

Trends in Gastrointestinal Endoscopy in Singapore 2014-2019

By: Tan Si Ying, Rowena Yap, Bob Ng, Jason Yap, Jeremy Lim

The NUS SSHSPH analysed a total of 212,793 episodes of gastrointestinal (GI) endoscopy (upper and lower GI endoscopies with and without biopsies, polypectomies etc) for the period 2014-2019. The data was obtained from seven MediShield Life Integrated Plan insurers and independently analysed for trends in utilisation, pricing and diagnoses. We present here highlights from our analyses.

I. Utilisation Trends

Claims rates of GI endoscopy: 2014-2019

Overall, the rates of GI endoscopy claims increased from 8.9 per 1,000 policy holders in 2014 to 17.3 per 1,000 policy holders in 2019 as shown in Figure 1. By 2019, the total number of all GI endoscopies was around 50,832 episodes, which is about 1% utilisation among the entire general population. This is much lower than the 2 million episodes (approximately 4.5%) utilisation rate reported in the UK in 2019.¹

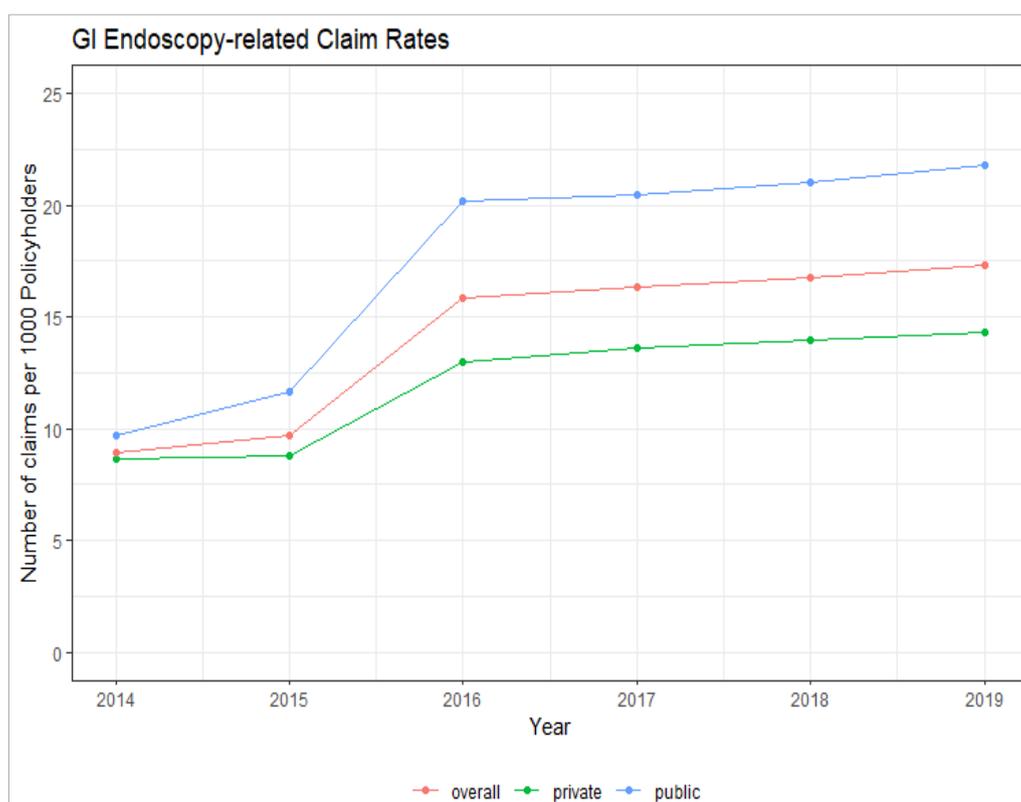


Figure 1: GI endoscopy-related claim rates between 2014-2019

Among the different age bands, Figure 2 shows that those aged between 40 to 65 had a steeper upward trend compared to those aged below 40 and those aged above 65. In particular, the claim rates of those aged between 40 and 65 were 3.6 times higher than those aged below 40.

¹ Lee, Thomas JW, Keith Siau, Shiran Esmaily, James Docherty, John Stebbing, Matthew J Brookes, *et al.* 2019. "Development of a national automated endoscopy database: The United Kingdom National Endoscopy Database (NED)." *United European Gastroenterology Journal*, 7(6): 798-806.

However, those above 65 years had claim rates 19% lower than those below 40 years (RR=0.813 [0.801,0.825]).

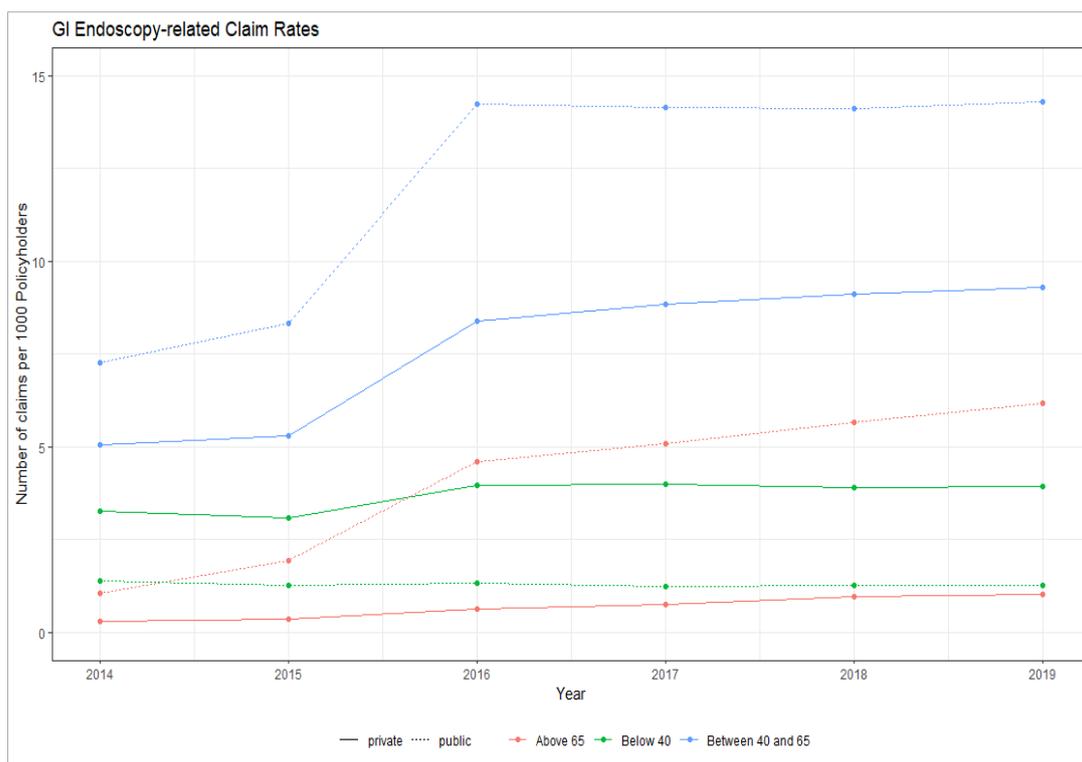


Figure 2: GI endoscopy-related claim rates by age groups between 2014-2019

Private policy holders claim rates were 34% lower than public policy holders (RR=0.663 [0.637,0.668]). (See Figure 3)

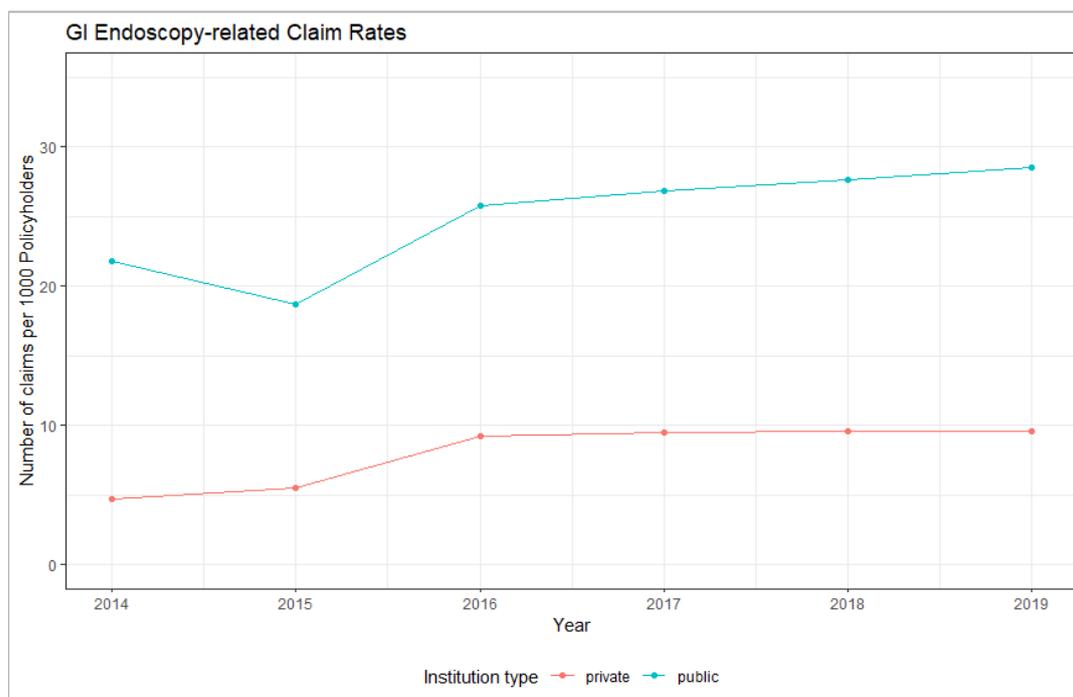


Figure 3: GI endoscopy-related claim rates by institution types between 2014-2019

Claims for Different Day Surgery Procedures

There was an increasing trend for three forms of GI procedures: Lower GI endoscopy with polypectomy, Upper GI endoscopy with/without biopsy and Upper GI endoscopy with polypectomy. For Lower GI endoscopy with/without biopsy, the claims per 1,000 public policy holders increased from 4.3 in 2014 to 8.8 in 2016, and decreased to 8.5 in 2019. Upper GI endoscopy with polypectomy recorded the lowest claim rates from 2014 to 2019 for both private and public policies, ranging from 0.3 to 1.4 claims per 1,000 policy holders.

Figures 4 and 5 show the breakdown of claims for different day surgery procedures. For both private and public policies, there was an increasing trend for all forms of GI procedures from 2014-2019 except for lower GI endoscopy with/without biopsy for public policies, which increased from 4.3 claims per 1000 policyholders in 2014 to 8.8 claims per 1000 policyholders in 2016 and fell to 8.5 claims per 1000 policyholders in 2019. Upper GI endoscopy with polypectomy had the lowest claim rates in all years for both private and public policies (ranging from 0.3 claims per 1000 policyholders to 1.4 claims per 1000 policyholders).

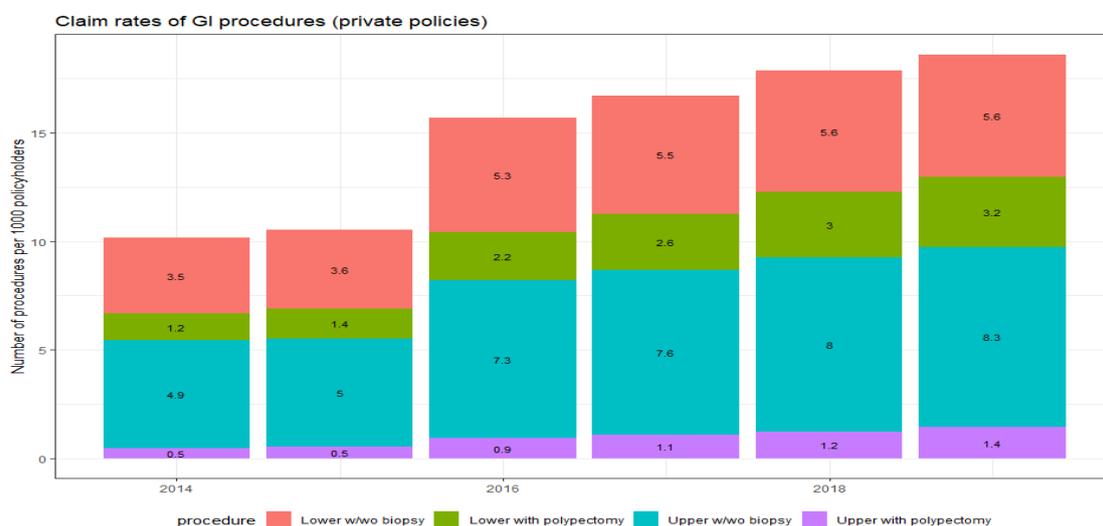


Figure 4: Claim rates for each GI procedure in private settings between 2014-2019

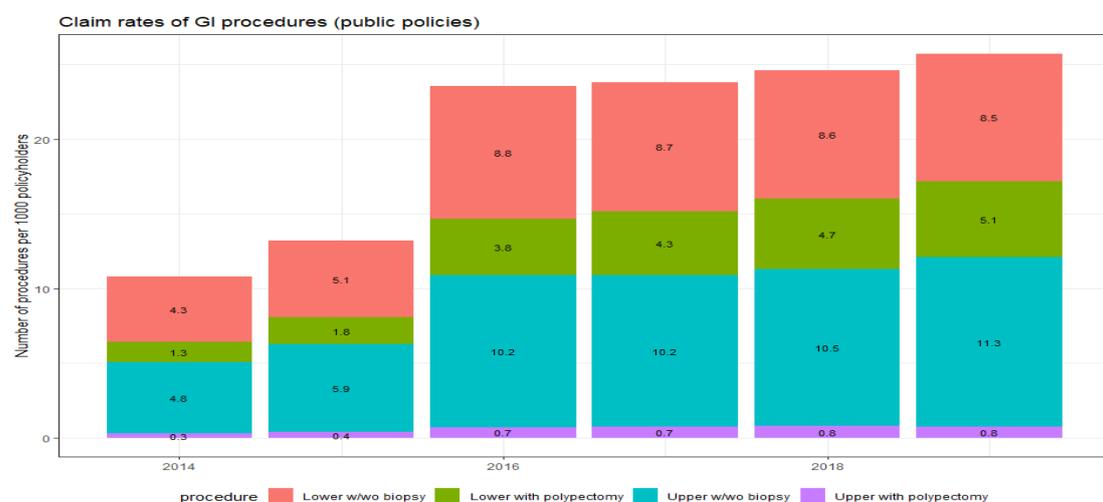


Figure 5: Claim rates for each GI procedure in public settings between 2014-2019

Upward Trend for Concurrent Endoscopies

The proportion of multiple GI endoscopies in the same setting increased from 2014 to 2019 in both the public and private sectors, more notably in the private sector (see Figure 6). There is not much clarity on the circumstances under which concurrent endoscopies are performed. In 2018, the Australian Commission on Safety and Quality in Healthcare highlighted that 36% of colonoscopies in Australia included a concurrent gastroscopy and deemed this suggestive of some ‘inappropriate use’, stating that concurrent endoscopies are indicated for “only a limited number of conditions.” The increased utilisation rates for concurrent endoscopies in Singapore could relate to the higher prevalence of gastric cancer in Singapore compared to Australia² with consequent practice bias for more proactive endoscopy use.

II. Pricing trends of GI endoscopy: 2014-2019

The average bill size for GI endoscopy increased by 36.45% from S\$1,852 in 2014 to S\$2,527 in 2019 as shown in Figure 4, with a compounding annual growth rate (CAGR) of 6.4%. For every one-year increase, the mean price increased by \$146 [135,159]. Compared to public policies, the mean price for private policies is \$2,017 [1979,2054], which is substantially higher than that of public policies. Charges for older age groups was also higher than the younger age group. Compared to those aged below 40, the mean price of day cases for those aged between 40 and 65 is \$19 [-8,67] higher while that of those aged above 65 is \$135 [69,200] higher.

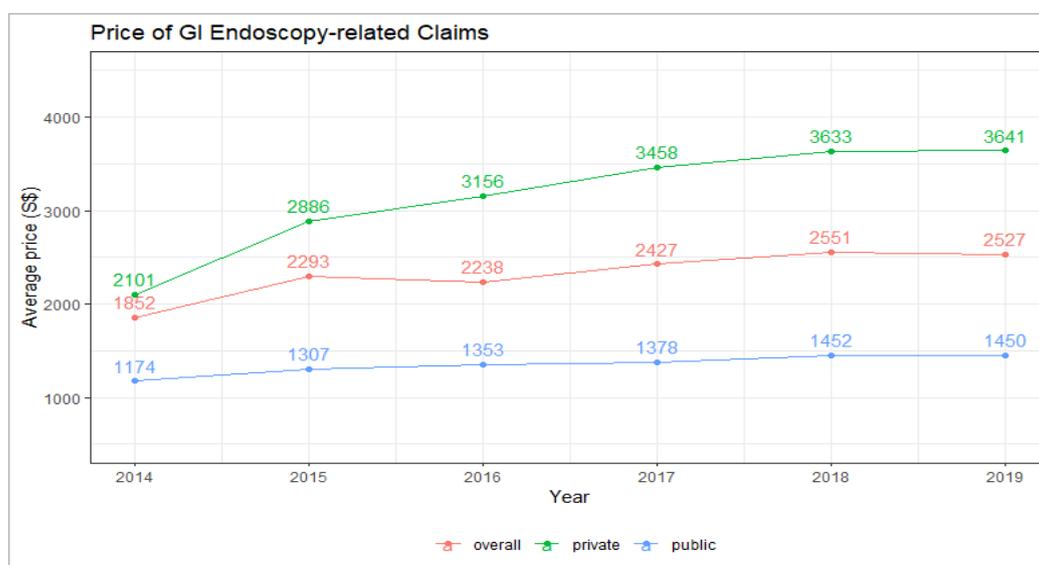
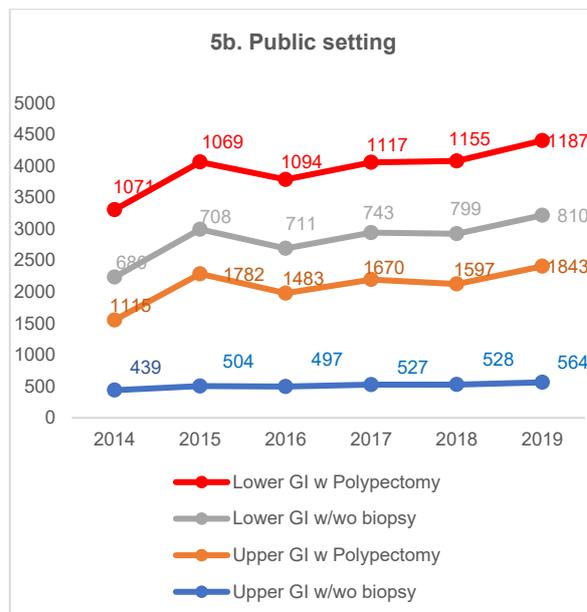
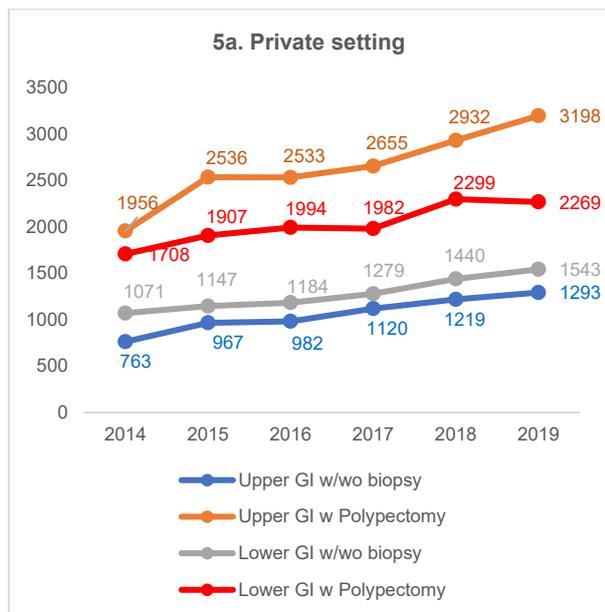


Figure 4: Average Pricing of GI-endoscopy related claims between 2014-2019

As shown in Figures 5a&b below, the average bill size for all types of procedures (both Upper and Lower endoscopies) demonstrated an upward trend between 2014 to 2019. This upward trend is most significantly observed for Upper GI endoscopy with polypectomy in both public and private settings.

² Rawla, P., and Adam Barsouk. 2019. “Epidemiology of gastric cancer: global trends, risk factors and prevention.” *Prz Gastroenterol*, 14(1): 26-38.



Figures 5a&b: Average pricing of Upper and Lower endoscopies in private (5a) and public (5b) settings

Presence of Outliers

Examining only lower GI endoscopies (TOSP Code-SF702C & SF704C) performed on day surgery basis, we noted that the median pricing was \$634 and the mean was \$1,361. However, the range was wide (from \$118 to \$558,900), with the 25th percentile price being \$280 and the 75th percentile being \$1,860. The top 0.5% episodes were priced at amount exceeding \$16,000. This is worth examining further especially as the number of doctors who priced above this amount were only 95 out of a total of 943, suggesting that only a narrow sliver of doctors consistently priced substantially higher than their peers.

III. Diagnoses

The most common diagnoses across 2014 and 2019 were gastritis and duodenitis, gastro-oesophageal reflux disease, other diseases of intestine, and other diseases of stomach and duodenum. This was consistent for both public and private policies. The diagnoses of cancer were rare (not showing up in the top 10 diagnoses), with only 13.1 per 1,000 endoscopies and 23.8 per 1,000 endoscopies reported in 2014 and 2019 respectively. It is interesting that cancer was not among the most common diagnoses, unlike other countries such as the US in which gastric cancer is one of the five most commonly diagnosed conditions with an Upper GI endoscopy.

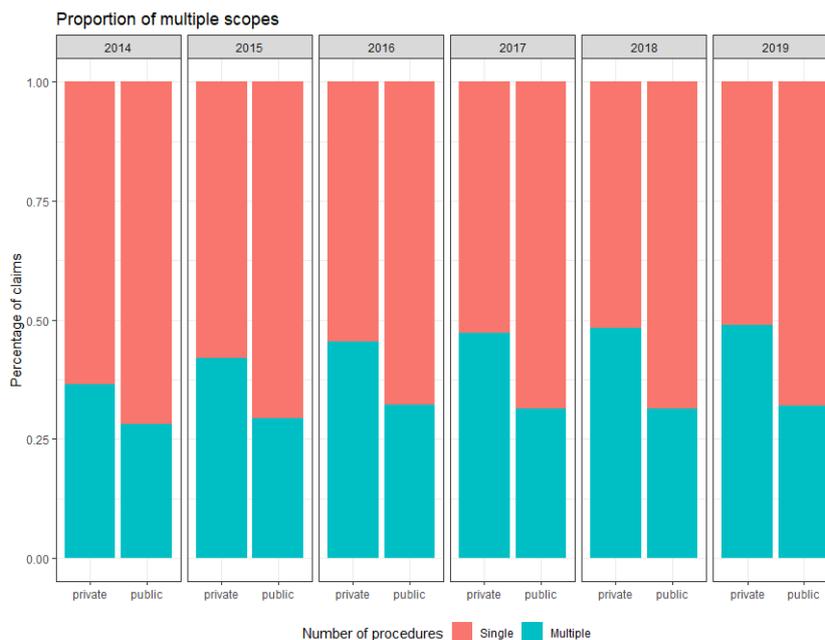


Figure 6: Proportion of single and multiple scopes between 2014-2019

Reflections

The steady upward trend in the increased utilisation of both upper and lower GI endoscopies and pricing from 2014 to 2019 could be due to multiple factors including population ageing, increased public awareness of endoscopy options and doctors' greater willingness to proceed with endoscopic evaluation. However, as the most common diagnoses above are generally benign, the increased utilisation of endoscopies, especially in the younger age groups, deserves further study for more specific guidance in selecting endoscopic use. It should be noted that local colorectal cancer screening guidelines for individual without any risk factors recommend routine screening from age 50 onwards every 5 to 10 years.³

Furthermore, the data reveals an increased trend in concurrent upper and lower GI endoscopies. This brings forth the question of cost-effectiveness of diagnostic testing, and suggests an important policy question around the appropriateness of procedures and motivations such as 'defensive medicine'.

In addition, the prices for all GI endoscopies have increased in both public and private settings. The difference in pricing between public and private sectors remains significant, with a steeper rise in the private sector. For instance, the mean price for private GI endoscopies increased from \$2,101 in 2014 to \$3,641 in 2019 (73.3% increase or a CAGR of 11.6%), whilst the mean price for public GI endoscopies increased from \$1,174 in 2014 to \$1,450 in 2019 (23.5% increase or a CAGR of 4.3%).

Both public and private settings saw a steep rise in the pricing of upper GI endoscopy with polypectomy [65.3% (CAGR=10.6%) and 63.5% (CAGR=10.3%) for public and private respectively between 2014 and 2019]. The pricing for upper GI endoscopy with/without biopsy and lower GI endoscopy with/without biopsy had also increased substantially among the private claims. These two procedures have both increased by 69.5% (CAGR=11.1%) and 44.1%

³ Ministry of Health (MOH). 2020. "Screening for Colorectal Cancer." Accessed from URL: https://www.healthhub.sg/live-healthy/106/screening_colorectal_cancer_nuhs

(CAGR=7.6%) respectively in the private sector as opposed to only 28.5% (CAGR=5.1%) and 17.7% (CAGR=3.3%) increase in the public sector during the same period (2014-2019). While it is understandable that the private providers offer differing amenities and service levels, the extent of pricing increase warrants further scrutiny.

Procedures	PUBLIC			PRIVATE		
	Pricing in 2014 (\$)	Pricing in 2019 (\$)	CAGR (%)	Pricing in 2014 (\$)	Pricing in 2019 (\$)	CAGR (%)
Upper GI with polypectomy	1,115	1,843	10.6	1,956	3,198	10.3
Upper GI with/without biopsy	439	504	5.1	763	1,293	11.1
Lower GI with polypectomy	1,071	1,187	2.1	1,708	2,269	5.8
Lower GI with/without biopsy	688	810	3.3	1,071	1,543	7.6

Table 1: Comparison of pricing and compounding annual growth rate of different procedures in public and private settings

Implications for policy and research

Gastrointestinal endoscopy is an important clinical procedure for the diagnosis of cancer and other significant disease. The large national volume of procedures indicates its relevance to policy makers. Trends observed in both utilisation and pricing for GI endoscopies between 2014-2019 merit further study and ongoing surveillance, with safeguards introduced as appropriate to mitigate excessive use and unwarranted pricing increases. Future research should be conducted to understand more fully underlying utilisation and price drivers as well as payer-provider dynamics that could inadvertently encourage inappropriate use of this important technology.