Universal Bulk Billing mathematics

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Mean benefit ($) per service p as the result of adopting universal bulk billing and relative change to revenue q as the result of adopting universal bulk billing depends on calculated mean service revenue before adopting universal bulk billing r_0 and mean service revenue after adopting universal bulk-billing r_1.

Mean service revenue before adopting universal bulk-billing r_0

$$\begin{aligned} r_0 &= bx + bi + (1-b)x + (1-b)g \\ &= x + g + b(i-g) \end{aligned} \quad (1)$$

where $b =$ proportion of patients bulk-billed concessionally (0-1)
$x =$ mean service fee
$i =$ mean individual service bulk-billing incentive
$g =$ mean gap-fee when patient not bulk-billed with incentive fee

Mean service revenue after adopting universal bulk-billing r_1

$$r_1 = ux + i \quad (2)$$

where $u =$ rebates plus quarterly loading payment $= 1.125$
$x =$ mean service fee
$i =$ mean individual service bulk-billing incentive

Mean benefit per service of adoping universal bulk-billing p

Mean benefit ($) per service of adopting universal bulk-billing p

$$\begin{aligned} p &= r_1 - r_0 \\ &= x(u-1) - (g-i)(1-b) \end{aligned} \quad (3)$$

Implications of equation for p (Equation 3):

- The greater the mean service fee x the greater the mean benefit (per-service) p of adopting universal bulk-billing i.e. $p \propto x$

  - x may increase if longer consult items ('C' vs 'B') are used, or if higher-rebate items are more frequently used e.g. care plans and health assessment.

- The greater the mean gap-fee g increases over and above the mean individual service bulk-billing incentive i, the less the mean benefit (per-service) p of adopting universal bulk billing i.e. $p \propto -(g-i)$
  - The mean gap-fee g is less than the 'nominal' gap-fee if the gap-fee is not charged for all relevant services e.g. care-plans, health assessments, reviews.
  - For example, if a nominal gap-fee of 35 dollars is charged for only 50% of services which don't attract a current bulk-billing incentive, then the mean-gap fee g will be 17.5 dollars.
  - The mean individual service bulk-billing incentive i can change with service billing patterns, as some services attract a 'single' incentive of 7.15 or a 'triple' incentive of 21.35 (in Monash Area 1).
    * For example, if a clinic charges more care plans (which attract a single incentive) and less BCDE services (which attract a triple incentive), then i will be reduced.
    * For the 'average' general practice, according to MBS 2024 figures, i is 19.28. For a particular practice which does - relatively - more care plans i is 18.52.

- As pre-existing bulk-billing (with existing bulk-billing incentives) increases ($b \to 1$), the less influence the difference between mean gap-fee g and mean bulk-billing incentive fee i have over mean benefit per-service p i.e. $\lim_{b\to 1} p(b) = x(u-1)$. Conversely, as $b \to 0$, the greater the influence of $(g-i)$ on p.

Relative benefit of adopting universal bulk-billing q

The *relative* benefit of adopting universal bulk-billing q

$$
\begin{aligned}
q &= \frac{r_1 - r_0}{r_0} \\
&= \frac{x(u-1) + (i-g)(1-b)}{x + g + b(i-g)} \quad (4) \\
&= \frac{x(u-1) - (g-i)(1-b)}{x + (g-i)(1-b) + i} \quad (5)
\end{aligned}
$$

where x = mean service fee
u = rebates plus quarterly loading payment = 1.125
g = mean gap-fee when patient not bulk-billed with incentive fee
i = mean individual service bulk-billing incentive
b = proportion of patients bulk-billed concessionally (0-1)

Implications of equation for q (Equation 5)

- As the mean service fee x increases ($x \to \infty$) then $q \to (u-1)$ i.e. $\lim_{x\to\infty} q(x) = 0.125$
- q is quite sensitive to $(g-i)(1-b)$, which appears in both the numerator and denominator, but with opposite signs.
  - q is sensitive to the difference between the mean gap-fee g and the mean individual bulk-bill incentive i i.e. $q \propto -(g-i)$
  - As the gap-fee increases $g \to \infty$ then $\lim_{g\to\infty} q = \frac{-g}{+g} = -1$.

- As the proportion of bulk-billed with pre-existing incentives increases $b \to 1$ then $\lim_{b \to 1} q(b) = \dfrac{x(u-1)}{x+i}$
- As the proportion of bulk-billed with pre-existing incentives falls $b \to 0$ then $\lim_{b \to 0} q(b) = \dfrac{x(u-1)-(g-i)}{x+g}$

Plots and tables

3D Plot of relative benefit vs mean gap-fee and proportion concessionally bulk-billed

Service item distribution derived from Medicare Benefit Schedule 2024 statistics.

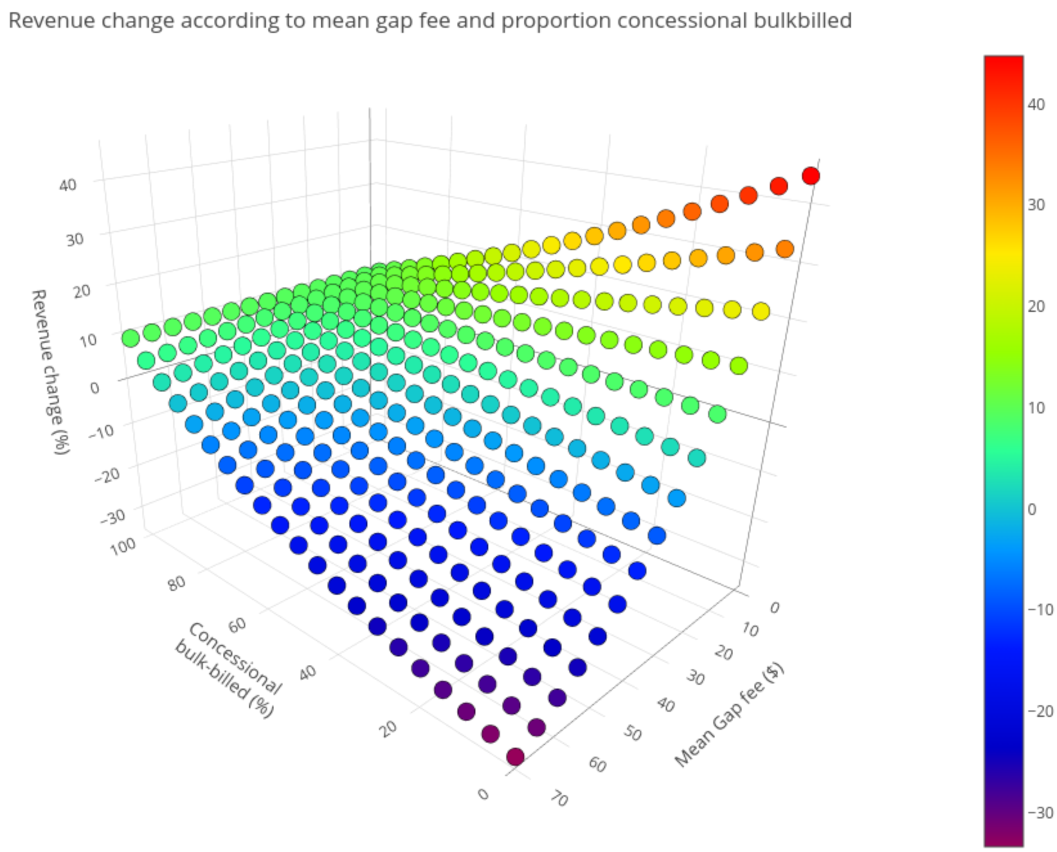

Table of relative benefit vs mean gap-fee and proportion concessionally bulk-billed

Service item distribution of a practice which has longer consults, and more care plans, than the 'average' practice.

Change in revenue (%)

Concessional bulk-billed (%) \ Mean Gap fee ($)	0		10		20		30		40		50		60		70
100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	11.1	10.8	10.5	10.2	10	9.7	9.4	9.1	8.8	8.5	8.2	8	7.7	7.4	7.1
90	12.2	11.6	11	10.5	9.9	9.3	8.7	8.2	7.6	7	6.5	5.9	5.4	4.9	4.3
	13.4	12.5	11.6	10.7	9.8	8.9	8.1	7.2	6.4	5.6	4.8	4	3.2	2.5	1.7
80	14.5	13.3	12.1	10.9	9.7	8.5	7.4	6.3	5.2	4.2	3.2	2.1	1.1	0.2	−0.8
	15.7	14.1	12.6	11.1	9.6	8.2	6.8	5.4	4.1	2.8	1.6	0.3	−0.9	−2	−3.2
70	16.9	15	13.1	11.3	9.5	7.8	6.2	4.6	3	1.5	0	−1.4	−2.8	−4.1	−5.5
	18.2	15.9	13.6	11.5	9.4	7.5	5.5	3.7	1.9	0.2	−1.5	−3.1	−4.6	−6.2	−7.6
60	19.4	16.7	14.2	11.7	9.4	7.1	4.9	2.8	0.8	−1.1	−2.9	−4.7	−6.4	−8.1	−9.7
	20.7	17.6	14.7	11.9	9.3	6.7	4.3	2	−0.2	−2.3	−4.3	−6.3	−8.2	−9.9	−11.7
50	22	18.5	15.3	12.1	9.2	6.4	3.7	1.2	−1.2	−3.5	−5.7	−7.8	−9.8	−11.7	−13.6
	23.4	19.5	15.8	12.3	9.1	6	3.1	0.4	−2.2	−4.7	−7	−9.3	−11.4	−13.4	−15.4
40	24.8	20.4	16.4	12.6	9	5.7	2.5	−0.4	−3.2	−5.8	−8.3	−10.7	−13	−15.1	−17.1
	26.2	21.4	16.9	12.8	8.9	5.3	2	−1.2	−4.2	−7	−9.6	−12.1	−14.4	−16.7	−18.8
30	27.6	22.3	17.5	13	8.8	5	1.4	−2	−5.1	−8	−10.8	−13.4	−15.9	−18.2	−20.4
	29.1	23.3	18	13.2	8.8	4.6	0.8	−2.7	−6	−9.1	−12	−14.7	−17.3	−19.7	−21.9
20	30.6	24.3	18.6	13.4	8.7	4.3	0.3	−3.5	−6.9	−10.2	−13.2	−16	−18.6	−21.1	−23.4
	32.1	25.3	19.2	13.6	8.6	4	−0.3	−4.2	−7.8	−11.2	−14.3	−17.2	−19.9	−22.5	−24.9
10	33.7	26.4	19.8	13.9	8.5	3.6	−0.8	−4.9	−8.7	−12.2	−15.4	−18.4	−21.2	−23.8	−26.2
	35.3	27.4	20.4	14.1	8.4	3.3	−1.4	−5.6	−9.5	−13.1	−16.5	−19.5	−22.4	−25.1	−27.6
0	37	28.5	21	14.3	8.3	3	−1.9	−6.3	−10.4	−14.1	−17.5	−20.7	−23.6	−26.3	−28.8

Change in revenue (%): 20, 0, −20

Links

Github source

Dashboard (shiny)

Explanatory notes