# Alternative systems for organising and paying primary health care services: the role of patients' choice

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**Objectives**

To study the choice of patients for the health care provider in an environment characterised by

a) Uncertainty
b) Asymmetry of information

For two environments:

- Non opportunistic behaviour
- Opportunistic behaviour

How to use the choice of patients to reduce the scope for opportunistic behaviour by physicians

Table 1: Primary health care systems

| Organisation / Forms Of payment | Vertical | Horizontal |
|---|---|---|
| Capitation | VCAP | HCAP |
| Fee for Service | VFFS | HFFS |

| | A | | | B | | |
|---|---|---|---|---|---|---|
| Severity | Provider | Prob. | Care | Provider | Prob. | Care |
| Mild | GP – $SP_A$ | $p_1$ | *m* | GP – $SP_B$ | $p_2$ | *m* |
| Severe | $SP_A$ | $p_3$ | *s* | $SP_B$ | $p_4$ | *s* |

| | Time | | Cost (Capitation) | | Cost (FFS) | |
|---|---|---|---|---|---|---|
| | Referral | Care | Referral | Care | Referral | Care |
| GP | $t_r = 1$ | $t_m =$ m | CF | CF | c | c.m |
| SP | $t_r = 1$ | $t_s =$ s | c(1+μ) | c(1+μ)s | c(1+μ) | c(1+μ)s |
| SP/Mild | $t_r = 1$ | $t_m =$ m | n.a. | c (1+μ)m | c(1+μ) | c(1+μ)m |

Utility:

$$EU = U(Y_i) - E(t)$$

When care is organised according to a horizontal scheme, the patient chooses the alternative that maximises his utility while in a vertical system it is Central Government that determines the expected utility through the behaviour of physicians.

## 3.1.The perfect agency case.

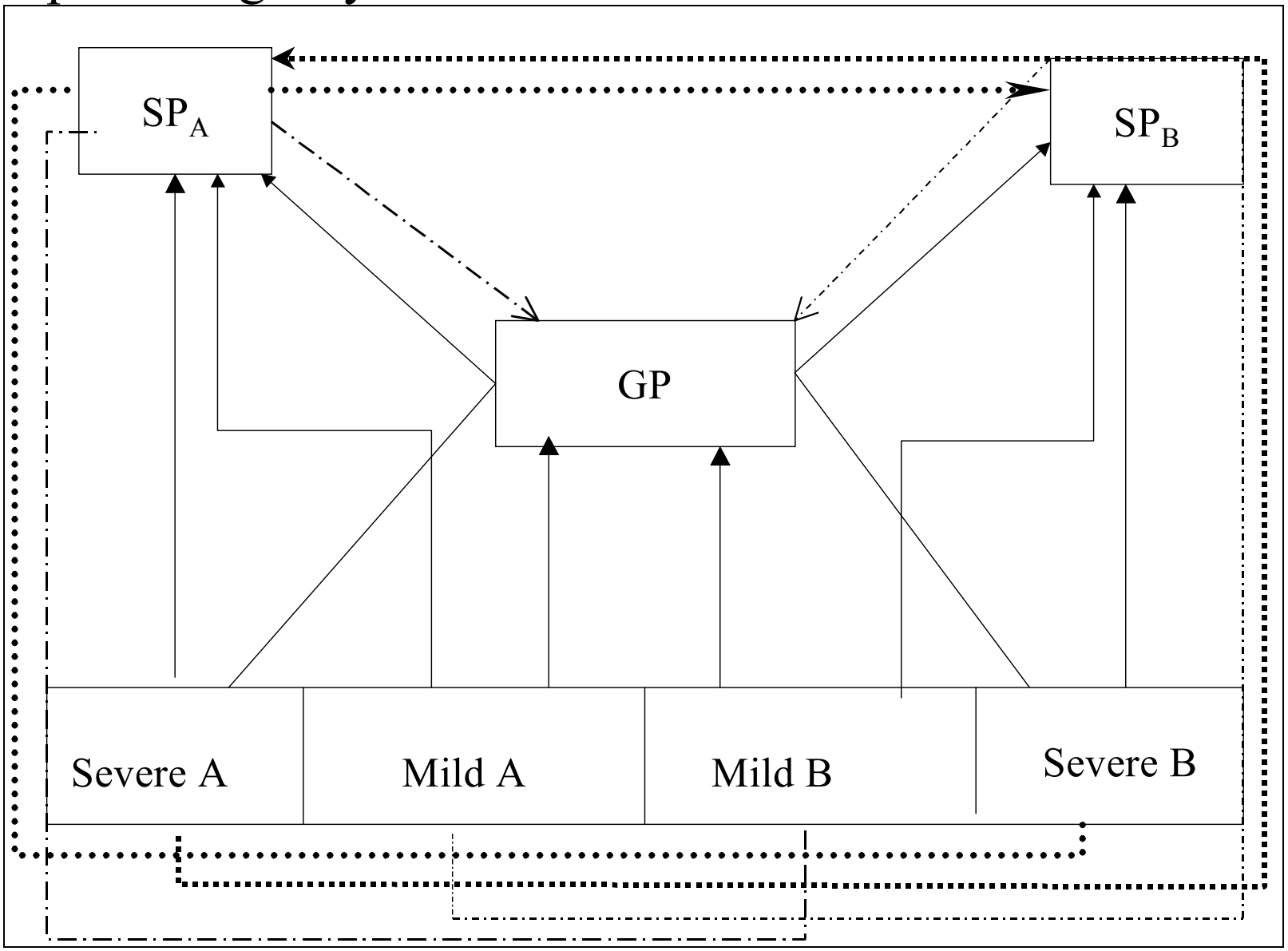

Table 4: Time cost for the different alternatives

| *Action* | *Time cost* | *Probability* |
|---|---|---|
| Going to GP | $t_m$; $t_r + t_s$ | $p_1+p_2$; $p_3+p_4$ |
| Going to $SP_A$ | $t_m$ ;$t_r+t_m$; $t_s$;$t_r+ t_s$ | $p_1$;$p_2$; $p_3$; $p_4$ |
| Going to $SP_B$ | $t_r+ t_m$ ; $t_m$ ;$t_r+t_s$; $t_s$ | $p_1$;$p_2$; $p_3$; $p_4$ |

$$EU_{GP} = U(Y) - [(p_1 + p_2)U(t_m) + (p_3 + p_4)U(t_r + t_s)]$$

$$EU_{SPa} = U(Y) - [(p_1)U(t_m) + (p_2)U(t_r + t_m) + (p_3)U(t_s) + (p_4)U(t_r + t_s)]$$

$$EU_{SPb} = U(Y) - [(p_1)U(t_r + t_m) + (p_2)U(t_m) + (p_3)U(t_r + t_s) + (p_4)U(t_s)]$$

*Proposition 1:* If there are no priors on the different events, so that $p_i = 1/4$ i=1,4 and the utility function of the patient is linear in time used to restore health, he is indifferent between seeking GP or specialist care. If on the contrary his utility is increasing (decreasing) in time, he will prefer to seek a specialist (a GP) instead.

Table 5: The expected financial costs of treatment alternatives

| | *Type of organisation* | |
|---|---|---|
| | Vertical organisation | Horizontal organisation |
| Capitation | $CP+\frac{1}{2}c(1+\mu)m$ | $\frac{1}{2}\left[CP+\frac{1}{2}s.c(1+\mu)\right]+$ $\frac{1}{2}\left[CP+\frac{1}{4}c(1+\mu)m+\frac{1}{4}[c(1+\mu)+0]+\frac{1}{4}s.c(1+\mu)+\frac{1}{4}[c(1+\mu)+s.c.(1+\mu)]\right]$ $=CP+\frac{1}{2}s.c.(1+\mu)+\frac{1}{4}c(1+\mu)+\frac{1}{8}c(1+\mu)m$ |
| FFS | $\frac{1}{4}[(cm)+(cm)+(c+c(1+\mu)s)+(c+c(1+\mu)s]$ $=\frac{1}{2}c(m+1)+\frac{1}{2}c(1+\mu)s$ | $\frac{1}{2}\left\{\frac{1}{4}[c.m+c.m+[c+s.c(1+\mu)]+[c+s.c(1+\mu)]]\right\}+$ $\frac{1}{2}\left\{\frac{1}{4}[c(1+\mu)m+[c(1+\mu)+cm]+c(1+\mu)s+[c(1+\mu)+c(1+\mu)s)\right.$ $=\frac{1}{2}c(m+1)+\frac{1}{2}s.c(1+\mu)+\frac{1}{4}c\mu\left(1+\frac{m}{2}\right)$ |

## 3.2 Opportunistic behaviour - FFS

| *Action* | *Time cost* | *Probability* |
|---|---|---|
| Going to GP | $t_g$; $t_m+t_s$ | $(p_1+p_2)$; $(p_3+p_4)$ |
| Going to $SP_A$ | $T_s$;$t_r+t_s$ | $(p_{1+}\ p_3)$;$(p_2+p_4)$ |
| Going to $SP_B$ | $t_r+t_s$;$t_s$ | $(p_2+p_4;)$ $(p_1+\ p_3)$ |

$$EU_{GP} = U(Y) - [\,(p_1 + p_2)U(t_m) + (p_3 + p_4)U(t_m + t_s)]$$

$$EU_{SPa} = U(Y) - [(p_1 + p_3)U(t_s) + (p_2 + p_4)U(t_r + t_s)]$$

$$EU_{SPb} = U(Y) - [(p_2 + p_4)U(t_s) + (p_1 + p_3)U(t_r + t_s)]$$

*Proposition 2:* In the benchmark case, the patient will choose a specialist if $m > \frac{s+1}{2}$.

## Opportunistic behaviour - Capitation

| *Action* | *Time cost* | *Probability* |
|---|---|---|
| Going to GP | $t_r+t_s$ | 1 |
| Going to $SP_a$ | $t_s;t_r+t_s$ | $(p_{1+}\ p_3);(p_2+p_4)$ |
| Going to $SP_b$ | $t_r+t_s;t_s$ | $(p_2+p_4;)\ (p_1+\ p_3)$ |

$$EU_{GP} = U(Y) - [\,U(t_r + t_s)]$$

$$EU_{SPa} = U(Y) - [(p_1 + p_3)U(t_s) + (p_2 + p_4)U(t_r + t_s)]$$

$$EU_{SPb} = U(Y) - [(p_2 + p_4)U(t_s) + (p_1 + p_3)U(t_r + t_s)]$$

*Proposition 3:* the patient will always choose to consult a specialist independently of his priors or preferences

## Patients' choice as a solution to opportunistic behaviour - FFS

$$EU_{GP} = U(Y) - \{(p_1 + p_2)U(t_m) + (1 - z^*)[(p_3 + p_4)U(t_m + t_s)] + z^*[(p_3 + p_4)U(t_r + t_s)]\}$$

$$EU_{SPa} = U(Y) - \{[(1-q^*)\, p_1\, U(t_m) + q^*\, p_1\, U(t_s)] + p_3 U(t_s) + [(1 - q^*)p_2 U(tr + t_s)$$

$$+ q^* p_2 U(tr + t_m)] + p_4 U(t_r + t_s)\}$$

$$EU_{SPb} = U(Y) - \{[(1-q^*)\, p_2\, U(t_s) + q^*\, p_2\, U(t_m)] + p_4 U(t_s) + [(1 - q^*)p_1 U(t_r + t_s)$$

$$+ q^* p_1 U(t_r + t_m)] + p_3 U(t_r + t_s)\}$$

*Proposition 5:* If there are no priors on the different events, so that $p_i = 1/4$ i=1,4, and the utility function of the patient is linear in time, competition between the GPs and the specialists make the medical profession behave in a non opportunistic way.

# Patients' choice as a solution to opportunistic behaviour - CAP

$$EU_{GP} = U(Y) - [(p_1 + p_2)zU(t_m) + (p_1 + p_2)(1-z)U(t_r + t_s) + (p_3 + p_4)U(t_r + t_s)]$$

$$EU_{SPa} = U(Y - EC) - \{[(1\text{-}q^*)\, p_1\, U(t_s) + q^*\, p_1\, U(t_s)] + p_3 U(t_s) + [(1-q^*)p_2 U(t_r + t_s) + q^*\, p_2 U(t_r + t_m)] + p_4 U(t_r + t_s)\}$$

$$EU_{SPb} = U(Y - EC) - \{[(1\text{-}q^*)\, p_2\, U(t_m) + q^*\, p_2\, U(t_s)] + p_4 U(t_s) + [(1-q^*)p_1 U(t_r + t_s) + q^*\, p_1 U(t_r + t_m)] + p_3 U(t_r + t_s)\}$$

*Proposition 6:* If there are no priors on the different events, so that $p_i = 1/4$ i=1,4, competition between the GPs and the specialists make the medical profession does not allow to reach a first best solution. This result is independent of the utility function of the patient.

| | Vertical organisation | Horizontal organisation (no opting out) |
|---|---|---|
| Cap. | $CP + c(1+\mu)s$ | $\frac{1}{2}[CP + c(1+\mu)s] +$ $\frac{1}{2}\left[\begin{array}{l} CP + \frac{1}{4}c(1+\mu)s + \frac{1}{4}[c(1+\mu) + c(1+\mu)s] \\ + \frac{1}{4}c(1+\mu)s + \frac{1}{4}[c(1+\mu) + s.c.(1+\mu)] \end{array}\right]$ $= CP + c(1+\mu)s + \frac{1}{4}c(1+\mu)$ |
| FFS | $\frac{1}{4}\left[\begin{array}{l} (c.m) + (c.m) + (cm + \\ c(1+\mu)s) + (cm + c(1+\mu)s \end{array}\right]$ $= c.m + \frac{1}{2}c(1+\mu)s$ | $\frac{1}{2}\left\{\frac{1}{4}[c.m + c.m + [c + c(1+\mu)s] + [c + c(1+\mu)s]]\right\} +$ $\frac{1}{2}\left\{\frac{1}{4}\left[\begin{array}{l} c(1+\mu)m + [c(1+\mu) + cm] \\ + c(1+\mu)s + [c(1+\mu) + c(1+\mu)s)] \end{array}\right]\right\}$ $= \frac{1}{2}c(m+1) + \frac{1}{2}c(1+\mu)s + \frac{1}{4}c\mu\left(1 + \frac{m}{2}\right)$ |