7%	60.2	56.6
		7% – 8%	19.3	20.0
		8% – 10%	15.3	17.0
		≥ 10%	5.3	6.4
Respiratory	FEV1/FVC‡ levels	FEV1/FVC ≥ 0.7	65.0	65.6
	Smoking status	Daily Smoker	16.7	19.1
		Irregular Smoker	1.8	2.4
		Ex-Smoker	27.4	27.3
		Never Smoked	54.1	51.1

*HDL: high density lipids
†HbA1c: haemoglobin A1c
‡FEV1/FCV: forced expiratory volume in one second; measured during a forced vital capacity test

Acute inpatient service utilisation

We found some changes in acute service use between the pre- and post-Pathways cohorts. After adjusting for age, gender, and Aboriginal/Torres Strait Islander status, we found that cardiology and diabetes patients showed no major cost differences, but costs declined for urology and respiratory patients. These findings are shown in Table 7.

Table 7: Changes in acute service utilisation costs post-Pathways

Disease group	Change in costs post-Pathways	95% confidence interval	p-value
Diabetes	3.1%	[-46.6%, 99.2%]	0.926
Cardiology	17.2%	[-25.1%, 83.5%]	0.484
Respiratory	-59.9%	[-77.6%, -24.6%]	0.005
Urology	-48.8%	[-73.4%, 2.3%]	0.058

Discussion

Findings and limitations

We found that numbers of referrals declined considerably for cardiology and diabetes patients, but increased for urology and respiratory patients. We have made substantial assumptions, acknowledged repeatedly throughout this paper about potential or notional cost savings. However, our analysis shows that there is a strong possibility that HealthPathways has reduced inappropriate utilisation for diabetes. It may be possible that other interventions or changes in population prevalence and incidence have caused this change, which emphasises that further research is needed. However, our findings suggest that HealthPathways has likely reduced costs for diabetes patients in Mackay through a reduction in unnecessary referrals.

For true systemic cost savings to have occurred, any decline in referrals must not have been replaced with increased acute or subacute care, temporary or permanent relocation of patients to private care or other HHS areas, or a substantial reduction in incidence. We found no evidence of the former in our analysis, and consultation with the NQPHN epidemiology unit showed no evidence of the latter two. While the population of Mackay declined slightly, this decline was largely driven by the departure of younger, healthier adults working in the mining industry after the closure of several local mines, and were thus less likely to be part of the patient population evaluated under any of the four pathways, who were typically older and sicker.

We found that health indicators in both the primary and acute sectors for cardiology, diabetes, and respiratory patients were unchanged from 2015 to 2017, suggesting that reducing specialist care utilisation does not adversely impact population health. The declines in acute costs found in the respiratory and urology groups were likely driven by a lack of primary care management, leading healthier patients to be treated in the acute sector instead of by their GPs. We were hesitant to draw too many conclusions from the acute care dataset as hospitals typically employ many methods of reducing costs, and HealthPathways was tangential to hospital care when compared to improving the referrals process.

The decline in referrals for diabetes may represent a declining overall rate of referral for Pathways-managed patients, provided a comprehensive implementation model. Our results suggest that the diabetes pathway enables primary care physicians to better judge when patients need to be seen by a specialist, likely due to increased engagement with pathways when referring. This decline in inappropriate referrals resulted in less specialist appointments and thus lower costs for the health system as a whole. The differences in appropriateness across disease groups may be driven by the availability of the referral pathway, which was available for cardiology but missing for respiratory patients. Further research around the implementation of HealthPathways in the primary care sector would be needed to test this hypothesis. A similar approach of Pathway availability, referral pathway implementation, and administrative engagement are required to corroborate the findings from this analysis.

In the absence of Pathways, urology referrals increased substantially, driven by a significant reduction in appropriateness. We were informed that this was due in part to unavailability of urologists in Mackay, which was eased when a urologist was appointed late 2016. Considering many of these 2017 referrals were inappropriate, however, this suggests that Pathways might have enabled GPs to manage these patients in primary care and represents a potential future cost saving. We also noted a substantial decline in specialist-to-specialist referrals for the disease groups covered by HealthPathways. While this decline could be driven by HealthPathways, specialists were not a targeted intervention group, and there was not enough information to attribute this to the program.

Economic impact

We considered the change in avoided inappropriate referrals as the basis for potential cost savings due to HealthPathways. As previously discussed, these cost savings are for the health system overall. While the practical impact for Mackay HHS of reductions in appointment numbers impact wait times rather than the HHS bottom line, long-term cost savings are achieved by reducing patient demand. These changes in referral patterns between 2015 and 2017 are summarised in Table 8 below. This table shows the total referrals and the total avoidable referrals for both pre- and post-Pathways patient groups. Table 8 informs the cost savings in Table 9 below.

Table 8: Avoidable referrals per quarter from 2015 to 2017

Disease group	Total referrals		% referrals appropriate		Number of inappropriate referrals		Reduction in inappropriate referrals
	Pre	Post	Pre	Post	Pre	Post	
Diabetes	259	149	31.1%	57.8%	178	63	116
Cardiology	508	374	51.9%	50.9%	244	184	61
Respiratory	69	169	42.3%	30.8%	40	117	-77
Urology	107	246	60.0%	45.1%	43	135	-92

The diabetes pathway experienced a substantial decline in inappropriate referrals in the post-Pathways period. We consider this to be the gold standard of HealthPathways implementation, which can be expanded to other disease groups. Comprehensive implementation leading to a decline in avoided referrals from 178 to 63, or 64.8%, was extrapolated to other disease groups to calculate expected cost savings from full HealthPathways implementation in Table 9 below.

Table 9: Expected long-term cost savings for Mackay HHS from a gold-standard HealthPathways implementation

Disease group	Observed avoidable referrals (pre)	Gold standard potential reduction	Potential referrals avoided (quarterly)	Potential referrals avoided (annual)	Cost saving per referral avoided	Cost savings for Mackay (annual)
Diabetes	178	64.8%	116	464	$160	$74,240
Cardiology	244	64.8%	158	632	$289	$182,648
Respiratory	40	64.8%	26	104	$228	$23,712
Urology	98	64.8%	64	256	$631	$161,536
Total	**561**	**64.8%**	**364**	**1,454**	**$1,308**	**$442,136**

As noted previously, there are significant assumptions made in calculating these cost savings. While we believe that HealthPathways contributes to improved primary care management, diabetes may be better suited to primary care compared to the other disease groups. Similarly, other factors not involved with HealthPathways may have influenced diabetes care patterns and could not be captured using the available data. Our findings in this paper thus constitute a rough guide of expected long-term cost savings. We encourage further research into the potential impact of HealthPathways, especially into the barriers and facilitators that best prepare GPs to manage patients within their practice with the help of the HealthPathways program. While these expected cost savings are substantial, they are but four of the total number of possible Pathways for GPs to engage with.

Discussion

Provided a full implementation of HealthPathways across Mackay, including sufficient clinical and referral pathways, executive buy-in, and a requirement to consult best practice before making a referral, we have shown that there is potential for HealthPathways to save the health system over $442,000 per year from just four pathways, which could greatly increase after analysing all currently available pathways across Queensland. As of October 2018, there were 544 live pathways for clinicians to engage with, providing substantial opportunities for cost savings. We stress that these are just potential cost savings, and a full evaluation is required to confirm whether these are seen in practice.

Return on investment

While cost savings are systemic, it is important to note that Mackay HHS will not directly recoup the cost of implementation. The savings are long-term and come as a result of reduced overall demand for specialists that allow the HHS to redirect funds elsewhere. The only short-term impact will be a reduction in waiting lists by up to two-thirds for fully and successfully implemented pathways.

Comparing the costs of implementation to the actual cost savings was not possible given the availability of data and scope of the evaluation. We estimated an average annual systemic cost saving of approximately $110,500 per Pathway, but without evaluating each Pathway individually it is not possible to determine return on investment. However, we estimate that a gold-standard implementation is required for just 4 Pathways before the program is cost-saving, and with 6 gold-standard Pathways will pay off its initial investment within a year in system-wide savings. There are 36 different disease groups supported by HealthPathways as of November 2018, and a long-term change to practice involving comprehensive use of Pathways could save upwards of $3,600,000 annually in Mackay alone after deducting the costs of maintaining the program.

A roadmap for success: Comprehensive evaluation of HealthPathways and future directions

Health services evaluation differs considerably from the controlled environment of clinical trials. In the evaluation of HealthPathways, we were forced to conduct the best possible evaluation from the available data.

While this enabled us to study a large sample population, we repeatedly encountered obstacles that prevented statistically rigorous analysis. We were unable to gather data on GP utilisation of HealthPathways, the underlying prevalence of our four disease groups of interest, and additional information such as waiting times, patient pharmaceutical and medical utilisation, and health status. Current data availability laws and the siloed nature of health data were significant obstacles to accessing health service utilisation of individual patients. While having perfect data is not feasible, improved data linkages, more granular primary care data, and a streamlined ethics process could all improve the viability of comprehensive evaluations in the future. This evaluation was difficult to conduct as what was essentially a quality improvement evaluation was more difficult and time-consuming to register than a clinical trial for a novel drug.

In any analysis of the impact of best practices on patient costs and outcomes, access to GP engagement is necessary. This is to gauge the treatment effect of HealthPathways and compare GP practices with strong adherence to practices with weak or no adherence to the program. Individual patient health data is also required. This data is currently available, but only shared with external organisations like AusHSI in an aggregate format. In order to fully evaluate HealthPathways, clinical indicators from primary care data such as Hba1c must be linked to primary, acute, and specialist care, which is only possible through individual patient data linkage. HealthPathways evaluation seeks to draw correlations between primary care and secondary/tertiary care appropriateness and any methodologically sound approach must cover all of these aspects with granular patient data. This would allow patient matching to compare outcomes with and without HealthPathways, with individual patient utilisation and demographics able to control for confounding and isolate the treatment effect.

Given the limitations in the paper and the recommendations for a comprehensive program above, we suggest using Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Scheme (PBS) data from the Australian Institute of Health and Welfare (AIHW). If patient-level hospital and outpatient data, including clinical indicators and service utilisation, could be linked with GP practice implementation and AIHW data, HealthPathways could be adequately evaluable across Australia. We strongly suggest this is conducted given the level of current and planned investment in HealthPathways across the country.

Conclusion

We have conducted an analysis of the HealthPathways program using the data available. While we were not able to draw many statistically rigorous correlations, we found that there was a notable decline in inappropriate referrals and referrals overall for diabetes, while the control group of urology moved in the opposite direction. On this basis, we found that there was early evidence for the effectiveness of HealthPathways, provided a comprehensive suite of clinical and referral pathways as well as an administrative drive for full GP uptake and collaboration.

While there were many limitations to our approach, as stated throughout the paper, we believe that there is some evidence that HealthPathways is already generating notional cost savings for Mackay through the diabetes pathway, and long-term cost savings for the health system through reduced patient demand. Provided that the implementation factors are examined and replicated, notably the impact of GP engagement, this could be expanded to other disease groups and other HHS areas. We have suggested a template for a more causative investigation into HealthPathways effectiveness, and strongly suggest that Queensland Health and the NQPHN continue conducting further research into its effectiveness.

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