Preliminary note to suggest and explain the computation of the savings formulae to be applied for Medicine supplies at Mater Dei Hospital.

Expenditure on Medical supplies within the health care setting is generally driven by a number of distinct components. The level of medical supplies expenditure will be assumed to be made up of two main components: the actual costs of the medical product being used and the volume levels of medical supplies in question. As described within the literature on this topic the drivers of medical supplies costs vary but are usually grouped into a number of distinct categories, primarily the price effects, the volume effects and the drug-mix effect[1].

The methodology proposed in this note to derive a measure of cost and thus to study the variations in cost between two periods makes use of the Laspeyres approach[2]. This approach is applied to isolate and quantify the factors that drive expenditure in medical supplies. The methodology applied in this note follows the basic cost decomposition approach using the Laspeyres approach adopted from the paper referenced under footnote 1 below.

A possible decomposition of medical expenditure could be represented by the following relationship which encompasses the following three effects:

Volume, Price and Mix.

If we let 'M' represent the total monetary value of expenditure on a particular medical supply, P represents the price and Q measures the quantity of the product under consideration.

$M = P*Q$

M is observed over two periods: Before (B) and After (A) a change in policy or following the implementation of a new measure, whereby B is referred to as the base period hereunder (**B**efore the change. **A**fter the change).

Thus $M(B) = P(B)\ Q(B)$

$M(A) = P(A)\ Q(A)$

Based on the decomposition referenced in footnote 1 below the variation in cost between the two periods can be represented by:

$$M(A) - M(B) = [P(A)-P(B)]\ Q(B) + P(B)[Q(A)-Q(B)] + [P(A)-P(B)][Q(A)-Q(B)]$$

Price effect quantity effect mix (cross) effect

[1] *The Drivers of Prescription Drug Expenditure – a methodological report* (December 2013) – Patented Medicine Prices Review Board (Canada).
Morgan SG (2002) *Quantifying Components of Drug Expenditure Inflation:* the British Columbia Seniors Drug Benefit Plan. Health Services Research 37(5): 1243-1266.
Gerdtham UG, Lundin D. (2004) *Why did drug spending increase during the 1990s?* PharmacoEconomics 2291):29-42.

[2] The Laspeyres methodology assess the general tendency in prices by tracking the cost of a fixed 'basket' of items over time. This approach singles out the effect of a change in a specific factor (e.g. price) by holding the other factors (e.g. quantity) constant at the base-period value.

The above calculation will give an estimate of the variation in expense between the two periods. This will be referred to as the **expense variation**. The variation between the two periods could though be the result of variations within a number of other different components which effect this relationship.

The impact of the introduction of the new system for medicine supplies distribution is expected to have an impact on the overall size of M. It is expected that the introduction of this new system of medicine distribution will mainly impact the Volume (quantity) component of the cost structure. The main impact will be on the quantity of medicines distributed to the final users. It is to this effect that the variation in the volume component of the expenditure model is analyzed in further depth within this analysis.

It is important to highlight that variations between the two different periods may also result from other factors which are exogenous to the implementation of the new system of medicine distribution. It is being proposed that such factors (listed below) are taken into account in the calculation of the final savings derived from the implementation of the new system. The process of **normalization** aims to look at expenditure against a number of variables which are deemed as determinants of variation in expenditure between the two periods, which factors are not related to the new system of medicine distribution.

The variables which are being proposed to be used as normalization factors will include the following

a) Number of bed days in the specific ward
b) No of discharges from the particular ward
c) The severity of patients treated within the ward
d) No of procedures carried out within the ward.
e) No of users of the particular medicine item

The determination and available of data for each of the above factors is currently being assessed through a number of pilot studies within specific wards within the hospital. The internalization of variation arising from the above mentioned factors will be incorporated within the determination of the savings formula on the basis of the following computation.

$$\Delta Vol_{AB} = \{[Vol_A - [(Vol_B * \frac{N_A}{N_B} * W_N) + (Vol_B * \frac{O_A}{O_B} * W_O)] * P\}$$

Vol = Volume of supplies at time given by subscript

N = Number of patients treated at a particular time given by the subscript

W = Weight assigned to the normalization factor set by the subscipt

O = No of outlier cases at the particular time given by subscript.

P = Weighted average price. (weighted by volume levels)

Work is currently underway, through the use of a number of pilot studies, to determine and assess the relative size of the weights to be applied within the savings formula stated above.