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**The Application Of A Decision Support System For
Dispensing Practices When Purchasing Medicines**

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Abstract

In England, Dispensing Practices face the difficulty of purchasing drugs based on clinical need but must strike a balance of retaining cost effectiveness, provide value for money whilst simultaneously maximising profits. The current process of making decisions over where drugs are purchased is very much reliant on buyer intuition and supplier bias rather than extensive knowledge of costs within the supplier market.

This feasibility study investigates the theoretical concept of using a decision support system as a best practise approach to identifying the most cost effective sources for Dispensing Practices buying medicines for dispensing.

The research was undertaken using a deductive and inductive approach. The inductive approach was carried out in the form of questionnaires and interviews to engage practitioner perspectives.

The findings suggest that a decision support system could be used by Dispensing Practices to improve their decisions over where drugs are purchased and used to enable best practise of purchasing medicine. It was proposed that despite some potential weaknesses and concerns regarding reliability it was a concept that could be adopted and utilised as an effective tool to assist healthcare professionals within their role.

(Keywords) *Dispensing Practice; Decision Support System; Price Comparison; Medicine*

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Chapter 1: Introduction

I) Introduction To Study

In England, Dispensing Practices face the difficulty of purchasing drugs based on clinical need but must strike a balance of retaining cost effectiveness, provide value for money whilst simultaneously maximising profits.

Decision making by Dispensing Practices is often culturally determined by intuition, established friendships and relationships, staff knowledge and supplier bias within the drugs market. Purchasing decisions when buying medicine may not be the most cost effective for Practice budgets and profit margins.

The use of technology has been a highly effective tool within the field of medicine and in drug dispensing, where decision support systems have been used. Despite the success of web based price comparison systems as an effective tool used within other buying environments, a similar concept has yet to be transferred within Dispensing Practice for improving healthcare professional's decision making when purchasing medicine.

As the NHS budget deficit continues to grow Dispensing Practices are under continual pressure from Primary Care Trusts (PCT's) to spend their drug budgets wisely in order to justify value for money and to contribute to the sustainability of a high quality service for the future. A decision support system could compare drug prices, enabling greater decision making within a Dispensing Practice environment. The concept of a decision support system could impact positively on buying decisions, reducing costs and securing Practice profits.

This feasibility study has been conducted to establish whether there is a potential for the use of such a system within the context of drug purchasing within UK Dispensing Practices.

II) Study Title

The application of a decision support system for Dispensing Practices when purchasing medicines.

III) Research Question

Can the principle of a decision support system be used to improve the decisions of Dispensing Practices over where drugs are purchased?

IV) Study Aims & Objectives

To establish if a decision support system could be used within the context of Dispensing Practices to enable best practise of drug purchasing.

This objective will be addressed by (1) examining contemporary literature around the subject area to establish justification for the use of a decision support system in the context that has been proposed; (2) establishing a greater understanding behind the purchasing rationale of Dispensing Practices through the engagement of practitioners.

V) Methods Of Research

The methods of research comprised of both a systematic approach involving a deductive, (desk based, secondary), approach and an inductive, (field based, primary), approach. A literature review was conducted that combined contemporary academic and professional information based within a healthcare context. Questionnaires and semi-structured interviews were used to engage practitioner perspective of drug purchasing and decision support systems within a Dispensing Practice environment.

VI) Key Definitions

As part of the introduction to this study a number of key concepts and meanings have been defined.

Knowledge Management: Is regarded as a respected management discipline and a social science. In a Dispensing Practice environment, good knowledge management is essential in order to remain profitable and offer both patients and tax payer's good value within a changing and highly regulated environment.

Good Knowledge management within a Dispensing Practice purchasing environment involves the ability to acquire the right knowledge capital at the appropriate time in order to make informed and cost effective decisions when purchasing medicines for dispensing.

Best Practise: Is a consistent method or process that when used produces results more superior than previous methods before it. This process often involves the use of benchmarking (measuring or judging against others). Benchmarking for best practise was once restricted to inter-organisational comparisons but it has been increasingly recognised that in large organisations such as the NHS, there is much to be gained from the intra-organisational transfer of best practise (Newell et al, 2003).

Best practise must be adopted by all internal components of the NHS. This service however is large, made up of both public and private entities. To retain a consistent and high value service it is important that all external components (e.g. Dispensing Practices) also functioning as part of the NHS are similarly striving towards the concept of best practices.

“Sharing best practise is a major challenge and priority for the NHS” (NHS purchasing and supply Agency, 2009). The continual development and priority towards best practise will create a healthcare service that will run more smoothly and cost effectively, providing better value in the long run to both patients and tax payers. From a commercial perspective Dispensing Practices will make considerable savings and profit gains if best practice is strived for. This process is however deemed challenging because it is difficult to quantify and it is a continuing and evolutionary process. There is also “no single best practise because best is not always best for everyone” (Newell et al, 2003).

Within the context of this study best practise refers to a consistent method or process that will allow for a better and more informative decision when it comes to drug purchasing within a Dispensing Practice environment. This proposed best practise is through a theoretical concept of a decision support system that when used would improve Practices commercially (from their purchasing operational side) by allowing them to access drugs from the most appropriate and cost effective sources.

Decision support systems: Are used in a variety of different business and service environments. They are primarily recognised as information technology (IT) based systems which act as an enabler to better decision making within a variety of different contexts.

Within this study the term decision support system refers to an IT based system, which theoretically could help a Dispensing Practice by enabling them to make superior decisions where drugs are purchased, leading to more cost effective buying and profit gains.

Chapter 2: Literature Review

I) Dispensing Practices

Dispensing Practices function in a similar way to any other UK General Practices. Dispensing Practices differ mostly from General Practices due to their additional dispensing role. Dispensing Practices dispense prescription drugs, controlled under regulatory conditions to NHS patients. General Practices, provide NHS patients with prescriptions that must be produced or accessible to a pharmacist (A person trained in the dispensing of controlled and non-controlled drugs to the general public) as they do not dispense drugs but can personally administer them. Unlike General Practices, they are effectively running two separate services for the local community that are interconnected.

The service of a Dispensing Practice functions mostly within rural areas where access to pharmacies, (a place where prescription drugs are dispensed under regulatory conditions to the general public), is least accessible for NHS patients. Dispensing Practices are perceived to be best placed within this environment because they can provide all the primary care needs of the local community and are “particularly important for elderly patients and people with mobility problems” (Countryside Alliance, 2008). Dispensing Practices can provide this additional service within this environment, and can make a profit due to the way each one is funded. The GP’s themselves are not employed directly by Primary Care Trusts (PCT’s) but function as a service provider to them and the NHS.

According to latest figures (*Figure 1*) obtained by the Dispensing Doctors Association (DDA), in 2009 there are currently 1,139 Dispensing Practices and 5,731 Dispensing GPs within England. The DDA, (2009) have calculated that in the UK 6.9% of the population are currently dispensing patients (patients receiving both pharmaceutical and medical services) whilst 16.27% of the population are receiving medical services from a dispensing doctor. This demonstrates the importance Dispensing Practices are as an NHS service.

	2002	2003	2004	2005	2006	2007	2008	2009
Dispensing Doctors in England	4842	4995	5118	5279	5353	5311	5553	5,731
Dispensing Practices in England	1176	1174	1181	1179	1166	1149	1135	1139
Dispensing Patients in England	3369110	3413847	3451728	3477519	3482032	3,491,092	3510895	3,513,528
Dispensing Patients per Practice (average)	2865	2908	2923	2950	2986	3038	3093	3085
Dispensing Patients per Doctor (average)	696	683	674	659	650	657	632	613
Dispensing Doctors per Practice (average)	4.12	4.25	4.33	4.48	4.59	4.62	4.89	5.03

Figure.1: UK Dispensing Practice statistics (Dispensing Doctors Association, 2009)

II) Practice Funding Streams

It is the role of The Department of Health (DH) to forecast the likely drug spends by each Primary Care Trust (PCT). This Department allocates government funding to PCT's based on these forecasts and it is then the role of the PCT's to distribute this money to primary and secondary healthcare services. According to the Audit Commission, (2003), and the Royal College of General Practitioners, (2009), approximately 75-80% of NHS money is channelled through PCT's; this includes managing all prescribing spending, for Dispensing Practices. PCT's are the main providers of their funding.

The subject of funding of Practices according to the National Association for Patient Participation (NAPP), (2009), "has been an emotive issue". Despite this the 2004 GP contract was also described by NAPP, (2009), to have broken new ground with the introduction of the new quality incentives known as QOF. These new incentives however have received a mixed reception by some health professionals due to the way they incentivise health professional behaviour as a whole, whilst others perceive them as a true benefit.

The British Medical Association (BMA), (2008), state that the aim of the current funding streams for Practices is to assign resources "according to workload associated with each Practice's patient population". This is done because it is believed to give "GP Practices greater flexibility and autonomy in the delivery of services". Today the aims are to primarily address the needs of patients better at a local level and strive to reward "quality rather than quantity of clinical care" (The Royal College of General Practitioners, 2009).

The BMA, (2008) highlights that most funding is directed towards Practices rather than the owners who are usually GP's or similarly skilled health professionals. They must manage these budgets appropriately in order to make profit, whilst also providing value to the NHS.

The BMA, (2008) provides a descriptive list of 6 funding streams that all Practices can receive.

1. Global sum and Minimum Practice Income Guarantee (MPIG)
2. Quality
3. Enhanced services
4. Seniority payments
5. Premises
6. Dispensing payments (applicable to Dispensing Practices)

Global sum and Minimum Practice Income Guarantee (MPIG): Provides in the order of 50% of Practice money and it is received in the form of a global sum, which is reviewed quarterly and mostly calculated based on each Practices workload. Age, patient gender and morbidity are taken into consideration as well as the mortality rates within the areas of each Practice. Those Practices with registered patients within nursing and resident homes tend to receive higher levels of funding from this source because these patients require higher levels of care and as a result create a higher workload for Practices. Similarly Practices who receive new patients gain an increase in funding because "newer patients tend to need more services than longer-established ones" (BMA, 2008). A final consideration is made based on "a market forces factor" taking into consideration living costs within the Practice area that impact on staff costs (BMA, 2008).

Practices which do not provide out of hours care or additional services receive a reduction in payments from the global sum. In 2004 a Minimum Practice Income Guarantee scheme was set up to make sure that Practices would not lose out financially under new contractual changes that would result in “basic Practice operational costs being underfunded”.

Quality & Outcome Framework (QOF): Offers all Practices points for proven high quality delivery throughout the Practice services that are available. This method of collecting points aims to provide further financial resources into General and Dispensing Practices, but only if they can provide evidence of the benefits the services are providing. Included within this system would also be service feedback from service users. A Practice can receive money for quality in two ways. Firstly an agreement in advance is made between the Practice and PCT as to the number of QOF points the Practice is aiming for each year. Then every month “payment equal to the value of 70% of these points is made to the Practice” (BMA, 2008). The PCT will only pay the other 30% of payments after the agreed points have been achieved.

Enhanced Services: Include Direct Enhanced Services (DEs) and Local Enhanced Services (LESs) which are both optional for Practices. Direct Enhanced services (DEs) include flu and childhood immunisations and most Practices provide these services. “These services are commissioned according to a national specification and price” (BMA, 2008). Local Enhanced services (LESs) are specific local needs or initiatives and as a result often vary between areas. These service rates “are negotiated locally with the PCT’s and may vary” (BMA, 2008).

Seniority payments: Are in place to reward Practices who have experienced GP's working within them. This is calculated on years of experience and time within the NHS. These payments are there to encourage GP's to stay within the NHS to maintain a high level of experience and skills at a primary care level.

Premises Payments: Often vary and are largely based on individual agreements between Practice and PCT's.

Dispensing: Is only applicable to Dispensing Practices but similarly to the other income streams it often varies between Practices. Funding is dependent on dispensing list sizes but income from dispensing can be as high as 50% for a Practices entire income. "Dispensing Doctors earn more than non-dispensing doctors because they are effectively running two separate, but interconnected services" (BMA, 2008). This added workload is reflected in their overall funding streams but as most Dispensing Practices are situated in rural communities they particularly "depend on the dispensing revenue to support the surgery premises and service provision...the larger part of that income comes from repeat prescribing/dispensing" (Countryside Alliance, 2008). According to Trevor Baldry (Partner and Director of Grant Thornton), Dispensing Practices make approximately 32% gross margin from dispensing. When he was contacted for information for this study he stated that in the last five years the gross margin had dropped by about 5% which was mainly due to tighter government control on drug costs and tighter controls on discounting of branded drugs.

Drug Purchasing: Is an area of funding only received by Dispensing Practices and Pharmacy but has been added to the funding list due to its importance in the context of this study. Currently PCT's will cover the cost of drugs purchased for dispensing. These prices are set by government drug tariffs or fixed branded prices. Additional funding can be gained from this method by Dispensing Practices through purchasing

strategically. If Practices can purchase drugs below the set tariffs the savings made can be kept by the Practice or Pharmacy. These savings alone can be significant for a strategically minded Practice or Pharmacy.

III) The NHS & The Economic Downturn

The NHS is made up of both public and private entities which as well as providing a number of benefits to the service such as greater accountability and improved efficiency it can also create its own difficulties and challenges such as economic conflicts of interest. The NHS has always tried to deal with these issues by tailoring economic benefits with targets, specifically tailored towards benefiting the patient and adding value to the service as a whole. This can be identified within a number of the funding streams.

As a healthcare provider and functioning at a local level, Dispensing Practices are highly influenced by a wide number of Government agencies and independent authorities (*See Figure 2*) but are similarly influenced as a private entity by economic factors. As is the nature of Dispensing Practices, similarly to pharmacy and many other privately owned services they all suffer some conflict of interest as a service provider. This however is not necessarily a problem as long as the NHS manages this appropriately.

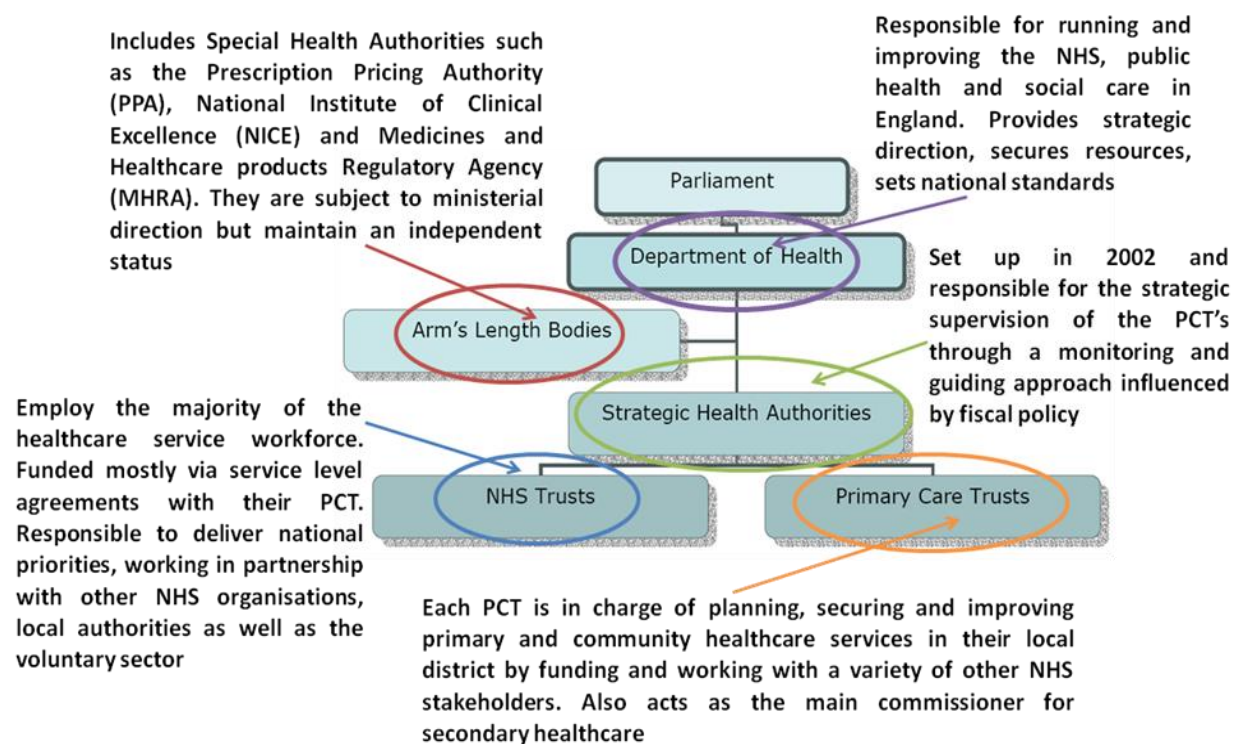


Figure.2: The NHS structure (Royal College of General Practitioners, 2004)

The NHS has been functioning for over 60 years; however its future is far from certain in its present state. According to a BBC report by Jeffreys, (2009), the entire NHS “will face the most severe and sustained financial shortfall in its history after 2011”. It is reported that rising costs are to blame due to an aging population and new treatment costs (See Figure 3).

The source of Jeffreys, (2009) report, the NHS Confederation, (2009) has looked into how to address today’s economic downturn within the NHS and highlights that early action needs to be made now in order to address funding problems in the near future. Current estimations made by the NHS Confederation, (2009) state that the entire service is facing an £8-10 billion shortfall “in the three years from 2011”.

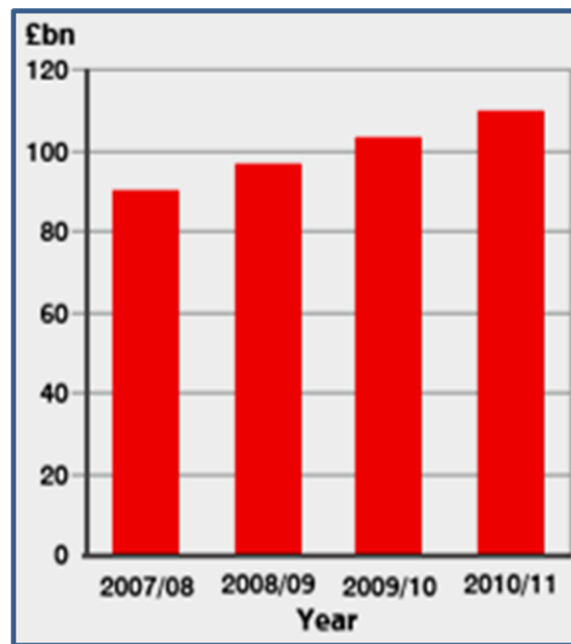


Figure.3: HM Treasury statistics, past, present & future NHS budgets (Jeffreys, 2009)

The NHS Confederation, (2009) believe that the next two years will be “tough but manageable” however following on from 2011 and beyond will be “unprecedentedly difficult”. In the context of Dispensing Practices, the impact on them will be tighter budgets for all. They face further pressures to purchase and prescribe appropriately and provide the most cost effective services. The likely event of the downturn will lead to a culture of increasing scrutiny within the public sector. This has already been experienced in other areas and recently seen within government itself regarding the concern of expenses.

Even before the poor economic climate PCT’s were experiencing funding difficulties. The Audit commission, (2003) acknowledge that PCT’s are experiencing a substantial funding gap because drug prescribing has been steadily increasing, requiring the need for an increase in yearly budgets (*See Figure 3*).

IV) The NHS & Decision Making On Drugs

With the ever growing need to control costs, whilst maintaining the quality, as stressed by the NHS Confederation, (2009), the need for commissioning authorities such as The National Institute for Clinical Excellence, (NICE), and Prescription Pricing Authority (PPA), becomes apparent.

The National Institute for Clinical Excellence (NICE) define themselves as an “independent organisation responsible for providing national guidance on promoting good health and preventing and treating ill health”. Within the NHS hierarchy they are an Arms Length Body and recognised as an independent, Special Health Authority (See *Figure 2*). NICE in particular has a large and influencing role within the NHS because as Wishart, (2009) highlights, a primary role of this Authority is to make judgments on new drugs to assess their cost effectiveness within the NHS domain.

All decisions made by NICE impact on those lower down the NHS hierarchy. The PCT's are encouraged to use NICE for their primary guidelines to primary and secondary healthcare providers to promote best value drug prescribing, which inevitably prevents inappropriate drug purchasing by healthcare providers.

Despite the positive impacts NICE has in decision making, with regards to prescribing and indirectly, drug purchasing, NICE can also create a number of problems for both PCT's and Dispensing Practices. In Wishat, (2009) report it highlights that each PCT often had its individual healthcare areas of improvement within their serving district. This is a fundamental reason why every PCT functions and invests their budgets differently to one another, to address health concerns and direct money into areas which will create the best benefits towards the local community in the most effective way and provide value to the highest number of people possible. But as a result of the

varying pockets of healthcare needs within the UK, the impact of NICE decisions can vary between PCT's. A decision by NICE to recommend, for example an expensive cancer drug would as a result impact financially on PCT's in areas with high cancer rates rather than those with more modest ones. The impact of this creates variability between PCT's. The cost implications can make the decision making process too difficult for some PCT's in their choices of priorities between new initiatives and existing precedence's.

Despite a drug being approved by NICE many PCT's often deny its initial or continual use within its local community, which creates the issues of the post code lottery for some patients and is a highly controversial topic. Primary and secondary healthcare providers including Dispensing Practices are continually reminded of these restrictions often by letters from its PCT (*See Appendix 1*). These prescribing controls are made known to local GP's but are rarely publicised due to the controversial nature of the subject.

The cost of drugs is as indicated a real concern for the NHS. This is clear due to the vast level of restriction currently in place. This is the primary reason why the NHS uses organisations such as NICE. The high drug costs are regularly justified by drug companies that blame the high elements of risk, time and incentives that are involved in developing drugs as the primary cause of the problem (Wishat, 2009). Goozner argues in Wishat's, (2009) report that the current process of investing in drug technology simply through capital investment in the private marketplace is wrong because it is financially unsustainable. Goozner, (2005) strongly believes that drugs are priced on what the market is believed to take and priced more for value which puts major financial strain on healthcare systems.

Goozner's view may explain why drug prices can differ so wildly between different countries. As similarly seen within the car industry, drugs appear to be priced to what the markets can bare and society demands and values, which pushes health services to breaking point. An example of this can be provided with evidence of drug imports from southern EEC countries (See Appendix 3).

As seen in the car industry, imports can be a cost effective method of buying. Dispensing Practices can purchase drug imports as it is often a highly cost effective method of buying identical drugs, which can lead to substantial savings and increased Practice profits. Many Dispensing Practices recognise the long-term savings that can be made through this method and utilise it as best as possible. With a predicted cut in NHS budgets this strategy of cost saving is likely to increase by well informed and strategically minded healthcare professionals if supply and currency exchange rates are favourable. Drug company strategies throughout Europe have consistently fought to curb the practice of parallel importation and exportation through litigation and supply restriction.

Goozner's view regarding the current strategy of drug development and selling demonstrates the importance of NICE as a firm regulator. Wishat, (2009) is of the opinion that the drugs market, in its monopolistic state cannot be left on its own to decide if a drug is good value for money. The chair of the NICE committee, Dr Professor Barnet also cited in Wishat's, (2009) report described how NICE plays an important role by carrying out a drugs appraisal programme that strives to stand outside of the whole situation and take a decision that is free from emotion and best for the NHS in a longer term perspective. This process is seen as best for cost control and overall service value.

NICE and similar bodies play a crucial role when it comes to decision making for drugs usage within an NHS environment. Wishat's (2009) report demonstrated and argued how fundamentally important NICE has currently been in controlling drug costs. However Wishats' (2009) report also argued that there were a number of fundamental problems with the organisation.

V) Drug Spending In The UK

The NHS is currently spending £8.16 billion on prescriptions, a 0.8% increase from last year (NHS Prescription Service, 2009). Prescribing is “relatively stable” but “growth in the cost of prescribing has started to increase during the last two quarters and is now no longer in negative growth” (See Figure 4).

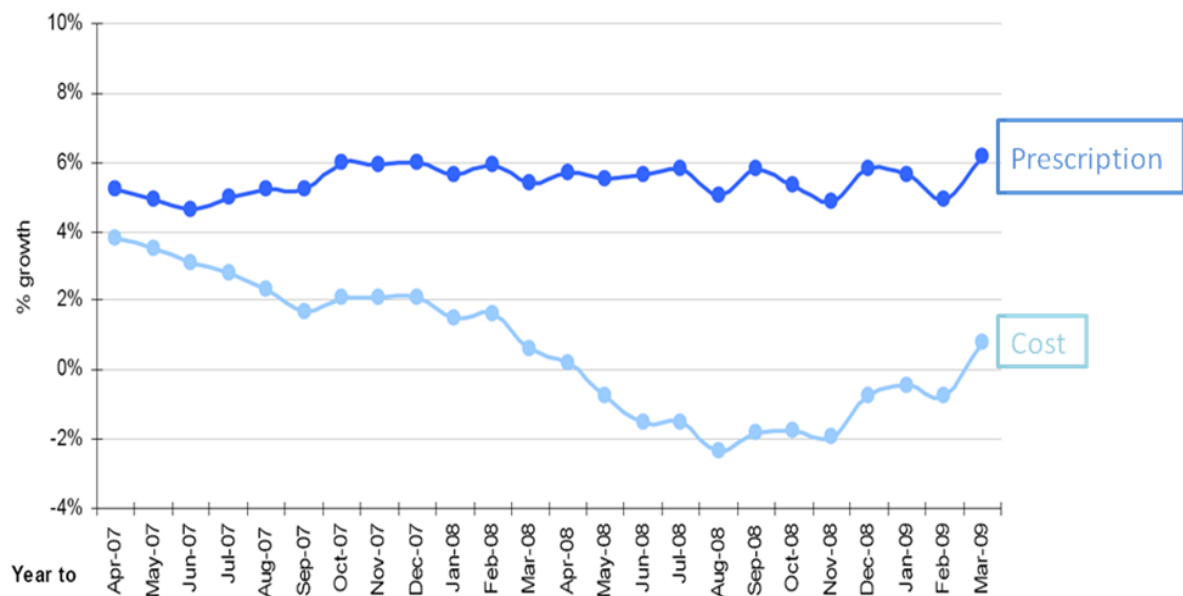


Figure.4: Growth in drug prescribing & growth in costs of prescribing (NHS Prescription Service 2009)

Despite the continual growth in drug costs generally, statistics show that the UK spends less on medicines than most other European countries (See Figure 5). This is because the Department of Health has traditionally retained high control of drug costs through regulation, placing high demands on price cuts from drug manufactures and highly supports the use of generic drug alternatives (Association of British Pharmaceutical Industry (ABPI), 2009). Branded medicine is also “the second largest earner for the UK balance of trade after North Sea oil” (Lay, cited in Canadian Healthcare Manager, 1996). This gives the industry some leverage when negotiating with government.

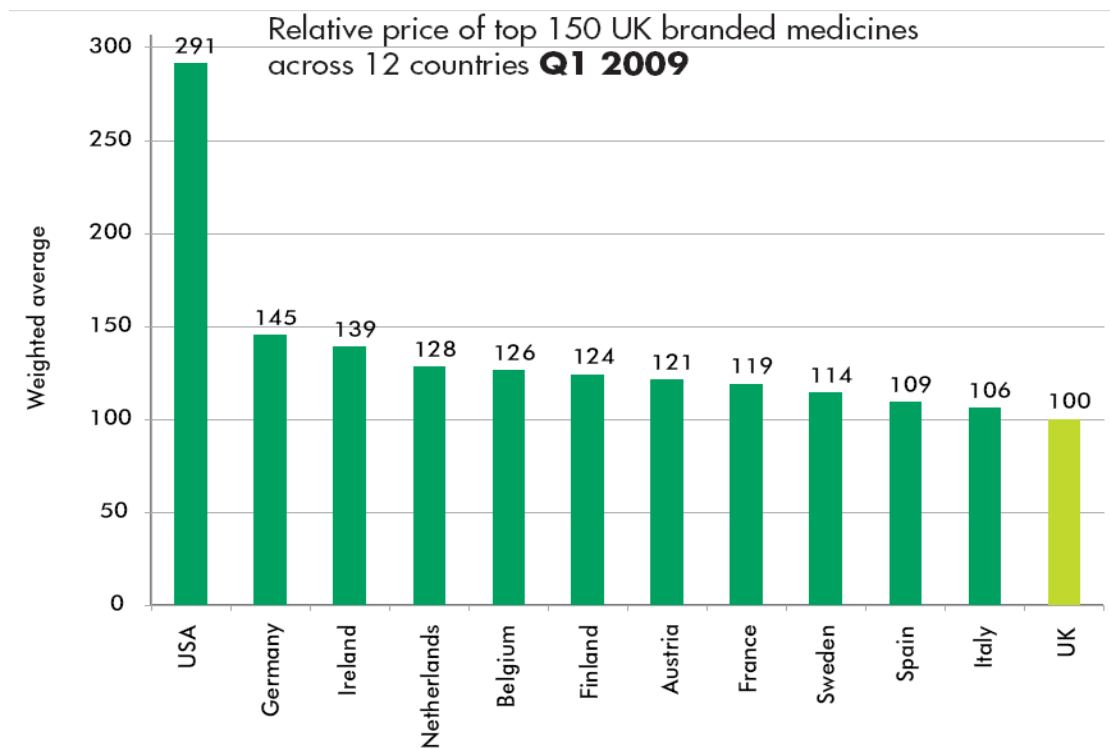


Figure.5: 12 country comparison of drug spending of the top 150 UK branded medicines (ABPI, 2009)

VI) Brands Vs Generics & Decision Making

Generic drugs are regularly purchased by Dispensing Practices as in most cases they are the same as Branded drugs but substantially cheaper to purchase. The use of generic drugs has proven to provide both Practices and the NHS significant reductions in costs and is regularly recommended by NHS Authorities such as NICE and the PPA because they provide the NHS better value for money. However it is recognised by the NHS as well as American health authorities that use of generics "needs to be maximized" (Dr. Kirking cited in Deutsch, 2001).

Most GP's will use a mixture of both generic and branded drugs, depending on their situation. A GP's primary consideration when prescribing should always be what is in the best interests of the patient; however a prescribing decision is not simply based on this as a number of factors come into play (*See Figure 6*).

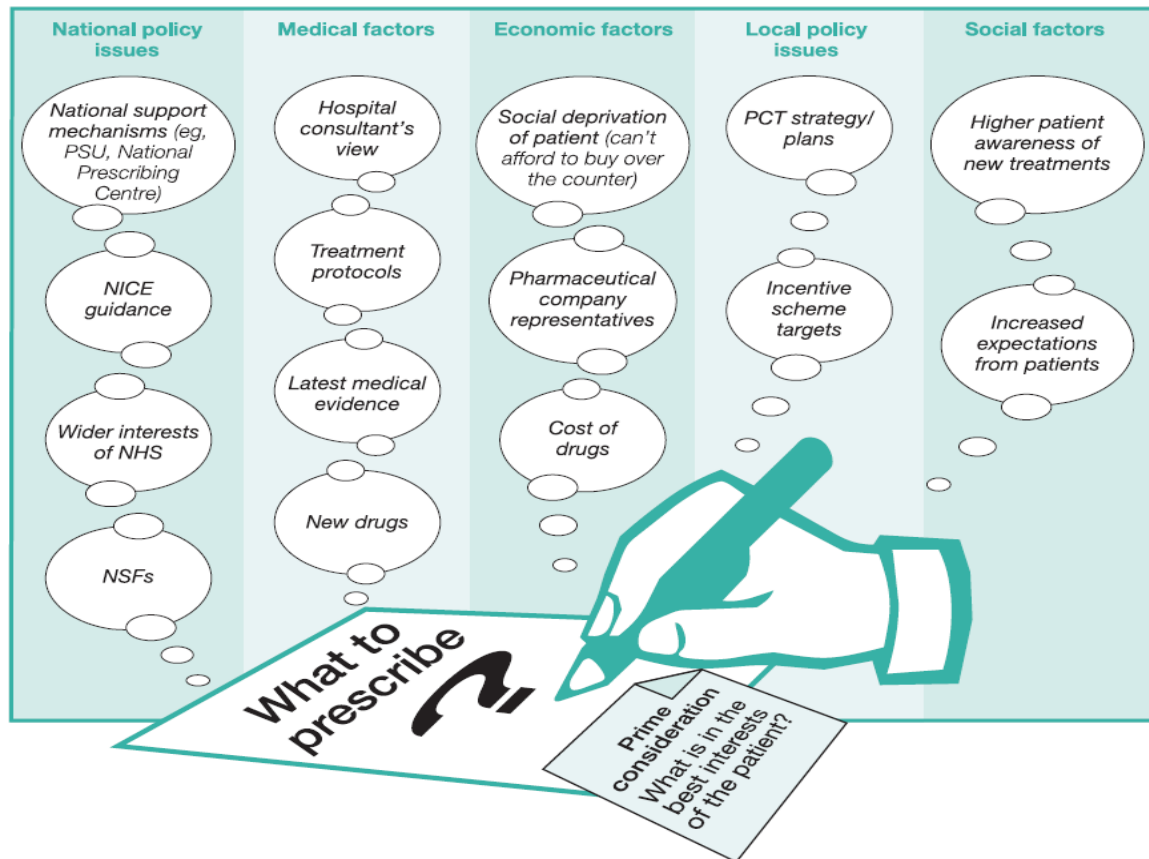


Figure.6: Influential factors that impact on decision making when prescribing (Audit Commission, 2003)

When prescribing, “most of the doctors say they prescribe a mixture of medications both generic and brand name” but “many physicians prefer brands, but will prescribe generics” (Nash, 2005). Based on US studies, brands are often preferred over generics for a wide number of reasons. Nash, (2005) identified within a dermatology environment that many clinicians had more information on brands and there was some fear that generics did not need to meet the same standards as their branded counterparts. It was also identified that there was some concern as to the source of many generics as well as their effectiveness in regards to bioavailability. Furthermore it was identified that experience of brands was greater and posed less confusion for patients and so clinicians stated that patients tended to trust and demand branded drugs. Studies indicate that only 20% of patients ask their doctor for a generic, but 75%

of patients will accept a generic substitution if it is offered by their doctor (Deutsch, 2001). These US studies indicate that patients do prefer brands but most will accept a generic alternative as suggested by the conclusions by Nash, (2005). These trends are difficult to compare with the UK because healthcare delivery in the UK and America is different.

Deutsch, (2001) also raises similar issues to Nash, (2005) but in a more general context stating that US healthcare authorities did not provide enough advice on generics, creating confusion and lack of knowledge regarding their variations and drug sources. Within the UK generics are highly documented and supported by healthcare authorities but sources indicate that generics could still be utilised further.

Despite these concerns "substantial cost savings can be realised with generic medications" (Arbor, cited in Deutsch, 2001). Dr Kirking, cited in Deutsch, (2001) follows the general consensus that generics are highly "appropriate and can save significant amounts of money without compromising care." It is the Physicians that "have a great impact on the use of generics and could help to save the healthcare industry money by encouraging their use...doctors should think about consistently prescribing generics... In almost all instances, generics are fine and should be used."

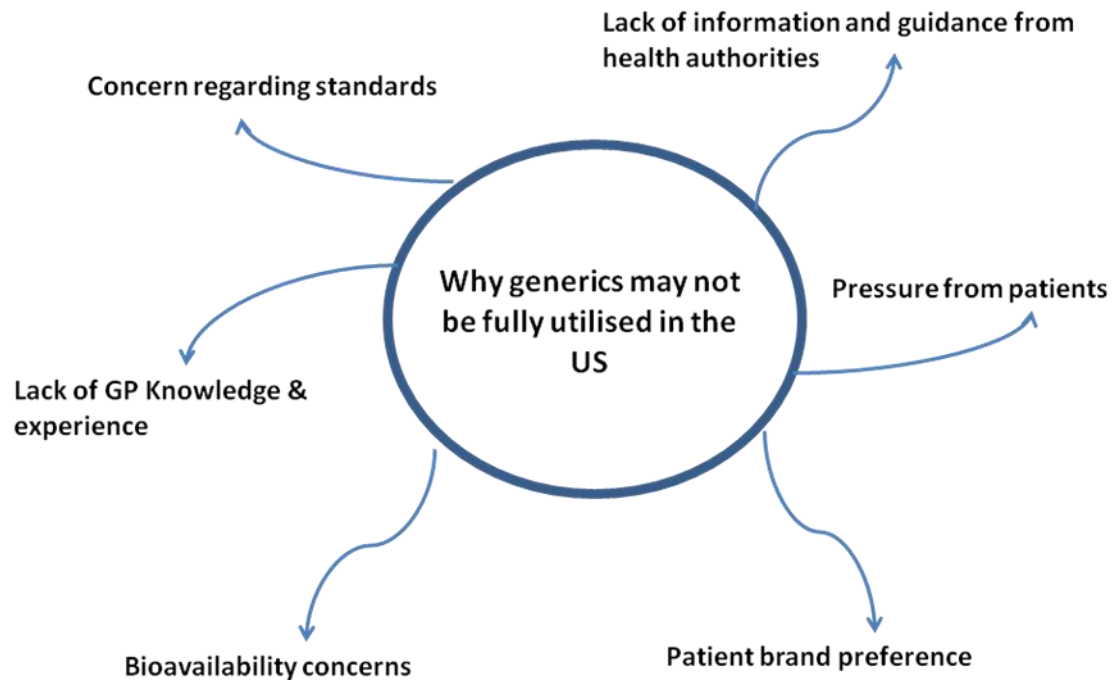


Figure.7: Reasons why doctors in America may make the decision not to prescribe generic drugs in accordance to the views of Deutsch, (2001) and Nash, (2005)

VII) The UK Drugs Distribution Chain

There are two different methods that drugs are distributed to Dispensing Practices throughout the UK. The first method is simply through the drug manufactures themselves. This method is not used by all manufactures. The second method is through wholesalers (*See Figure 8*), which is the most common distribution point for many manufacturers, who use the wholesalers to access the individual customer (i.e. Dispensing Practices).

Sources suggest that wholesalers in recent years have become polarised due to poor trading conditions, cheap imports, and reduced profit margins due to government pricing strategies and more control of distribution by major manufacturers. This has been particularly noticeable by the reduction in small wholesalers. The large wholesalers have been picking up larger percentages of the market shares as they have greater leverage when it comes to price. Despite a vast reduction in competition drug wholesaling is still a highly competitive environment. Drug pricing can vary dramatically between suppliers despite many integrated partnerships throughout.

Figure 8 illustrates the UK distribution chain for the larger and most recognisable drug wholesalers functioning in the UK and illustrates a number of connections/partnerships many of the wholesalers have with each other.

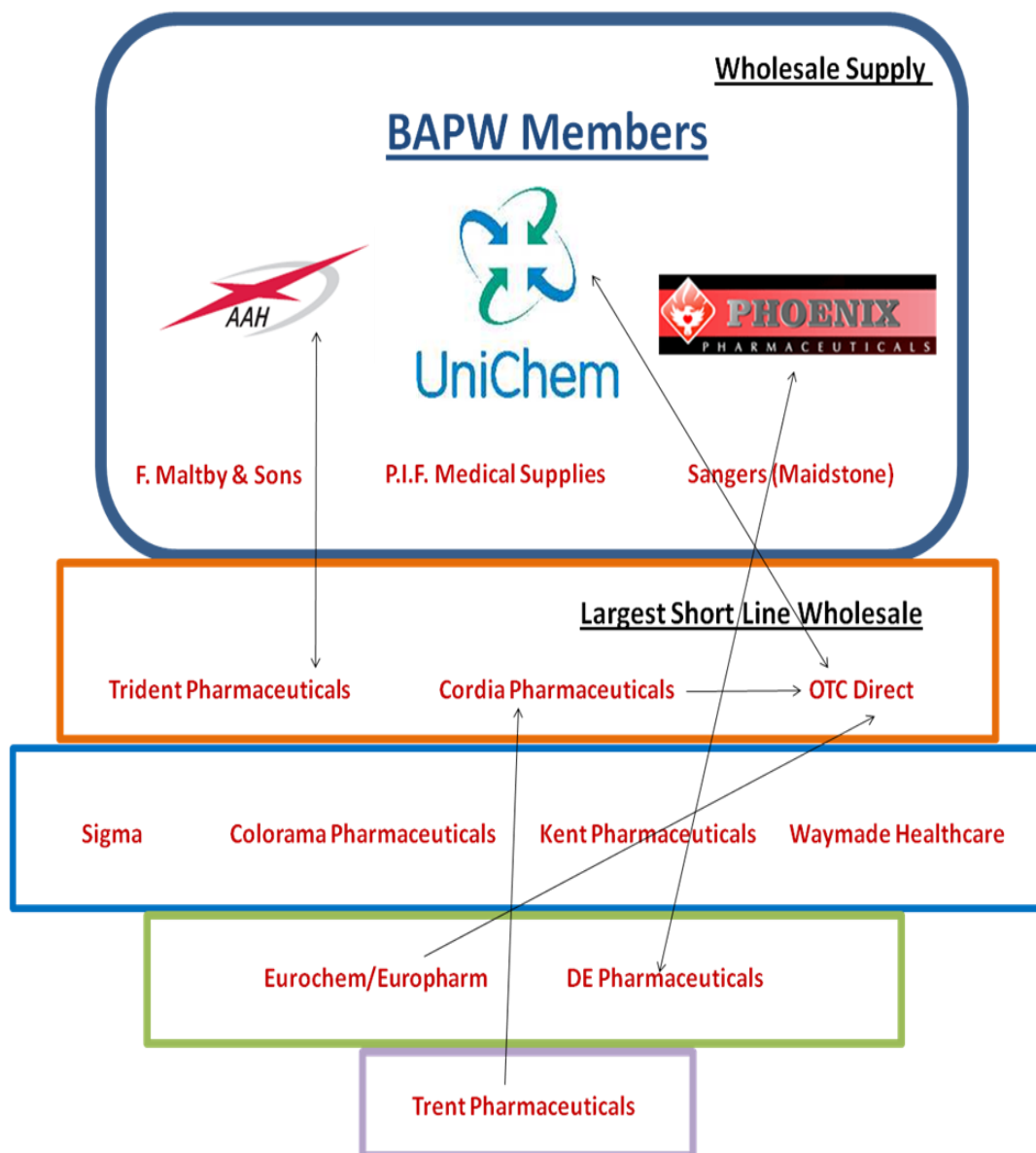


Figure.8: The BAPW UK drug wholesale distribution chain and their relationship with other wholesalers

VIII) Providing Best Practise With Technology

The Wanless report, (2004) stated that part of securing good health for the whole population will “not just depend on there being adequate resources, but also on those resources being used as productively as possible”. The report identified that “productivity will be one of the most significant determinants of the cost of delivering high quality healthcare over the next 20 years” and identified 4 crucial areas that would “offer the greatest potential for productivity gains”. One of these critical areas included the use of IT.

“Basic computerisation of Practices is now, virtually universal” according to the Royal College of General Practitioners, (2005). They state that this is due to a “mixture of government reforms and incentives, personal and practice-based administrative benefits and societal expectations”. Today there are many examples of IT systems currently used throughout the NHS by GP’s. These include systems such as care record services, choose and book and electronic transmission of prescriptions. Each has provided a revolutionary aspect in how the NHS operates today.

The Royal College of General Practitioners, (2005) identify that despite a number of concerns relating to “compliance, consent and data integration and integrity” these IT systems can bring to the service a number of benefits, which include:

- Improved communication through information sharing between health professionals
- Reduction in errors
- Improved safety by reducing conflict between health professionals regarding prescribing and treatment
- Reduced bureaucratic procedures
- Reduced risk of work duplication

In chapter 6 of the Pharmacy White Paper, (2008) it discusses the use of technology as a way of promoting innovative practises. In 2007 the government published its strategic case for a wider adoption of technology that would improve current forms of Pharmacy practise. The Pharmacy White Paper, (2008) state that auto-identification and data capture (AIDC) was highlighted as a suitable technology within a Pharmacy healthcare context. This included such technologies as bar codes and radiofrequency identification systems. Similarly to what the Royal College of General Practitioners, (2005) suggested, these systems have been used to improve patient safety through reducing human error when dispensing as well as helping to manage supply and purchasing issues in pharmacy, which reduce both costs and improve overall efficiency.

Despite these benefits identified within a healthcare environment these systems were described in the Pharmacy White Paper, (2008) to be nothing new as they have been widely used within other industries such as retail. These systems today are highly utilised within both Pharmacy and Dispensing Practice environments but the White Paper, (2008) suggests that their integration has been slow in comparison to other industries. One observation is that both Dispensing Practices and Pharmacies function within both a public and private environment and as a result it is far more difficult to implement change and conformity. Furthermore the NHS is a vast organisation with a traditional top down hierarchical approach to leadership. With its size and leadership

approach, change in the NHS is often incremental but not impossible.

This growing recognition of what IT can bring to the NHS, has over the years produced a number of IT targets relating to its integration and general use, both in a general sense but also specifically towards healthcare providers at a more local level such as PCT's, GP's and Practices. These targets provide the indication that IT really does have a place today in bringing the NHS forward into the future. Most importantly within the context of this study, demonstrates that the NHS environment as a whole may be in the right position to embrace new technological ideas. This willingness to change may be linked to the need to reduce costs whilst retaining quality, highlighted as essential in the NHS Confederation's, (2009) report.

The Royal College of General Practitioners, (2005) produced a summary of specific national targets that were most relevant to a primary care context (i.e. GP's and Dispensing Practices). One target set out from 2006-08 was to provide "additional decision making support for doctors and nurses". A further target for 2010 is for "full integration of health and social care systems in England". To meet these targets, today GP's and Practices have an opportunity to select systems that are deemed appropriate to them. This freedom is justified "as long as they support this with a justifiable business case" (Royal College of General Practitioners, 2005). The Royal College of General Practitioners, (2005) provide a list of 10 GP clinical system suppliers that have been used to improve health professional knowledge management and decision making.

1. Chime UCL Medical School
2. EMIS Ltd
3. Healthy Systems Software
4. In Practice Systems Ltd
5. Torex (iSoft)
6. Microtest Ltd
7. Protechnic Exeter Ltd
8. Seetec
9. The Computer Room
10. Phoenix Partnership

To improve knowledge management as a whole the NHS has set up the National Electronic Library for Healthcare (NELH). This library of information acts as an information repository system to assist all health professionals and the general public by providing “access to the best and current knowledge available for improving healthcare, clinical practise and patient choice” (Royal College of General Practitioners, 2005). Although this is not really a decisions support system, it helps to demonstrate one example of technology being used within a healthcare context to encourage consistency and to drive better practise throughout the NHS. It does this by sharing knowledge and effectively allowing healthcare professionals as well as patients to access a greater degree of information to enable better and more effective decision making.

IX) Decision Support Systems In Healthcare

“While the diffusion of large-scale diagnostic systems has been slower than originally anticipated, the growing availability....and the increasing technical diversity of medical decision support systems will promote the widespread use of computer-assisted medical decision making” (Marckmann, 2001). Within a healthcare context they are beginning to “play an increasingly important role in medical practice”.

Within a Practice environment Marckmann, (2001) identifies that “most medical decision support systems (MDSS) provide decision support for particular diagnostic or therapeutic tasks” and “help physicians to organize, store, and apply the exploding amount of medical knowledge”. The use of such systems follows the common perspective that it will “improve the quality of care by providing more accurate, effective, and reliable diagnoses and treatments, and by avoiding errors due to physicians' insufficient knowledge”.

Importantly for the future of the NHS, these systems will help to address the “healthcare costs by providing a more specific and faster diagnosis, by processing drug prescriptions more efficiently, and by reducing the need for specialist consultations” (Marckmann, 2001).

The Royal College of General Practitioners, (2005) identify that within Practice environments an online clinical decision support system are already being used. They discuss one system known as Prodigy, used during a GP's consultation process, providing “evidence based prescribing support” and extensive clinical knowledge (Royal College of General Practitioners, 2005).

Sources suggest that the move towards the use of a decision support system has not been easy. The Royal College of General Practitioners, (2005) state that many healthcare professionals believe Prodigy reduces their clinical autonomy but others have reported it as a true benefit to them, not as a replacement to decision making but more of an enabler to making a more informed one.

Additionally an investigation was conducted to gain a greater “understanding of barriers to the implementation of clinical decision support systems in primary care” (Toth-Pal et al, 2008). The investigation was carried out to explore “GP handling of a clinical decision support system during the implementation process”. The results identified that “GP’s attitudes and characteristics constituted different profiles that seemed to be associated with the degree of acceptance of the clinical decision support system”. Those profiles were related to conceptions about the GPs' professional role and their attitudes towards the computer's function in disease management and in decision making”. Other barriers were also identified within the study the main ones being a GP’s “insufficient level of computer skills and time constraints in everyday work”.

Similarly to the Prodigy system there are a wide variety of other systems on the market today that offer decision support. Within Dispensing Practice environments, many of these systems function heavily within the area of drug dispensing and patient diagnostics which appear to be primary areas for decision support systems within Practices and Pharmacy.

Isabel is another example of a decision support system that has been used by health professionals. Sources indicate that the Department of Health have shown interest in this system in 2002. Isabel healthcare, (2009) state that their “Web-based, diagnosis decision support system provides clinicians with a safe checklist of diagnostic

information for signs and symptoms and acts as a support and learning system". The system has "undergone a robust, peer-reviewed validation process over 7 years to demonstrate its accuracy, effectiveness and value" within a healthcare setting.

Script Switch is a highly successful decision support system being used in healthcare within the UK. This computer package is being sold to Practices and was developed by students at Warwick University who claim it could save the NHS approximately 10% of the overall drugs budget (BBC News, 2001). This decisions support system "automatically searches for the least expensive drugs" when a GP organises a patient's prescription. Andrew Bodsworth, who is a key member of the Script Switch team that developed the system explained to BBC News, (2001) that the decision support system "will enable GP's to do the best job they can...The software will search all available information to optimise the cost efficiency of the prescription".

This decision support system according to Bodsworth is a great enabler for GP's when it comes to prescription decisions. In reality "a GP can't have all the information in front of him". Script Switch helps to reduce a GP's work load when it comes to making the right clinical and economic decisions. Fay Wilson a representative from the BMA cited in the BBC News, (2001) report that Scrip Switch "could have more benefit for Pharmacy rather than GP's. She believed that it sounded great in theory but had "doubts whether it will be used in practise".

Evidence suggests that Script Switch is currently having a positive impact on PCT's, GP, Practices and the NHS as a whole. The Healthcare Republic, (2006) report provides some evidence of this. It "outperformed the national average in the NHS productivity metrics for increasing low cost statin prescribing...78% of PCT's using Script Switch performed better than the national average".

The British Heart Foundation (BHF), (2008) state that “cardiovascular disease is the most common cause of death in the United Kingdom”. Drugs such as statins create a substantial impact on the NHS drugs budget alone. Statins are increasingly being used to treat coronary heart disease conditions because it is believed to be a cost effective method despite the cost pressures they create (Wanless Report, 2004). Early predictions by the Audit Commission, (2003) state that these types of drugs will be used more extensively in the future, which will put further strain on PCT budgets.

The “Findings are a clear indication that the Script Switch system is helping PCT’s to improve efficiency by enabling prescribers to comply with NICE guidelines and to keep statin prescribing costs down” (Martyn Carrol, head of Script Switches medicines management, cited in Healthcare Republic, 2006). Healthcare Republic, (2006) indicate based on research conducted by Script Switch that “a cost benefit” of approximately £35,000 per Practice per annum can be achieved and “more than 60 Primary Care Organisations (PCO’s) have signed up”.

Script Switch works well within the area of prescribing within Pharmacy, General Practice as well as Dispensing Practice and both the PCT’s and the NHS like the system because of the overall cost saving it promotes (£300 million per annum). From a Practice perspective specifically, it benefits by helping to select the right drugs to dispense and stay within budgetary constraints and their PCT prescribing boundaries. Additionally there are economic benefits by doing these things, however there is more economic benefit and savings for Dispensing Practices in particular if they could have greater control when purchasing their drugs as well as dispensing them.

The information based on these examples of decision support systems similarly follows the view of Marckmann, (2001) as the literature suggests that these systems work well within the areas of prescribing and diagnosing but very little documentation has provided the indication that it has yet to function within Dispensing Practice purchasing. It must be noted that from the documentation not all GP's and Practices have decision support systems in place. If these systems show such significant cost savings it is difficult to establish firstly why Dispensing Practices have not demanded them and secondly why PCT have not made them compulsory.

The literature suggests that decision support systems are being used within the context of primary and secondary healthcare but has provided inconclusive evidence that it is being used extensively throughout. Additionally it is also inconclusive as to whether systems are functioning within a Dispensing Practices environment within the context of drug purchasing.

X) Decision Support Systems Outside Of Healthcare

Decision support systems have been highly utilised in a much wider context than just healthcare. Many of these decision support systems focus exclusively on price and assist in decision making exclusively through the internet. "Moneysupermarket.com, Go-Compare.com and Confused.com are among the leading players in the price comparison market" (Blake, 2009). Moneysupermarket.com had approximately "120 million visitors last year" and GoCompare.com "generates more than 1 million car insurance quotes a month" (Cumbo, 2009). These initial statistics provides some indication to how popular they are with consumers and the influence they command when it comes to consumer choice.

Since the recent economic downturn consumers have utilised these types of decision support systems in an attempt to reduce their living costs. According to Cooper, (2008), "price-comparison sites have significantly increased their online ad budgets to exploit higher consumer interest sparked by the current economic downturn". Sources suggest that during economic uncertainty decision support systems have been used as a method of greater cost control.

Web based decision support systems have provided consumers with greater autonomy by placing greater emphasis on service providers to provide the best service and deals. The consumer has greater power because they have more accessible information to utilise which provides them with greater knowledge to formulate decisions.

Many web based decision support systems that have had great success, provide purchasing assistance on goods or services which are purchased based on necessity, examples being gas, electricity and insurance. These goods or service tend to be those that consumers buy based on the emphasis of best price rather than other factors such

as image or current fashion trends. In comparison to drug purchasing there are many similarities which can be established. Due to tight government regulation in drug supply a healthcare professional should not need to worry about the sources or supplier of drugs and medicines. Instead, similar to the insurance or utility sector they should only be concerned that the right goods or services are being purchased from the most cost effective and reliable provider of services.

Despite the complexity of the drugs market there is little evidence found to suggest that purchasing drugs should be any more complicated than purchasing insurance, gas or electricity. A healthcare professional should have very little emotional attachment where drugs are being purchased. Culture, intuition, established friendships/relationships; staff knowledge and supplier bias should not be fundamentally used as the primary methods of drug purchasing. This should be left to sound reliable knowledge to encourage consistency and ultimately best practise.

Despite the overall benefits the web based decision support systems appear to have provided to the consumer, there are a number of issues associated with these support systems. It is difficult to establish how effective they really are when it comes to providing the consumer with the best support for decision making. According to Prosser, (2007) "at first sight, online price comparison services offer the perfect solution if you're shopping around" however they simply do "not capture the deals offered" A problem with web based decision support systems used for insurance is that every customer is individual and have different requirements. A decision support system that focuses on price may not always take into consideration other factors. In the context of car insurance a comparison website may find a cheap selection of insurance cover but may fail to consider the level of cover itself. As a result a more expensive option may in fact be seen as a more cost effective solution by the decision maker given the level of cover it includes.

In relation to buying drugs this could be problematic because as with many other different types of buying, there are often a variety of deals and discounts available to the customer either directly or indirectly. A decision support system needs to take into consideration these aspects. Similarly a Dispensing Practice may need to buy in drugs quickly and often convenience comes at a higher price. In this instance buying from the cheapest supplier but most inconvenient one may not be the best decision overall. This however brings up many other questions such as why would drugs need to be purchased quickly if a Practice was organised? Given that approximately 80% of prescribing is repeat prescribing, Practices already have a strong indication of what they need on a monthly basis.

One major weakness of many of the web based decision support systems discussed is that they do not have a fully inclusive list of data. The sector itself has already been warned about “misleading customers by using assumptions” (Mortgage Strategy, 2009). “An industry body is to launch a code of practice” according to Cumbo, (2009). The aim of this will be to prevent customers being “mislead”, preventing customers from “thinking that a quote can be relied on”. This is because many of the comparison websites provide estimation rather actual quotes according to Bridge, (2009). Another consideration is how independent each decision support system really is?

Based on this research it is difficult to establish if a consumer is really being provided with enough options to make the best purchasing decision. From these sources it suggests that perhaps best decisions cannot be fully relied upon solely through decision support systems simply because they may not hold enough information to provide it. Sources do suggest however that they can be used to prove a decision maker with information on prices generally which would certainly add value when making a decision through improved transparency of the markets.

The issue of price has been the main focal point in this discussion of web based decision support systems. In many services however, delivery and convenience as well as a variety of other similar factors are often as important. Similarly this could be important in the context of drug purchasing. A particular problem with these aspects is the measurability. Many web based decision support systems have addressed these issues by developing ways of measuring them in a simple and user friendly way. A common method used by Go-compare.com and other support systems is through a star rating structure (See Figure 9).



Figure.9: Star rating systems used in many web based decision support systems (Amazon.com, 2009; Ebay.com, 2009)

The star rating systems has been presented in a number of different ways between support systems but generally they are used to indicate similar issue such as service, delivery and reliability. The rating system is often traditionally left to the user of the web based system, as they are in the best position to provide information. This improves the reliability of the results to some extent however it is highly reliant on continual user feedback and reliable information.

This method of measuring service and reliability appears to be highly effective despite some weakness that it has. This tried and proven method could similarly be used for drug purchasing to help Dispensing Practices purchase drugs from reliable suppliers who can supply drugs most effectively this would further add value to any decision support system being considered.

According to Cumbo, (2009) web based comparison sites is now reaching saturation point “with the number of comparison websites doubling in recent years to reach more than 40”. The internet alone provides the room and opportunities for a wide number of support systems however this could be detrimental within the context of drug purchasing alone. Although the UK drugs market is large the amount of people who would potentially use a decision support system to buy drugs would be small in comparison. The amount of customers buying insurance, gas or electricity is far larger than healthcare professionals buying drugs for prescribing. Healthcare professionals could benefit more from using just one proven system to reduce complication and promote a wider scale, best practice approach of drug purchasing. However this would require further investigation.

XI) Concluding Remarks

There are currently pressures on the NHS to control costs in a wide variety of areas but there is strong evidence that suggests the NHS is trying to address some of these cost concerns within the area of drug spending. Dispensing Practices have the opportunity to create a positive impact in addressing this area of concern. They also have the scope to gain an even greater financial advantage by improving their knowledge within the area of drug purchasing based on the current funding streams that are available to them.

Technology is being used and supported within the NHS by health professionals. It has been used to help reduce costs and improve processes; however technology is sometimes slow to be implemented.

Decision support systems already form part of this technological support within a variety of healthcare environments, this includes primary healthcare. However there is a lack of knowledge to establish if all Dispensing Practices are using decision support systems on a day to day basis. Currently there is no decision support systems used extensively to enable best practise in drug purchasing. There is also limited evidence to support the view that a decision support system could be used within the context of Dispensing Practices to enable best practise of drug purchasing. There is a lack of information also available to establish whether there is either a need or interest in the application of a decision support system for Dispensing Practices when purchasing medicines. It is also difficult to establish where Dispensing Practices are getting their information to make any informed decisions when it comes to purchasing drugs from manufactures or wholesalers.

Web based Decision support systems have proven to be highly successful in improving market transparency and providing greater knowledge to buyers generally in other markets outside of healthcare. The adoption of these types of support systems within drug purchasing shows potential but as to whether these could be transferable into a drug purchasing environment, this is not fully conclusive. Similarly there is a lack of information as to the potential savings a Practice could achieve through the use of a similar constructed decision support system as seen within price comparison websites.

Culture within Dispensing Practices could be either a barrier or enabler to the implementation of a decision support system. Furthermore similar issue could be presented from the drug supplier's side as ultimately it is them that hold the pricing information required. A change in regulation or drug purchasing agreements could also severely impact on the use of a decision support system for Dispensing Practices. However even if purchasing agreements changed, decision support systems could still potentially be used for cost saving even if these did not equate to profit gains for Practices.

Based on the deductive research conducted a number of areas need to be investigated further through more inductive means. To establish if a decision support system could be used within the context of Dispensing Practices to enable best practise of drug purchasing it is important to engage the two main stakeholders involved within the process. This would produce a more rounded perspective overall.

Further information needs to be collected directly from Dispensing Practices to gather a greater understanding on the current utilisation of electronic knowledge tools in place within Practices, aiding healthcare professionals with their decision making in drug purchasing. Furthermore it would also be beneficial to gather information on

drug spending, purchasing habits and methods of purchasing, as well as other factors such as reasons for purchasing.

Information also needs to be gathered from drug suppliers to engage their perspective and to identify how they currently assess price within their own environment and to establish if the concept of price comparing is being adopted within wholesale itself. It is also important to establish if there would be support for the implementation of a decision support system from those selling drugs to Practices.

Chapter 3: Research Design

I) Research Approaches & Strategy

The research was undertaken using a systematic approach involving a deductive (desk based, secondary) approach and an inductive (field based, primary) approach. Initially a deductive approach was taken to review all relevant academic and professional literature based around the area of study. Following this, an inductive approach was carried out in the form of a questionnaire and two semi-structured interviews.

The primary objective of the research was to establish whether a decision support system could be used within the context of Dispensing Practices to enable best practise of drug purchasing. The research conducted set out to prove or disprove this. The inductive research was conducted throughout the month of July and August 2009 and was addressed in two phases. Phase 1 included a questionnaire (*See Appendix 2*) sent to 50 (4.4% of UK Dispensing Practices) based within the Centre and East of England District. The second phase included two semi-structured interviews, conducted with a Dispensing Practice drug supplier/distributor and a Drug Sales Representative both of which provided information for a case study.

These techniques were selected over others, based on the nature of the research that was being undertaken. The research had a substantial amount of exploratory elements, which directed the research methods towards a social and humanistic stance (focusing primarily on social and qualitative aspects i.e. opinions or perspectives) as opposed to a rigorous scientific stance (researching and testing in highly controlled environments).

The research selected provided enough flexibility and promoted exploration, providing the opportunity to explore the issues in multiple depths when/if required. This was ideal within an environment where the researcher had limited experience and knowledge prior to conducting the research.

II) Research Settings

The research was conducted in multiple locations. The deductive research was conducted at the researcher's home, Cranfield University Health Department and Kings Norton Library, both situated on one campus in Bedfordshire. This provided the researcher with convenient access to a wide variety of relevant literature and academic advice.

The inductive research, the questionnaires were delivered to Dispensing Practices in multiple locations but developed at the same locations as the deductive research. The two semi-structured interviews were conducted at the interviewee's homes in Northamptonshire. The locations of the interviews were decided by the interviewee's, which were accepted by the researcher on the grounds of participant convenience, comfort and the nature of the environment which was primarily free of external influences (Gill & Johnson, 2002).

III) Ethical Considerations

Throughout the study a number of ethical principles were followed and adhered to. The following eight primary principles were devised by Bryman & Bell (2007).

1. Respecting the dignity of research participants
2. Ensuring a fully informed consent of research participants
3. Protecting the privacy of research subjects
4. Ensuring the confidentiality of research data
5. Protecting the anonymity of individuals/ patients
6. Avoiding deception about the nature or aims of the research
7. Honesty and transparency in communicating about the research
8. Avoidance of any misleading or false reporting of research findings

IV) Inductive Data Gathering: Practice/ Participant Selection & Characteristics

The theoretical population targeted through the questionnaire was Dispensing Practices within England and the study population was Dispensing Practices within the Centre and East of England district (See Figure 10). The study population selection was designed to take into consideration the uneven spread of Dispensing Practices. The respondents of the questionnaire all worked within a selected Dispensing Practice and had the primary responsibility of drug purchasing.

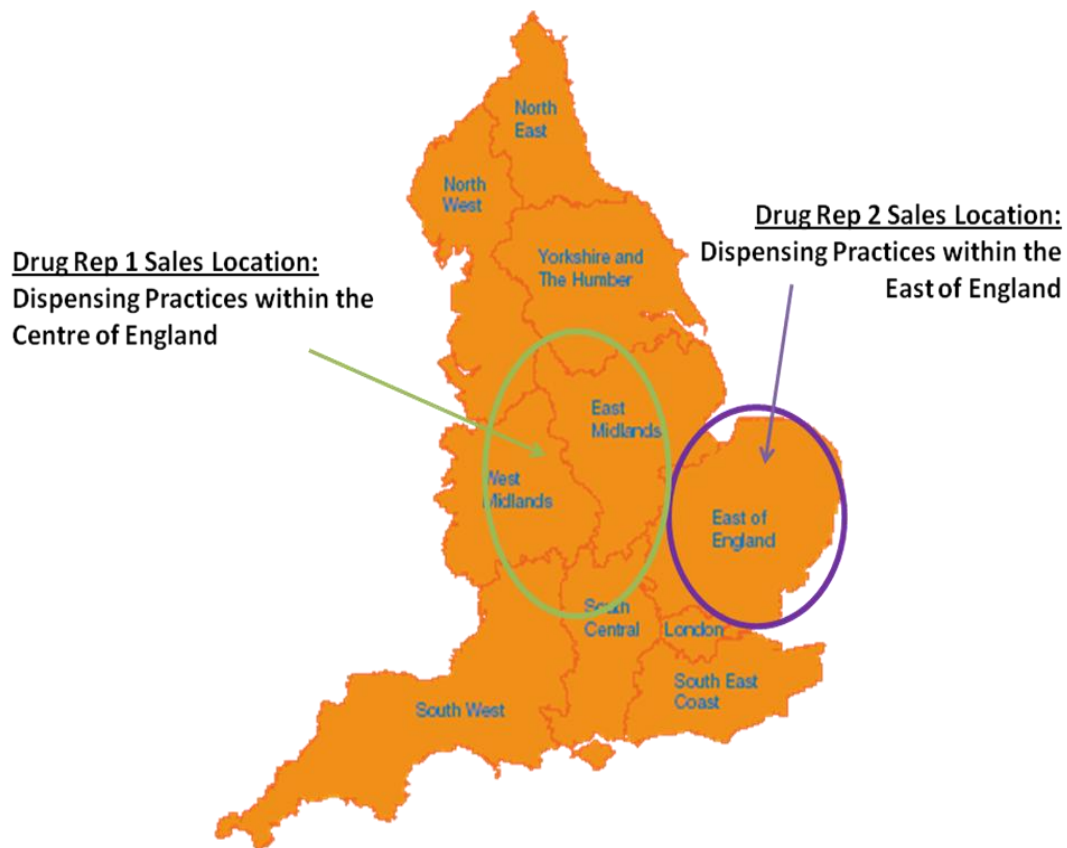


Figure.10: Dispensing Practice locations (Central & East of England)

Two samples of 25 Dispensing Practices were selected by two Drug Sales Representatives. These selections were made based on sales lists and Practice visits the Representatives were making within their sales location during the inductive research period. The Practice selections remain anonymous to the researcher to stay in line with the ethical considerations set but their size was established based on their dispensing list. Practices with a maximum dispensing list size of 2000 were regarded as small. Practices with a minimum dispensing list size of over 2000 were regarded as large. Dispensing Practice size was established based on the questionnaire design. Samples made up of both large and small Dispensing Practices were permitted to take into consideration any differences between the two, helping to reduce sampling error.

Theoretical population: Population of Dispensing Practices within England

Study population: Population working within the Centre and East of England

Sample: Healthcare professionals with primary responsibility of drug purchasing in large (minimum dispensing list size of over 2000) and small (maximum dispensing list size of 2000) Dispensing Practices. Selected by two Drug Sales Representative from within their sales lists and Practice visits

A strategic decision of the sample population was made based on judgement (Gill & Johnson, 2002). The sample size was small and may not have provided a fully representative sample. Based on this feasibility study the samples provided useful comparative data because of where the study population was taken from, taking into consideration the most densely populated spread and considering differences of perspective between Dispensing Practice sizes. It is acknowledged however that the sample size still provided a risk of sampling error.

Both interviewees selected for interviewing were previously known by the researcher and chosen based on their accessibility, knowledge and experience of drug distribution and selling to Dispensing Doctors. The first interview conducted was with a Dispensing Practice drug supplier/distributor that owns and runs a company based in Northamptonshire called Primary Care Products (PCP). He has over 30 years experience within the pharmaceutical industry and has specialised and worked with PCTs and Practices on projects to improve purchasing methodology in Dispensing Practice.

The second interview conducted was with a Drug Sales Representative who has over 15 years experience within his field. His employer, OTC Direct, part of the Unichem/Boots Alliance has adopted a knowledge system tool to enable customers (Dispensing Practices) to purchase drugs more informatively. His role as a Drug Sales Representative involves interaction with these new systems.

The rational of these semi-structured interviews was not to provide a cross-sectional representation. The rational was to provide a snapshot, through a case study into current concepts and practical methods that are being adopted by some drug sellers to compete more effectively on price and simultaneously provide more informed decision making to Dispensing Practices. The interviews provided the researcher with firsthand knowledge that would complement the deductive research approach. Drug

Sellers/Distributors and Sales Representatives are in a strong position to identify where drug savings can be made for Dispensing Practices. Both interviewees work with Dispensing Practices by helping to identify cost savings on drugs. They have invested resources in improving this knowledge which justified their involvement within this feasibility study.

V) Deductive Research

The deductive research approach was carried out through a review of literature that combined relevant, academic and professional information based around the area of study. This deductive research was carried out because Ghauri & Gronhaug, (2002) describe it as a method that goes to some length to answer or solve the research questions presented, as well as creating focus in distinguishing the objectives of the study. It also places the researcher in a strong position to make suitable comparisons with any inductive research that has consequently taken place after it (Ghauri & Gronhaug, 2002). Saunders et al, (2003) also describes it as a process that helps to answer or begin to answer the research questions that have been presented.

The approach to this deductive research was adopted from Easterby-Smith et al, (2008) framework, identifying (1) What is already known about the area?; (2) What concepts and theories were relevant to the area?; (3) What research methods and research strategies had been employed in studying the area?; (4) Were there any significant controversies in the area?; (5) Were there any inconsistencies in findings relating to the area?; And (6) were there any unanswered questions in the area?

The literature review was conducted to establish the contemporary views, issues and a number of discussion points in the field of Dispensing Practices. The review was taken from a socialistic and humanistic perspective due to the researcher's particular field of expertise in social science. This approach was selected based on the researcher's lack of training within an IT field; however there was a lack of requirement to address highly technical IT issues as the research being undertaken was within a feasibility study and took into consideration a number of different issues. However it is acknowledged that a greater degree of IT knowledge may have added value to the study.

As previously acknowledged the deductive research helped the researcher identify the next stage of the study, thus allowing the researcher to effectively make more informed decisions by filling in his/her knowledge gaps as well as identifying them from the literature collected and studied. The deductive research had a large influence in the researcher's decision making process in deciding what data/information was required through the inductive research. It also provided the researcher with the opportunity and flexibility to refine the research question further if it was required and provided some conclusions to the study.

VI) Data Collection Approach

At the beginning of the investigation and during the project proposal stage an initial review of literature was conducted as part of a project assessment. After the initial project proposal and initial review of literature had been conducted and approved, an extensive literature review commenced. This deductive research formed the first element of the overall research strategy. The second element of the strategy was split into two phases. The first phase involved data gathering by means of a questionnaire. The second phase involved two semi-structured interviews for a case study.

In phase 1 of the inductive research a set of questions were devised based on the objectives of the study and areas of interest formed from the deductive research. These questions were then assessed for their appropriateness within the context of a questionnaire. This assessment was made based on Marchington, (2002) 6 principles of questionnaire design.

1. Questions are clear and unambiguous
2. Questions are short
3. Questions are jargon free and non technical
4. Double-Barrelled questions (questions that ask about more than one issue in a single question) are avoided.
5. Leading Questions (suggestive questions) are avoided
6. Personal Questions are avoided

Questions which were deemed inappropriate were either dismissed or modified where appropriate. This provided the opportunity to evaluate the current list of questions and select which ones would be most appropriate within the context of the investigation. The areas of interest consisted of current Dispensing Practice technology and use of decision support systems, methods of purchasing, suppliers and decision making in general.

The questions that were used incorporated qualitative and quantitative data but there was a strong bias towards quantitative information i.e. it was in an enumerative or categorised format. This kept the entire answering process short, as suggested by Marchingdon, (2002), which was particularly important due to the nature of the respondents who had a number of commitments within their role at the Practice and had no direct stake within the research being conducted. The questionnaire was specifically designed to take no more than 8 minutes to complete.

The questions selected were developed to promote fast and simple answers and to speed up and improve ease of data collection as the purpose of the questions was to establish trends, themes, general opinions and perspectives. It was important to take into consideration the timescale of the study as data needed to be collected quickly and efficiently in order to stay within the research schedule.

Before any questionnaires were sent to select Dispensing Practices the questionnaire was piloted with a small number of Dispensing Practices to assess its effectiveness and appropriateness. This was delivered by the Drug Representatives. This was deemed “necessary as it is very difficult to predict how respondents will interpret and react to questions” (Gill & Johnson, 2002).

With the success of the pilot study, questionnaires with prepaid self addressed envelopes attached were given to two Drug Sales Representatives, who were instructed to distribute them. The decision to use Drug Sales Representatives was made based on their contacts and relationships with Dispensing Practices and their ability to deliver the questionnaire to the right source at each practice (i.e. healthcare professionals with the primary responsibility of drug purchasing). Previous experience of sending questionnaires to participants by traditional postal methods caused significant levels of unnecessary risk to research collection. There is often a varying degree of time delay and documentation can often get overlooked and forgotten within a busy working environment. Often these difficulties are only identified by the researcher weeks later, which for this study was deemed too risky based on the tight timescale. This method was used within the context of this study to promote the protection and ultimately success of the first phase of the inductive research and it was believed that the strategy would provide the opportunity to increase response rate and response time overall. It was acknowledged however that the method of delivery was untested and experimental, which in its self caused some element of risk.

In phase 2 of the inductive research, two semi-structured interviews were conducted. The strategy was to gather additional data for a case study by interviewing two experienced practitioners to gain an insight into methods used to assess Dispensing Practice drug purchasing costs and savings.

The semi-structured interview method was selected based on a number of factors. A primary factor was that the research was relatively exploratory and aimed to gather qualitative information from personal perspectives and experiences. The researcher had an understanding of the areas and direction of the interview but required freedom to explore them deeper. This technique offered the researcher the reliability, flexibility and minimal interview bias that was required (Easterby-Smith et al, 2008). It was

believed that other interview techniques such as unstructured or structured interviews did not sit appropriately within this research environment. The apprehension to use these interview methods was due to the concern that they could create an interview that was either too loosely structured, which would produce an interview that would be too general or offer a method of data collection that was too highly structured preventing exploration.

The researcher contacted the two interviewees in advanced to ask them for their involvement within the research and to organise an appointment. This method was adopted to encourage stakeholder buy-in which in previous studies and projects had proven itself as a successful strategy. Each interview began with the researcher introducing the research and explaining the reasons for the interview.

The two interviews each lasted approximately 30 minutes. A standard format was used as both interviews began with initial questions that were both general and unobtrusive in nature. This line of inquiry was adopted primarily to put the participants at ease. As the interview progressed these questions typically became more specific in nature. This was done to address specific areas of interest to the researcher.

Based on the advice Saks & Allsop, (2007) provides, sensitive questions were left to the end of the interviews but in the context of this research, very few personal or sensitive questions were asked based primarily on the nature and subject of the investigation. The ability to extract more in-depth knowledge was more obtainable based on the researcher's prior knowledge and established relationship with the interviewees.

The researcher collected qualitative information by listening to “the participant’s explanation and meanings” (Saunders et al, 2007). Notes were taken by the researcher when required to record and validate key discussion points. Summaries were regularly conducted throughout the interviewing process to aid in the route of clarification as suggested by Easterby-Smith et al, (2008). Knowledge acquisition techniques were used throughout each interview to help gather the information that was required.

VII) Data Analysis Approach

The questions within the questionnaire incorporated mostly quantitative data. As this data was either enumerative or in categorised format, the approach taken was to plot the data into suitable graphs and charts on a generic IT system. Through this simple and proven process, possible trends and correlations could be identified. Questions encouraging qualitative answers that were individualistic to the respondents from each Dispensing Practice were kept to a minimum to reduce complexity and the requirement for data adjustment.

Any notes taken by the researcher during each of the two interviews were written up to form a case study. This was supplemented by the researchers own views and perspective from the discussion. Images were taken and added to the case study to further illustrate and articulate key points.

VIII) Limitations Of The Research Undertaken

“Size of sample, data collection procedures, analysis and measurement are major concerns” when dealing with questionnaires and survey methods according to Gill & Johnson, (2002). The sample size was relatively small, due to the tight timescale available to complete the study and was open to some sampling error. Given a greater timescale the sample size would have been extended and more time would have been given to data collection.

Both data collection procedure, analysis and measurement risks were reduced by following a standardised data collection technique and adopting a proven generic IT system to assist in the collection, analysis and measurement of the data collected. It is acknowledged that despite these procedures in place there was still a risk of error.

The questions used in the questionnaire, although appropriate could have been improved and tested more extensively through the use of further pilot studies. This could have been conducted given more time to conduct the research and may have helped to provide greater and more reliable results to the study.

As with all questionnaires “the danger of respondents purposefully misrepresenting themselves to researchers or engaging in malicious multiple responses” was always present (Gill & Johnson, 2002). The control of this risk was limited and reliant on the good will of the respondents to act and respond appropriately. Another concern was that the questionnaires could have been filled in by the wrong individuals. This risk was controlled by briefing the Drug Sales Representatives prior to the distribution of questionnaires.

A main concern during interviewing was the risk of interviewer and interviewee bias (Easterby-Smith et al, 2008). This risk was acknowledged by the researcher and controlled as suggested by Gill & Johnson, (2002) through an affective validation process. Despite this process it is again highlighted by Easterby-Smith et al, (2008) that understanding all of the issue can often be very difficult. There was an initial lack of understanding due to the complexities and issues within the area of investigation. There was a substantial element of familiarisation that took place, which may have impacted on the efficiency of the information collected through the interviewing process.

The interviewer's interviewing skill must also be acknowledged as a potential weakness, partly due to a lack of experience with this research method and there was a risk that some information may have been missed by asking wrong questions or targeting the information incorrectly. Some information may have been lost simply through failing to record it appropriately. This risk could have been controlled by enabling more validation processes to take place.

Despite a well established relationship with the participants prior to interviewing it also acknowledged that there are also some concerns with participant/interviewee trust. According to McClelland, (1965) participants cannot always provide answers that are completely reliable and trustworthy. This is a weakness and limitation of this research method due to its sociological nature.

Newell et al (2003) acknowledged from their investigation that the use of a case study to form an inductive research approach “do not meet the criteria of credibility” on its own and “additional research, across multiple case studies is needed”. Similarly within this study the same issues must be acknowledged as a limitation. However the use of a case study was not extensive and was only used to add additional value to the deductive research approach.

Chapter 4: Case Studies

I) Case Description: Primary Care Products Ltd

Primary Care Products (PCP) is 9 year old company selling drugs to Dispensing Practices. The organisation specialises in supplying an extensive range of generics, parallel imports, dressings and other consulting services nationally. As a small organisation, PCP has had to remain competitive by taking a customer centric (Dispensing Practice) approach. Part of this approach involved the adoption of a simple method to identify where Dispensing Practices could make savings when purchasing. Part of this process involved analysing purchase data from Practices and making a direct comparison between his and other company prices.

II) Case Analysis: Primary Care Products Ltd

The use of decision support systems within Dispensing Practices for drug purchasing is rare. This is similarly the case within the pharmaceutical wholesale market. IT and decision support systems themselves are used within healthcare but there is very little in place to assist Practices when making drug purchasing decisions.

Pharmaceutical wholesales and drug purchasing is often a complex and guarded subject. In previous years drug distribution was highly profitable as the mark-up on drugs was high, but today this has changed because as acknowledged through the deductive research there is a greater need to control costs by the NHS. However wholesale is still extremely profitable.

Dispensing Practices have a wide variety of choice when making purchasing decisions. The prices of drugs can vary dramatically between the different wholesale suppliers despite the fact that the wholesale supply chain is relatively small with many of the supplies coming from the same sources. A big problem for Dispensing Practices is choosing a consistent wholesaler that offers not just cheap supplies but also a good, regular and reliable service, similar to any other wholesale or distribution service. Not all wholesalers stock the same products so most Practices will have a number of suppliers and one or two main suppliers that they do business with. Generally these suppliers are sometimes used based on convenience but also through established friendships, staff knowledge and supplier bias within the drugs market itself. A pricelist can also have a great impact simply because of the way it is designed and presented. This can be both positive and negative for a wholesaler but this is where Drug Representatives are needed by wholesalers, to break or promote Dispensing Practices buying habits and expand a customer base.

When it comes to maximising profitability within Dispensing Practices, most will not be receiving the best deal that wholesale can offer. Price checking is most certainly carried out by Practices between their selected wholesalers. Any price checking that is conducted is usually through wholesale pricelists provided to a Practice in a paper or electronic format (*See Appendix 3*). This checking is far from extensive in regards to all wholesale prices.

The process of comparing prices by pricelist is workable for small orders but larger ones can take a considerable amount of time, so price checking is only often done on particularly expensive items. Again any price checking that is done will not be fully representative of all current prices within wholesale just those few that each Practice usually does business with.

Dispensing Practice are interested in making savings when purchasing, however according to PCP the culture tends to be to not work overly hard in the process of doing this. The owners of Practices, who are usually GP's or other medical professionals certainly have an invested interest in purchasing decisions and drug costs but it is not them that usually take the responsibility of ordering because GP's are very busy in other areas of their Practice.

The drug purchasing role is usually left to one or a small number of Practice employees. This is also just one of their practice roles and there is unlikely to be any large incentives in place to encourage cheap strategic buying so it is difficult for them to justify the time and effort to purchase strategically. Most Practice employees that make the purchasing decisions are also unlikely to be fully aware of Practice profits made through drug purchasing as well. There are also no government targets to buying drugs strategically simply because the government has no stake in this area so Practices are left to make their own decisions and have very little outside pressure to

monitor this area extensively. These are all issues because without this knowledge it is difficult to identify where possible savings can be made based on previous buying habits. The problem with the current system is that many Dispensing Practices are missing out on major cost savings due to a lack of strategic thinking and this is the area PCP has tried to address.

PCP identifies potential cost savings of each individual Practice they do business with. This process involves data collection of a Practices purchasing of at least 3 months (*See Appendix 4*). By doing this PCP can establish an understanding of the average drug spending and profits made by each Practice as well as identifying where each drug was purchased. Based on this information PCP then makes a direct comparison with their product line against current suppliers using pricelists. This data is placed into a generic data analysis programme to provide a comparison (*See Figure 11*). This information is then provided to the Practice by Drug Representative and used as evidence to encourage and promote buying habits towards the company. Furthermore this information also helps PCP to remain competitive on price generally by enabling the company to identify which products in their range are the cheapest and most expensive.

PCP vs TEVA								
Description	Pack Size	PCP Price Dec 07	Packs	Total Price TEVA	TEVA per Pack	Total price PCP	Difference Teva/PCP	
TAMSULOSIN HYDRO 400mcg CAPS 30s	30	1.93	8	28.24	3.53	15.44	12.80	
TERAZOSIN 10mg TABS 28s	28	4.20	3	26.43	8.81	12.60	13.83	
TERAZOSIN 2mg TABS 28s	28	1.05	1	2.34	2.34	1.05	1.29	
TRAMADOL 50mg CAP 30s	30	0.43	20	27.00	1.35	8.60	18.40	
TRIMETHOPRIM 200mg TAB 14s	14	0.18	6	1.74	0.29	1.08	0.66	
WARFARIN 1mg TAB 28s	28	0.37	24	9.84	0.41	8.88	0.96	
WARFARIN 3mg TAB 28s	28	0.37	10	4.50	0.45	3.70	0.80	
WARFARIN 5mg TAB 28s	28	0.42	10	5.90	0.59	4.20	1.70	
ZOLPIDEM 5MG Tabs 28s	28	0.84	4	5.64	1.41	3.36	2.28	
ZOPICLONE 7.5mg TAB 28s	28	0.51	4	4.72	1.18	2.04	2.68	
Total				£1,830.06		£920.98	£909.08	
Discounted				£1,427.45				
inc VAT				£2,150.32		£1,082.15		
Difference				£1,068.17	on purchase			
Disc + VAT				£1,677.25				
Total Diff				£595.10				
x 12				£7,141.18	p.a			
Diff. ex vat				£506.47	pcm			
x 12				£6,077.60	real cash per annum			
Possible Savings Per Annum								

Figure.11: Price comparison/evaluation method used by Primary Care Products Ltd

The adoption of this simple method has provided PCP with a far greater knowledge of wholesale prices in general and has been a highly successful tool in identifying to Dispensing Practices where drug savings can be made throughout a supply range. From the table presented above these costs savings can sometimes be significant for a Practice. PCP has used this method as a way of trying to remain transparent in a market that often is not. Many of PCP's prices are not the cheapest and this method also highlights this, similarly as it does with PCP's competitors. This decision of transparency does have its risks as the tool can present a situation where a competitor's prices are cheaper but this tool would allow PCP to address this problem immediately which gives the company an upper hand when dealing with Practices.

Based on PCP's experience most Dispensing Practices are more interested in a product line that throughout the month or year provides best value for money overall. This is because as highlighted, Dispensing Practices generally stick to a small number of wholesalers. As a result PCP is not overly concerned if a number of their products are more expensive than their competitors as long as they represent a cheaper deal overall when a Practice makes an order. PCP highlights that generally Practices will not invest vast amounts of resources in shopping around for the best deals on each product.

Currently PCP's method only provides a snapshot of current prices of a small number of wholesalers and as a result it does not provide a true reflection of best price and is currently too simplistic. It could however be extended to incorporate a wide number of wholesalers that provide identical products. The difficulty of doing this as highlighted by PCP is that this method and process requires a great deal of time to maintain every month. A great amount of time is required to collect the data, firstly by getting hold of competitor's pricelists and then secondly plotting the data into a system for analysis. It was highlighted by PCP that not all data was accessible to the company. The data that is successfully collected cannot simply be placed into this system for direct comparison. This is because most data comes from a physical copy of a pricelist and any others collected in an electronic format are often formatted differently to each other. Whichever way the data is accessed there is an issue of compatibility, which means all the data needs to be plotted manually into an analysis system.

PCP currently does not have the capability to incorporate the comparative method to include all wholesalers, simply because it takes too long to set up and maintain independently and gaining access to all data is difficult. To add to the problem prices are always changing as most wholesalers produce a new pricelist on a monthly basis. Furthermore a lot of the information that is collected comes from Dispensing Practices themselves and the method PCP uses is highly reliant on the good will of Practices to

provide both their own purchasing data and a number of PCP's competitors pricing information. However the good will goes both ways because Dispensing Practices directly benefit by gaining greater knowledge from the comparative process PCP has adopted.

The use of this comparative process by PCP demonstrates that there is some requirement for more information on drug prices within wholesale itself. This is being proven by a wholesaler that has developed a simple way of assessing their drug prices against others. These methods are unlikely to be unique to PCP and many similar processes may be conducted by other wholesalers to establish a greater understanding of prices within the drugs market. This can only be confirmed however through further investigation.

This case demonstrates that prices can vary greatly between wholesalers and there is a greater need within the industry itself to establish effective methods to price match against other competitors. This variation of drug prices can be clearly identifiable by comparing a small number of wholesaler pricelists. PCP's method helps to improve pricing transparency to some extent which has had a positive impact on some Dispensing Practices monthly purchasing decisions but only on those that PCP does business with. Even with this assistance PCP is still just a wholesaler itself so it is unlikely a Dispensing Practice is making the best decisions from where to purchase drugs.

As a true decision support system the method PCP uses fails to provide enough information on all wholesale prices and is not appropriate to be used extensively in a Dispensing Practice environment simple because it is too simplistic and requires a great amount of time to keep up to date. For it to be used extensively within a Dispensing Practice environment it would need to be far more extensive and user-friendly. It must

however not be taken out of context. This system used is small and is currently functioning within a wholesale environment by PCP, which means the system itself is open to manipulation because it has primarily been adopted as the company's knowledge and strategic sales tool, which is what it was intended to be used for, rather than in the context of mainstream Dispensing Practice purchasing.

PCP's case also highlights a major issue with data collection in general. If a decision support system was to be developed appropriately data would need to be transferred quickly and easily on a monthly basis in order to keep prices up to date. This issue was discussed with an experienced IT programmer and software engineer at the Open University. He believed that there would be a requirement to gain access to all data in the same format for ease of transfer. This would be difficult to do without wholesaler co-operation. It could only be realistically achieved if a strong case was developed, providing each wholesaler with a tangible reason and direct benefit of providing the required data to develop a decision support system.

From a wholesalers perspective it may not be in their best interest to compete even more extensively on price, particularly for smaller wholesalers as price itself may not be the ultimate factor for drug purchasing. This factor similarly needs to be taken into consideration when considering a decision support system. PCP believes a main problem of decision support implementation in general would be the wholesalers themselves or wholesale environment rather than Dispensing Practices because it is ultimately them that hold the comparative data required and without their support a truly effective support system would be difficult to implement.

III) Case Description: OCT Direct Ltd

OTC Direct sell drugs to both Dispensing Practices and Pharmacy. OTC Direct is one of the three main short line wholesalers within the UK. This wholesaler specialises in supplying an extensive range of Generic, Parallel Import medicines as well as supplying a wide range of UK surgical equipment nationally and providing it on a next day delivery service. OTC now has an integrated IT system which provides the potential for Dispensing Practices to make more informed purchasing decisions.

IV) Case Analysis: OCT Direct Ltd

A major problem that Dispensing Practices experience when purchasing drugs is a genuine lack of transparency on pricing. For a Dispensing Practice to receive the best deals on drugs from wholesale it involves a lot of work for a Dispensing Practice. This work load simply cannot be accommodated by Practices. The difficulty is that there are so many suppliers, which equates to a lot of competition and Drug Representatives must work very hard in order to secure regular sales.

Each Practice will experience a number of Drug Representative visits every month including a number of telesales calls. Although a Practice has a wide choice of drug sources the current methods can cause confusion and ambiguity when it comes to best purchasing decisions. Furthermore a Practices decision to buy from a wholesaler is not always price related as suggested through the deductive research. A number of aspects contribute to a Dispensing Practices decision to buy such as service, delivery and convenience. For a Practice these aspects are similarly important today as price.

There are other aspects such as educational hospitality i.e. corporate hospitality wrapped within an educational process that plays an influencing role. Similarly a Drug Representative also plays a hugely influential role simply through their personality and how he or she portrays themselves in front of the customer or the sales technique they use. These factors today really should not play a part in purchasing decisions as these factors provide very little benefits to cost savings or profit making for Dispensing Practices and simply complicates the decision making process for healthcare professionals. These issues are still very much cultural within the industry and are simply part of the process of drug selling in the UK.

If a decision support system was to be implemented this would remove any negative influences to purchasing decisions. However it would be important for a support system to also take into consideration other relevant factors that helps to form a good decision when purchasing, these factors are not always price related.

In comparison to Primary Care Products, OTC Direct is a much larger wholesaler and is one of the main short line wholesalers within the UK. However similarly to PCP they use a similar method for assessing their competitor's wholesale prices (*See Figure 12*). This provides an even greater indication that wholesalers do have systems in place to make greater assessment of pricing within their environment.

1	Product Description	Strength	Pack	Price	Order	TEVA	TEVA	OTC	TEVA	%
2			Size	OTC	Qty	Price	Total	Total	-0.25	Diff
640	Warfarin Tabs	3 mg	500	£3.29						###
641	Water for injection BP Amps	2 ml	10	£1.24						###
642	Water for injection BP Amps	10 ml	10	£2.14						###
643	Zolpidem Tabs	5 mg	28	£0.59						###
644	Zolpidem Tabs	10 mg	28	£0.55						###
645	Zopiclone Tabs *	3.75 mg	28	£0.57	4	1.18	4.72	2.28	3.54	207
646	Zopiclone Tabs *	7.5 mg	28	£0.52						###
647							2,348.53	1,656.63	1,968.08	
648	OTC TOTAL at invoice	1,656.63								
649	TEVA TOTAL at invoice	2,348.53								
650	Difference at invoice	691.90								
651	TEVA TOTAL-25%	1,968.08								
652	Difference after discount	311.45								
653	Difference per annum	3737.43								

Figure.12: Price comparison/evaluation method used by drug sales representative at OTC Direct Ltd

As part of a current marketing strategy OTC Direct now shares information with Prescribing.org (See Figure 13). This website and small business is the brainchild of an East Midlands Dispensing Doctor called Julian Brown. Julian Brown developed this website to improve the level of transparency of drug prices for Dispensing Doctors. As a Dispensing Doctor himself and involved in drug purchasing he was becoming increasingly frustrated with the current method of price checking.

Prescribing.org was created a number of years ago developed to incorporate a new decision support system that would be accessible to Dispensing Doctors to improve their decision making when purchasing medicines. OTC Direct is directly linked into this system as well as a number of other large wholesalers who are similarly interested with the concept. The decision support system remains up to date and active due to wholesaler funding. This funding is received by Prescribing.org through a percentage of wholesale profits made through the system itself. Pricing data is sent by the wholesalers on a regular basis which keeps the system up to date. Dispensing Doctors and Practices themselves can access the system for free once they are affiliated with Prescribing.org.



Welcome to **PRESCRIBING** .org

This website is for authorised dispensing doctors only.
Anyone attempting unauthorised access will be considered for appropriate legal action.



Login	
Username:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Login"/>	

If you have forgotten your username or password or are having difficulties logging on please [click here](#).

Contact Information	
Alliance Healthcare	
Telephone:	0800 032 2454
Email:	Customer.IT@alliance-healthcare.co.uk
Office hours are: Monday to Friday 08:00 - 17:00	
Prescribing.org	
Telephone:	0844 991 0064
Email:	enquiries@Prescribing.org
Office hours are: Monday to Thursday 09:00 - 17:00, Friday 09:00 - 16:00	
Please feel free to contact us at anytime.	

Figure.13: Prescribing.org website & decision support system for Dispensing Doctors
(Prescribing.org, 2009)

This new system shows great potential and could greatly improve the way drugs are purchased for Dispensing Practices. A Practice can now be directed towards Prescribing.org by an affiliated wholesaler or wholesale representative. However it was highlighted by the drug representative that promoting a wholesaler, prices and its product range was still conducted through traditional methods and the use of Prescribing.org was used as a last resort on most occasions. This is because a sales pitch is highly successful for promoting sales. The use of the comparison system through Prescribing.org provided an opportunity for customers to make greater assessments towards best price and ultimately a better decision but it also created greater risk of a Sales Representative losing a sale if a competitor's price was more appealing. As a result Prescribing.org was used by Sales Representatives only when a sale was at risk, a Dispensing Practice needed convincing and when a Sales Representative was sure his/her prices were most cost effective.

If a customer logged onto Prescribing.org they will be provided with an option to select the drug that is required. In doing this a list of suppliers will appear displaying their prices in a clear format. This allows a customer to compare prices from OTC Direct against a small range of other suppliers. The test account image below illustrates this (See Figure 14).

The screenshot shows the 'Drugs: Choose Suppliers' page on Prescribing.org. The page has a navigation bar with links like Home, Ordering, Info, Companies, Stats, Settings, Messaging, Feedback, and Log out. Below the navigation bar, there are tabs for '1. Current Order', '2. Choose Suppliers', 'Order Status Messages', and 'Order Tracking'. The 'Choose Suppliers' tab is active, showing a table of drugs with columns for Drug, Pack size, OTC, and Qty. The table lists several drugs including Amoxicillin, Clopidogrel, Levothyroxine, and Simvastatin. A red arrow points from the 'Closing bell for last orders: 5:30pm' text to a red oval containing the text 'Other supplies & prices'. The oval also contains logos for Pfizer, TEVA, and AAH.

Drug	Pack size	OTC	Qty
Minimum order values: £100			
Subtotals: £78.32			
Top Up order: Top Up			
Closing bell for last orders: 5:30pm			
Cheapest combination Select			
Preferred combination Select			
Amoxicillin (Amoxicillin Cap)	21	£0.36 Out of stock	10
Clopidogrel tab	28	£27.81	2
Levothyroxine (Thyroxine)	28	£1.14	10
Levothyroxine (Thyroxine)	28	£0.39	10
Levothyroxine (Thyroxine)	28	£0.39	10
Simvastatin	28	£1.75	2
Subtotals: £78.32			
Minimum order values: £100			

Figure.14: OTC Direct test account (Prescribing.org, 2009)

This case provides a strong indication that a decision support system could be used to improve the decisions of Dispensing Practices over where drugs are purchased. However it is still in its early stages and only a small number of wholesalers are affiliated with the system. This is a similar case with Dispensing Doctors and/or Practices. As a result the system currently is not extensive enough and it is not currently being used by all Dispensing Practices. Because this system does not provide information on all wholesalers it fails to provide all the available prices on offer for Practices which is essential in order to make the most informed decision when purchasing medicine.

If this system was to develop and incorporate a higher percentage of wholesalers it could become a highly usable and common electronic tool for Dispensing Practices, greatly reducing ambiguity of drug pricing and potentially change the way drugs are bought from suppliers. From a Dispensing Practice perspective this could be highly beneficial and allow each drug to be purchased independently from the cheapest source but only if the government do not make any drastic changes to their drug reimbursement agreements in the near future.

There is still a high risk that many wholesalers would refuse to become affiliated with this system for a fear of greater competition on price but with larger wholesalers already involved these wholesalers could be at a far greater risk if they were to fail to affiliate themselves with the system as seen with many of the web based price comparison systems. Despite a small number of wholesalers who are affiliated with Prescribing.org the system its self is not used as extensively as a sales tool as it could be, simply because it creates greater risk to sales from a wholesaler's perspective.

In contrast to other market sectors that have embraced web based decision support systems for price comparison e.g. insurance, customers have used decision support system's so extensively as their primary method of deciding where they purchase goods and services, competitors are forced to become involved. This has improved price transparency greatly for customer's and decision making overall. As highlighted in the deductive research however very few of the comparison systems hold the complete information on all prices which prevents them from being 100% reliable. Despite this, substantial savings can still be made if used as an assisted tool.

A particular issue highlighted within this case however was that not all purchasing decisions are simply made on price alone with other factors playing an important part such as, service, delivery and convenience. These issues are not taken into consideration through this decision support system. A difficulty with this is measurability. How do you measure such things as service, delivery and convenience? An obvious method as seen in other decision support systems as highlighted through the deductive research would be through a development of a rating system, which has been commonly used in other decision support systems or IT purchasing methods such as Ebay and Amazon. This process could only be effective given time and co-operation from customers i.e. Dispensing Practices to experience a wholesalers overall service and then share this experience with others. Based on this view the variety of issues such as service, delivery and convenience could add greater value to a decision support system overall rather than create greater complexity.

Chapter 5: Questionnaire Analysis & Discussion

In chapter 5 the results of the questionnaire will be discussed. 28% of the Dispensing Practices targeted from within the Centre and East of England responded to the questionnaire. 72% of the sample came from large Practices whilst 28% of the responses came from small Practices. Together they represent 1.3% of all Dispensing Practices and represent 1.5% of the Dispensing Practice Patients in the UK.

The findings from question 1 of the questionnaire identified that most Dispensing Practices did not have a decision support system in place (*See Figure 15*). These findings concur with both the interviews and deductive research. These findings could suggest that a decision support system should be developed within a Dispensing Practice environment. From the research it was clear that a small number of Practices were using a limited in-house decision making tool i.e. a comparative spreadsheet.

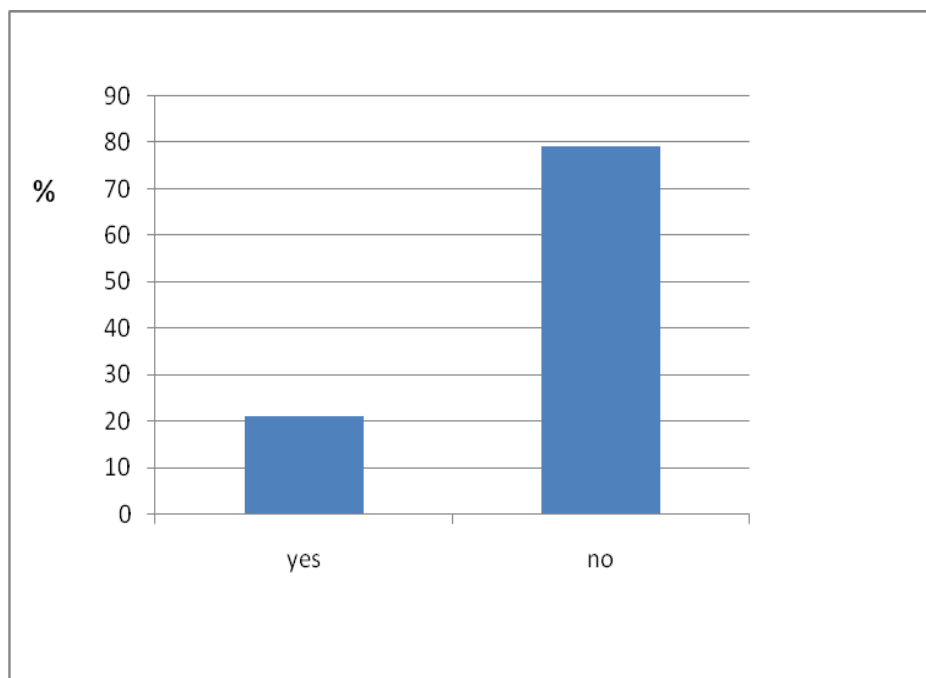


Figure.15: Graph to show the percentage of Practices claiming a decision support system in use

The findings from question 2 (See Figure 16) identified that a small number of drug suppliers were used by Dispensing Practices. None of the respondents used more than 6 suppliers when purchasing medicines for their Practice. These findings are again in accordance with the information provided from interviews. The data indicates that Practices only use a small number of suppliers.

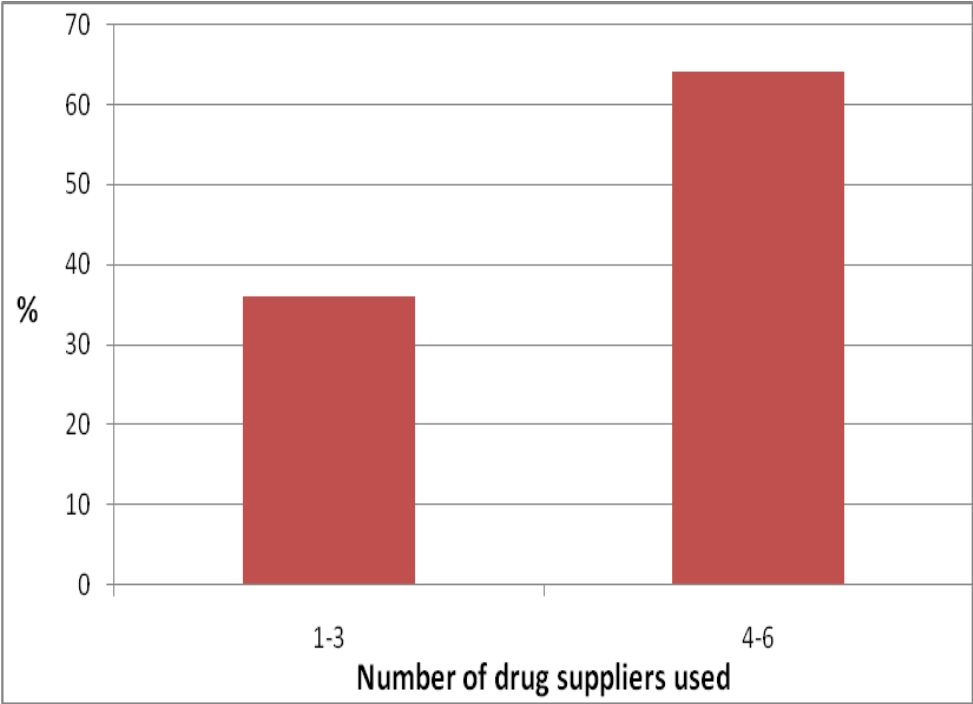


Figure.16: Graph to show the number of drug suppliers used by sample Practices

The findings from question 3 of the questionnaire identified that F. Maltby & Sons Ltd, Phoenix Healthcare Distribution Ltd & AAH Pharmaceuticals Ltd were the most popular main drug suppliers to the sample (See Figure 17). Many respondents used more than one main wholesaler for their drugs supply.

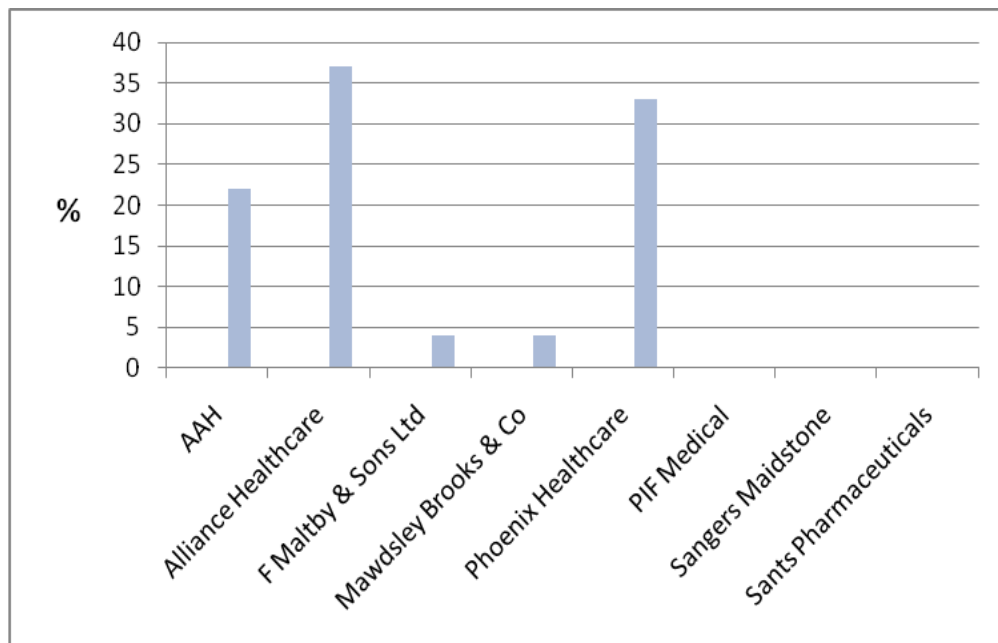


Figure.17: Graph to show which main British Association of Pharmaceutical Wholesalers (BAPW) were used by sample group

It was identified that the monthly drug expenditure varied between the Dispensing Practice samples (See Figure 18). The findings from question 4 were expected due to the different patient list size of each Practice. By using the data from question 5 it was possible to establish that in most cases 70% of Dispensing Practice expenditure was spent with their main suppliers. This suggests very little cross purchasing is carried out by Practices. Again the findings are in accordance with the information presented from the interviews. Furthermore and in accordance with the other research findings, 28% of respondents did not know their monthly expenditure altogether. Although this was expected the overall percentage was higher than anticipated. This lack of knowledge by the drug purchasers in regards to their working environment is surprising. Without this

knowledge on monthly drug costs it is difficult to establish how drug purchasers and Practices can improve and become more efficient within this area of the Practice. This lack of knowledge must be detrimental in enabling future learning and improvement.

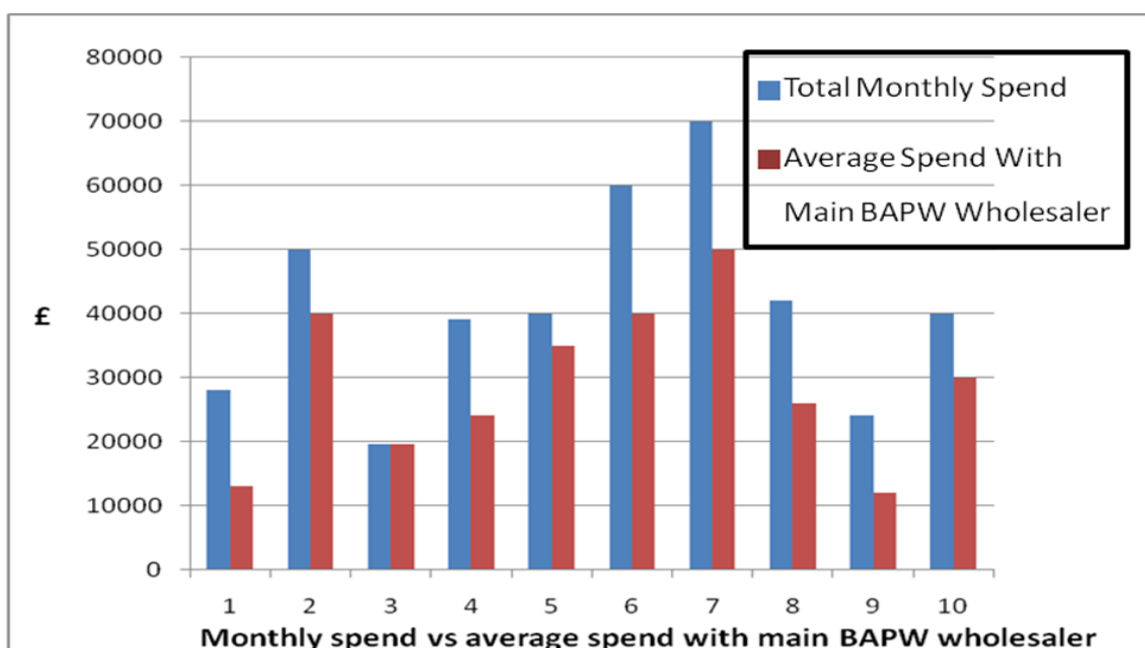


Figure.18: Graph to show monthly average spend against average spend with main BAPW suppliers

The findings suggest a lack of cost control but it is difficult to establish why. Again based on the interviews conducted this could be as a result of the current working culture within these Dispensing Practices. Furthermore there may be a lack of incentives in place within many of the Practices which may prevent an incentive to buy more strategically. These findings also provide some indication that the desire within Dispensing Practices to control their costs when buying medicine is a relatively low priority generally.

The findings from question 6 (See Figure 19) identified that both brands and generics are bought from main suppliers, 79% of the sample identified that this was the case. This does not indicate that brands and generics are always bought from the same suppliers but provides an indication to their buying trend in general. It was identified from the data from question 7 (See Figure 20) that 35% of the sample of Practices buys generics from only one source. This source would be a BAPW wholesaler. 29% of the sample, buy from two sources, 29% of buy from three sources and 7% buy from five sources.

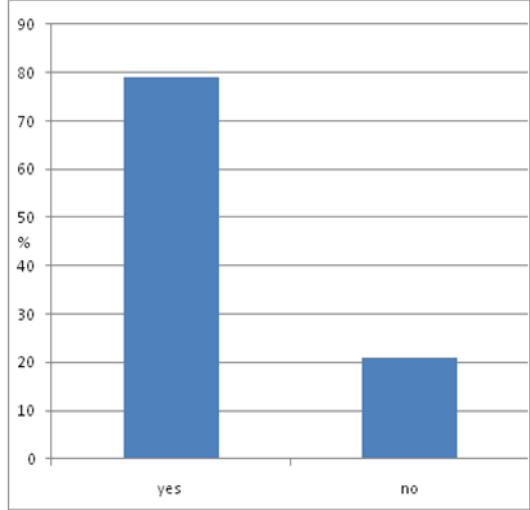


Figure.19: Percentage of Practices buying brands and generics from the same supplier

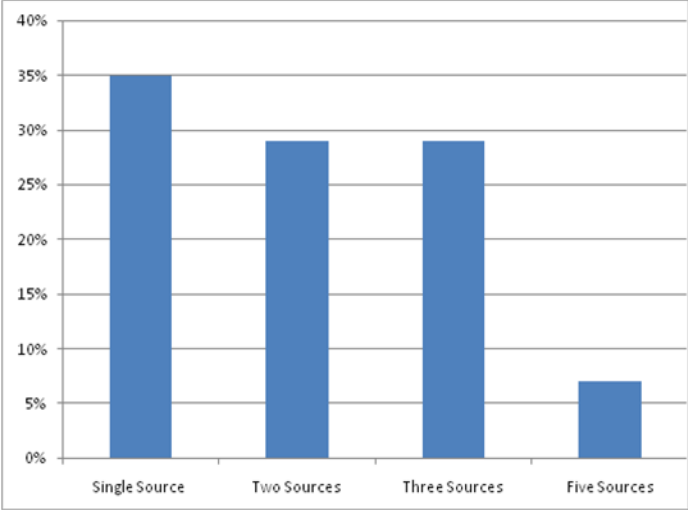


Figure.20: Percentage of Practices buying from wholesaler sources

These findings provide full indication that Dispensing Practices only use a small percentage of the available wholesalers on offer in the UK for their medicine supplies. Furthermore the current sources used could potentially be main BAPW wholesalers, which could suggest buying culture is highly based on convenience and simplicity rather than cost effectiveness. These results again fall in line with the findings from the interviews conducted.

The findings from question 8 (*See Figure 21*) identified that not all Dispensing Practices buy parallel imports. The data indicates that half of the Practices may be missing an economic opportunity to reduce their costs and maximise profits through the use of this method of purchasing. Similarly to generics, as discussed in the deductive research, parallel imports are rarely the most convenient sources of drugs but often highly cost effective when the economic environment is right.

It is difficult to accurately identify from this research why a large percentage of Dispensing Practices do not exploit this method. It is suggested however, that the added workload of dealing with parallel imports such as relabeling and instilling patient trust in the drugs plays a large factor in the decision making process. It is also important to acknowledge that not all suppliers supply parallel imports, which may also remove the choice of using them altogether for many Practices, particularly those who stick rigidly to a small supply base.

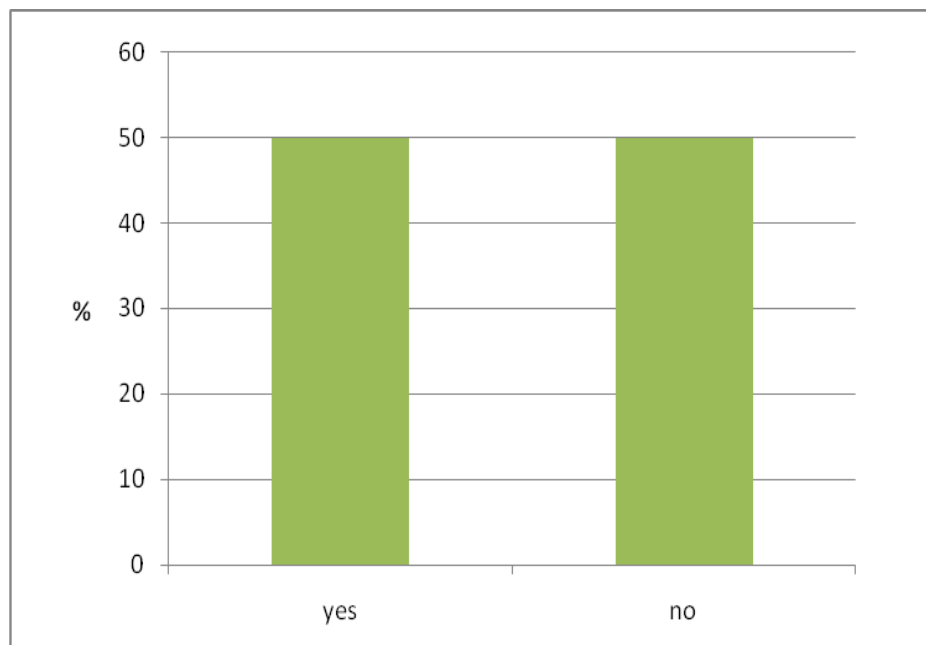


Figure.21: Graph to show percentage of Practices buying parallel imports

The findings from question 9 were in concurrence with the findings from the deductive research. The majority of Practices are utilising technology with the use of electronic purchasing systems (*See Figure 22*). These findings suggest that for most Practices the use of technology within the process of buying medicines is a relatively standard practise. Practices do use electronic tools to assist them in their processes with their working environment. These findings look relatively positive regarding cultural reaction towards the use of a decision support system, however the results do not provide an indication to the length of time it would take for electronic tools to be implemented into standard working practice.

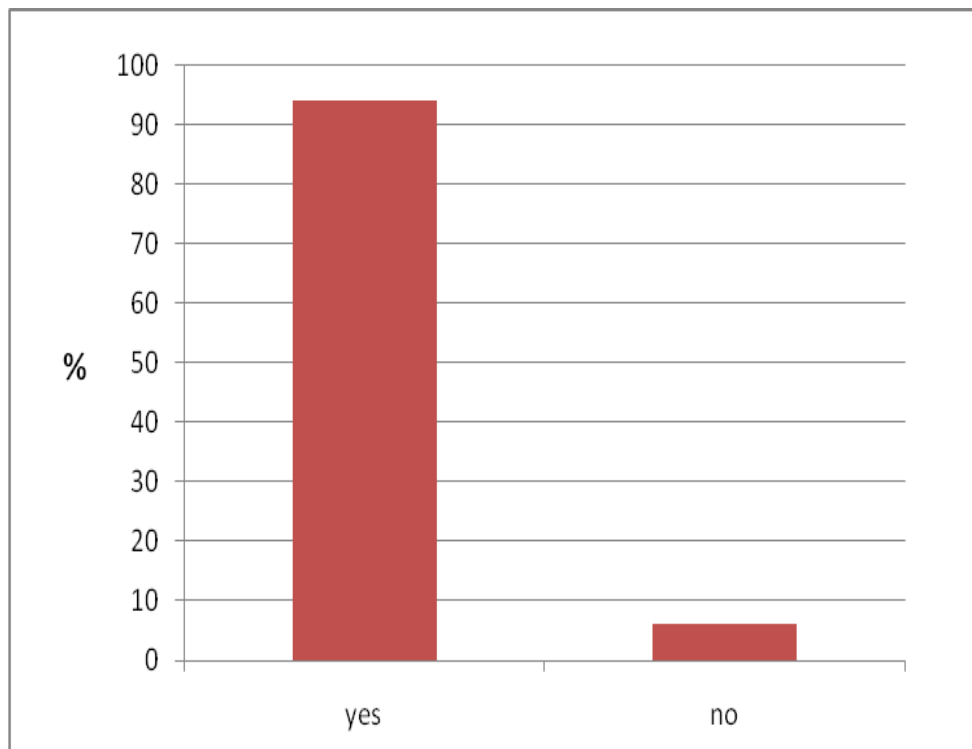


Figure.22: Graph to show percentage of Practices buying through electronic purchasing system

Question 10 (See Figure 23) identified that most Dispensing Practices do not buy from Drug Sales Representatives directly. This result was identical to the results found from question 11 (See Figure 24) regarding tele-sales operations.

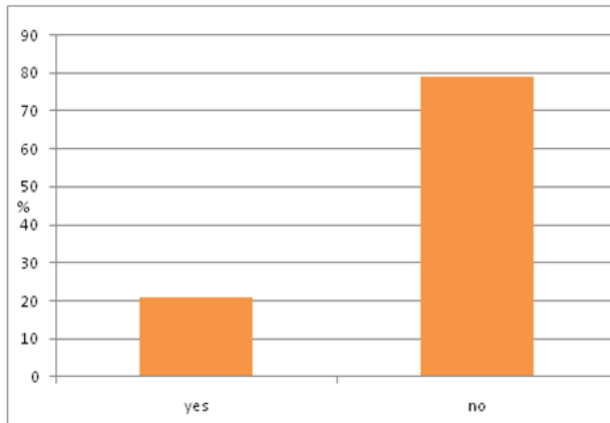


Figure.23: Graph to show percentage of Practices buying from Drug Sales Representatives

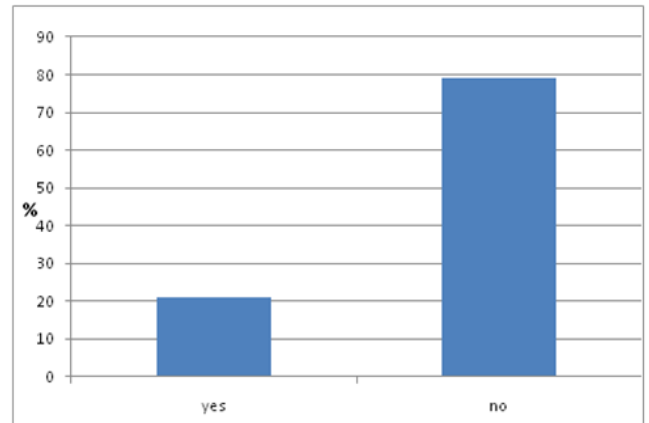


Figure.24: Percentage of Practices buying from tele-sales operations

These findings could indicate that many Practices have a buying process in place which prevents them from buying from inconsistent or irregular sources and may explain why many Practices only buy from a small variety of suppliers. This view does however require further investigation.

The data from question 12 (See Figure 25) identified that many Dispensing Practices do compare pricelists. Based on the results from the samples from question 13 (See Figure 26) those Practices that do make price comparisons only do so against a very small number, from 1-3 in most cases.

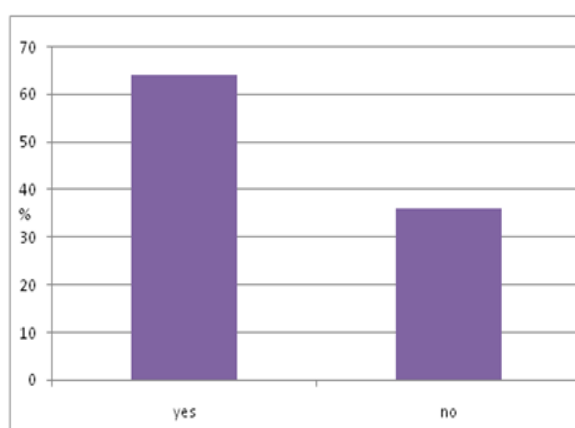


Figure.25: Percentage of Practices Comparing Pricelists

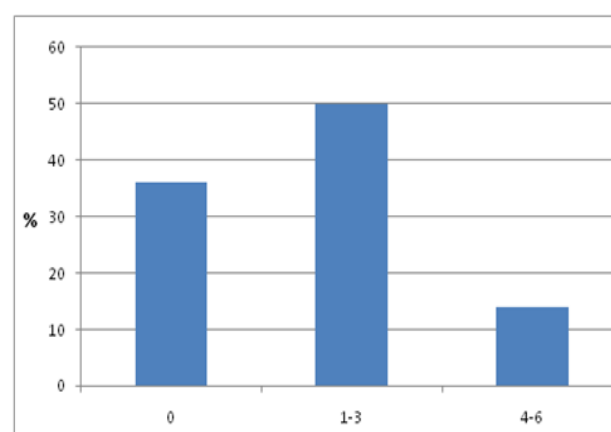


Figure.26: Percentage of Practices Comparing numbers of pricelists

These findings indicate that very little price comparing is carried out extensively by Dispensing Practices and suggest that it may only be done between the small number of select suppliers used by each Practice.

The data from question 14 (See Figure 27) identified that the perception of time comparing prices for drugs was not as expensive as initially believed. However based on the findings above (See Figure 26) the number of pricelists that are confirmed by the sample to be compared is relatively small, which may explain why the perception of time spent comparing drugs was not regarded as very expensive by the sample.

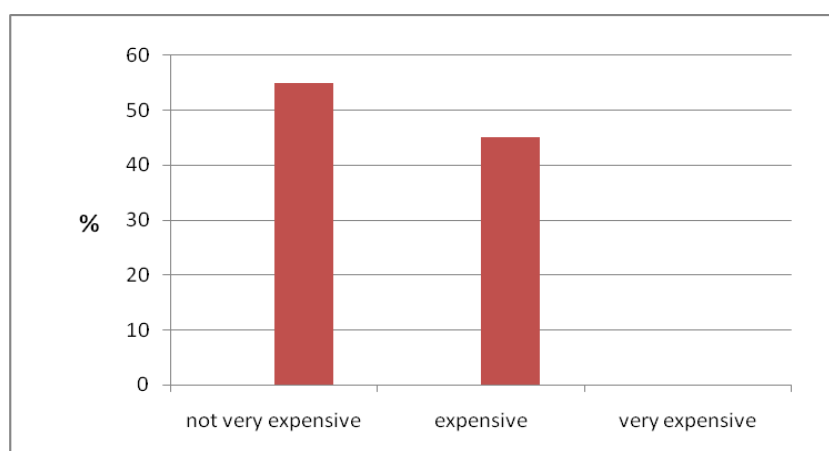


Figure.27: Graph to show Practices perception of time spent comparing prices for drugs

Question 14 tried to engage a drug buyer's perception of cost in regards to their time spent purchasing drugs for their Practice, which was open to interpretation by the respondents. If the respondents purchasing drugs were GP's they may have found the process of drug comparing expensive due to the fact that the purchasing role may be one of their many duties. A Practice employee however may find the process far less time expensive depending on their job role and the amount of time they had each day to invest in buying medicine.

It was found from the data that most drug purchasers did not find the act of price comparing time expensive however 45% believed that there was an element of expense to the process. It was suggested in the first interview with a drug supplier that this process, if done thoroughly and extensively took a substantial amount of time. The results provided conflicting information to that which was provided from the interview. Again based on the information presented above (*See Figure 26*) this perception may be as a result of only a few comparisons actually taking place which would explain why 55% of respondents believed that the act of comparing prices presented little expense to time overall.

Question 15 (*See Figure 28*) was produced to help identify a drug purchaser's rationale when it came to buying medicines. It was found that as previously believed price was important when purchasing drugs, however not all drug purchasers from the sample believed it to be important. Quality, rebate and delivery were just as important as price. Service itself was deemed even more important than price. These results were not unexpected based on the information received from the interviews.

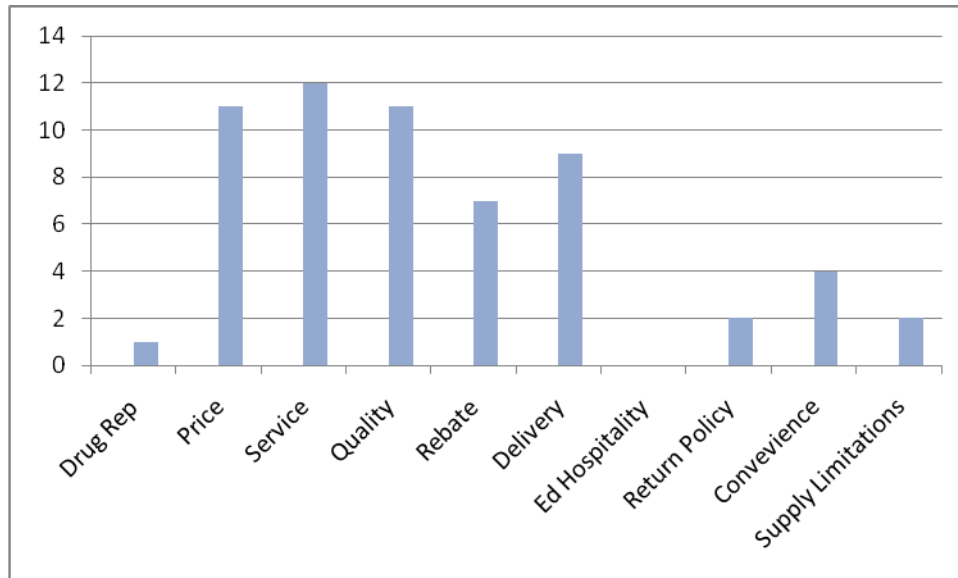


Figure.28: Graph to show score for reasons to buy from a supplier

From data provided from question 16 it was identified that service, quality and price were the top priorities for drug purchasers when selecting sources of medicine. This suggests that buying rationale is not solely related to price alone however this is perhaps not as dissimilar to other forms of purchasing rationale as seen in a wide variety of areas. A further interesting finding was that Drug Representatives had a low influence when it came to decision making. This provides further conflicting findings from the interviews as it was presented that Sales Representatives were highly influential within the process of drug purchasing. These results could suggest that Representatives do influence buying decision but simply in a more in-direct way.

Convenience, similarly to Drug Representative did not score as highly as expected. However from previous data established from the questionnaire, convenience does appear to play a highly influential factor based on the rationale that only a small number of drug suppliers are used by Dispensing Practices; very little price comparing is conducted and most purchasing that is conducted is most likely to be between only their main BAPW suppliers.

The data from question 17 provided some interesting findings in regards to the level of knowledge drug purchasers have of their working environment. The rationale for this question was to engage a drug buyers understanding of their Practices profit making potential as well as establishing how much opportunity there was to improve the current profit situation from the buying and supplying of medicine.

It was identified through question 17 (*See Figure 29*) that 72% drug buyers did not know how much profit was being made through drug dispensing. These findings are again in agreement with the information from the interviews. Again it is difficult to establish how a Practice can make possible improvements to their buying decisions without this knowledge and suggests a lack of communication between the buyers and Practice owners or managers.

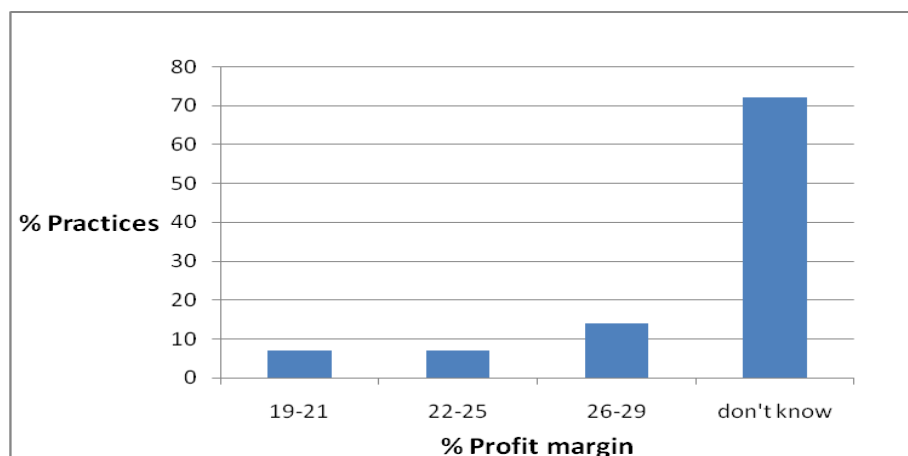


Figure.29: Graph to show profit margin made through the dispensary

Based on the information provided by a chartered accountant at Grant Thornton, discussed in the deductive research, it was identified that their customer Practices were making on average 32% gross margin from drug dispensing. Most of this study sample falls below this expectation based on the results from drug purchasers who had the information. This result suggests that Practices have far greater potential to increase their profit margins.

The findings from question 18 (See Figure 30) identified that 43% of Dispensing Practices would consider using a decision support system within their buying environment, however 43% did not know the answer to this question. It is believed that many of the respondents may not have known the answer to this question because they may not have had the authority within the Practice to provide a trustworthy perspective on this subject in question.

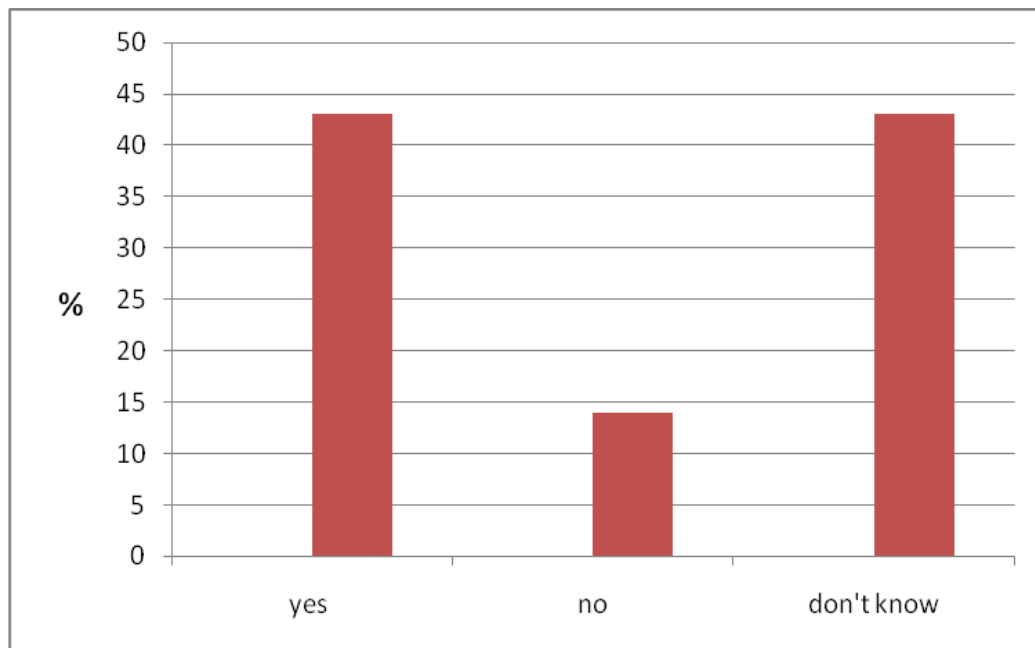


Figure.30: Graph to show Percentage of Practices who would consider using a decision support system

14% of the sample believed they would not consider using a decision support system. This response may have formulated for a number of reasons. A drug buyer may believe their current decision process is acceptable and change is not required. This response could also indicate some cultural resistance. These suspicions could be confirmed through a more qualitative approach through further research.

Question 19 was developed to establish if Dispensing Practices would consider investing financially in a decision support system. The results to this question (See *Figure 31*) were mixed. Many did not know the answer to this question which could be as a result of similar factors discussed in question 18. 29% would purchase or subscribe to a decision support system whilst the other 29% would not.

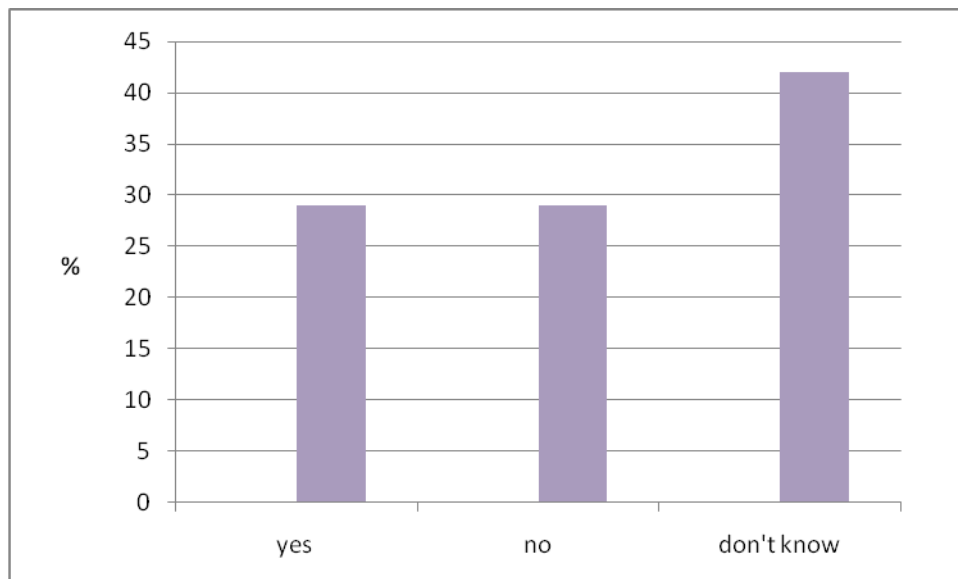


Figure.31: Graph to show percentage of Practices who would purchase or subscribe to a decision support system

These results suggest that careful consideration would need to be made as to how to implement the use of a decision support system. The data would suggest that Dispensing Practices would need to be convinced as to the potential offerings a decision support system could bring to drug purchasing and as to how it would be delivered as a tool.

Chapter 6: Conclusions & Further Studies

I) Concluding Discussion

Based on the research undertaken the findings indicate that a decision support system could be used by Dispensing Practices to improve their decisions over where drugs are purchased. A decision support system could be used to enable best practise of purchasing medicine. However this conclusion needs to be interpreted by the reader with some degree of caution.

It is proposed that a decision support system could be used by Dispensing Practices to improve decision making as to where drugs are purchased by providing the opportunity for healthcare professionals to make far greater comparisons between suppliers than the current methods dictate. There are concerns however as to the true effectiveness and reliability when providing the user with decisions

A decision support system could only be truly effective and reliable if complete data was available on all prices throughout the drugs market. Without complete data similar issues regarding reliability will be experienced as identified through many web based price comparison systems. Similarly to these systems there is a reliance on data from external sources. Access to data would be highly reliant on drug suppliers. There are concerns that compliance from these suppliers would be limited without incentives in place.

The current trading conditions favour many of the drug suppliers particularly for the larger wholesalers because it controls competition and maintains a far more predictable market. Similarly the level of ambiguity on drug pricing has to some extent reduced the level of accountability of those with the role of buying medicine for Dispensing Practices.

The research indicates that many buyers of medicine are not buying strategically enough with many proven buying methods failing to be fully utilised by buyers. Buyers appear to often lack fundamental knowledge not just on drug pricing but on wider aspects regarding their Practice environment. Without this knowledge many buyers are unable to maximise their Practices profits because they have no understanding as to where they are or where they can improve.

The lack of knowledge and true understanding of the Dispensing Practice environment and wholesale market means that many drug buyers simply cannot buy strategically which brings into question the effectiveness of a decision support system within their buying process. Many Practices would surely benefit and utilise such a support system, whilst others may not.

Buyers place great value on many different factors when making purchasing decisions and so a consideration also has to be made to the rationale of buying medicine by Dispensing Practices. The research established that price alone was not the sole factor when purchasing medicine from sources, which could impact on the effectiveness of a support system. However based on other support systems these factors can be taken into consideration and add greater value when providing support to the users.

As seen from many web based price comparison systems the greatest offering from a decision support system within an environment of buying medicine would be the increased levels of price transparency for Practices. Within an environment where little price checking is conducted, any system in place which promotes greater price awareness would be highly beneficial within Dispensing Practice. This is why a decision support system could be used to enable best practise of drug purchasing. It could be used as tool for healthcare professionals making the buying decisions where currently there is little support.

Both the current economic and healthcare environment provides the ideal opportunities to use more technological support to reduce costs and improve efficiency. Despite this however there are some difficulties. Within wholesale greater transparency for buyers of medicine could promote greater competition between suppliers and may force them to rethink their business strategies, changing the market altogether. As with all major changes to business environments, there would be both winners and losers. A decision support system would give a buyer within Dispensing Practices greater purchasing power but also greater accountability within their job role. This greater accountability would encourage better buying decisions but may also weaken the buyer's autonomy.

Culturally health professionals have purchased based on intuition, established friendships and relationships, staff knowledge and supplier bias. With the use of a decision support system there would be greater pressure for these health care professionals to justify their decisions much more effectively. The move towards the user of a price comparison system may provide a more even playing field within the wholesale market itself.

II) Further Studies

As a feasibility study the research undertaken has helped to form the foundation to greater knowledge both within the field of academia but also within primary care. Further investigative research would contribute and build upon the research undertaken. The study will conclude by highlighting a number of research areas of interest which could form further future studies.

The impact of culture within Dispensing Practices needs to be assessed much further. Practitioners need to be engaged to a greater extent and more in-depth, utilising multiple research methods to further identify issues and barriers towards the implementation of a decision support system within a Practices buying environment. Part of this strategy for further engagement with practitioners should include the owners of Practices, Dispensing Doctors.

Greater engagement with wholesalers also needs to be conducted to assess the level of support for information sharing on pricing data. Further investigation needs to be conducted to establish the impacts a decision support system could have on the environment of drug suppliers and whether the industry could benefit through greater knowledge sharing and transparency. Changes within the wholesale market should also be investigated to assess the future delivery of drug supply to primary care and the impacts on the NHS as a whole.

As financial pressure on the NHS continues to grow a greater understanding needs to be established regarding the future procurement of funding for primary care and whether the same funding opportunities will remain attainable in the near future for Dispensing Practices.

Lastly, Pharmacy could also be another potential beneficiary of a decision support system within drug purchasing. Further research assessing the Pharmacy environment should be conducted to identify where knowledge based tools could be developed and whether a similar concept proposed for Dispensing Practice could be adopted within their environment.

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Appendices

Appendix 1: NHS Authorities prescribing/cost control information for Dispensing Practices

Appendix 2: Questionnaire

Appendix 3: Drug wholesale pricelists (Sandoz/Phoenix October 2007 & KwikPharma October 2007)

Appendix 4: Practice purchasing data

Appendix 1: NHS Authorities prescribing/cost control information for Dispensing Practices

Cost Control Email

FOR THE ATTENTION OF ALL GPS, NURSE PRESCRIBERS, PRESCRIPTION CLERKS AND COMMUNITY PHARMACISTS We are advising practices that all prescriptions for mebeverine 135mg tds are changed to Colofac M/R 200mg bd due to the current shortages of mebeverine - see below for details. We are happy for this switch to be maintained long term, as Colofac M/R is less expensive than generic mebeverine (one of the many bizarre consequences of Cat M). Practices will not be penalised against their generic % for prescribing by brand in this case.

This action will alleviate supply problems for patients and save the PCT about £34K per year.

I have drafted a template patient letter that you may wish to use or adapt.

<<Mebeverine letter.doc>>

sent on behalf of
Sue Smith
Associate Director Pharmacy Policy & Prescribing

The Use of Medicine Criteria

TRAFFIC LIGHT SYSTEM - DOUBLE RED/RED/AMBER/GREEN/GREY

Criteria for inclusion of medicines on one of the traffic light lists, or for moving medicines between lists will be determined in the first instance by:

- Evidence base for clinical and cost effectiveness
- Clinical responsibility
- Patient safety
- Ensuring appropriate usage
- Ensuring efficient usage (clinical and cost)
- Willingness to provide shared care information
- Availability of suitable monitoring mechanisms in general practice
- Patient convenience and preference

In particular, attention will be paid to the introduction of new drugs, new uses of existing drugs and drugs whose use is under review in terms of shifting from predominantly being a drug normally prescribed within secondary care to a drug normally prescribed within primary care.

DOUBLE RED

These are medicines that are less suitable for prescribing and are not recommended in primary or secondary care due to the lack of good evidence for clinical- or cost-effectiveness, or due to the availability of more suitable alternatives. These medicines will not be included in the PCT Prescribing Guidelines or the Hospitals Trust Formulary and are not available in secondary care.

RED and AMBER 'Specialist' medicines'

A specialist medicine is likely to be one that has significant pharmacological complexity and rarity of use, or the indication for its use requires specialist investigation, and therefore requires specialist knowledge for diagnosis, monitoring, dose adjustment and/or further evaluation, which makes the prescribing of the medicine relatively uncommon in the community. Specialist medicines can be subdivided into RED and AMBER

RED

These are medicines that should be initiated by specialists only and prescribing retained within secondary care; a GP would not normally be expected to have the clinical knowledge to undertake this specialised care, even with the provision of written guidelines. Therefore, GP initiation or continuation of treatment of RED medicines is not recommended.

Medicines **may** be included in the red list because they:

- are unlicensed, ie products unrelated to any other licensed medicines on the UK market and may include clinical trial products and products without a UK licence because they have been suspended, revoked or not renewed.
- are only available through the Hospital Trust
- are part of a hospital Trust initiated clinical trial
- are not available on FP10
- require intravenous administration
- require long-term on-going specialist monitoring of efficacy
- require long-term on-going specialist monitoring of toxicity (difficulty in recognising side effects or high cost/availability of investigations to identify toxicity)
- are specifically designated 'hospital only' by product licence or by the DoH.
- are a specialist medicine being used for a novel unlicensed indication for that medicine (not described in BNF or BNF for children)
- are new, or are an older medicine with a new indication, where there is at present no experience of use in general practice

Classification of a medicine under the Red List does not preclude the drug being administered by a health professional in the community, for patient convenience. The organisation and management of the administration service should be from the hospital but may be provided by an outside agency that has entered into an agreement with the hospital.

AMBER

Broadly, a specialist medicine may be classified as amber if it is not normally prescribed by GPs, but the GP would normally be clinically competent to undertake associated specialised care if provided with appropriate guidelines, while the specialist initiating the treatment retains responsibility for monitoring the progression of the condition being treated. The amber category can be split into two sections, defined as follows:

AMBER 1: These are medicines that require significant monitoring and should be initiated by specialists only. Prescribing may be transferred, normally after specialist initiation and patient stabilisation and with prior consent, to a GP under a shared care agreement.

The request to share care should be made by the hospital consultant using the Shared Care Request Letter. If a Trust-approved shared care protocol (accessed via the HNN intranet site) is not available, then the letter should be accompanied by written interim guidelines.

AMBER 2: These are medicines that require little or no monitoring by the GP, but should be prescribed in general practice only after specialist referral and initiation.

The request to share care should still be made by the hospital consultant using the Shared Care Request Letter, but a shared care protocol is not required as little or no monitoring is required. However, GPs must still be provided with the required information by the hospital consultant; the duration of treatment must be specified and the possible consequences of treatment that would necessitate stopping treatment must be identified.

Medicines may be included in the amber list because they:

- require short or medium term specialist monitoring of efficacy
- require short or medium term specialist monitoring of toxicity (difficulty in recognising side effects or high cost/availability of investigations to identify toxicity)
- are rarely used, such that individual GPs are unlikely to see sufficient patients and acquire a working knowledge of the drug
- require specialist assessment to enable patient selection and initiation of treatment

GREEN

These medicines are appropriate for initiation in both primary and secondary care. Prescribing is appropriate within licensed or local recommendations

GREY

This is a holding category for drugs that have not been formally assessed by NPAG and awarded a traffic light designation. Grey medicines, or those not included elsewhere, are those that NPAG has not assessed for therapeutic use and prescribers should refrain from prescribing where possible.

REVIEW

The Traffic Light System is a dynamic tool to allow review and reclassification of medicines as evidence becomes available, which may be at the request of other bodies.

NPAG will review, or return to their author for review, all protocols and interim guidelines in accordance with the pre-determined review dates.

RED LIST

Factors to be taken into considerations when deciding whether a medicine should be included in the red list:

- Is the GP truly taking full clinical responsibility for a patient's treatment? eg if monitoring is performed within secondary care and not by the GP it would normally be inappropriate for the GP to prescribe unless the GP took responsible for ensuring that monitoring had occurred before each new prescription is issued (eg DMARDs = AMBER 1)
- New medicines still marked with a black triangle, ie there is limited experience of use of the product; prescribing should perhaps remain in secondary care unless there is experience in the use of older medicines in the same class to which the newer medicine belongs that may indicate the appropriateness of use in primary care.
- New, specialised medicines should only move into primary care when a shared care protocol (if wide usage expected) or interim guidelines (if limited use) have been provided by the consultant for that indication and the opportunity for training provided if required.
- Patients attending the hospital frequently for complicated treatments and specialist investigations, and the consultant needs to monitor progress
- The convenience of the patient and in the patient's best interest
- Circumstances where GPs justifiably refuse to take clinical responsibility

AMBER LIST

- The GP must have a role in the care of the patient that is justifiable in terms of improvement in patient care and proper use of the GP's expertise. For medicines that they prescribe, GPs should have sufficient expertise to stop or restart treatment, or alter the dosage of the medicine appropriately as under the terms of the shared care arrangement described in the shared care protocol.
- It would generally be inappropriate for a GP to refuse to take clinical and prescribing responsibilities for an individual medicine where shared care for that medicine has become common practice and where a shared care protocol has been approved by MMCC and NPAG.
- Where a dispute arises, the PCT Senior Pharmacist and the Director of Pharmacy will be consulted to seek a resolution. If a dispute arises over an invitation to share care, the Shared Care Request Letter should be returned to the consultant and copied as instructed. However, if a dispute arises over a request to prescribe, the Traffic Light Referral Letter should be returned to the consultant and copied as instructed.
- If a GP or consultant breaks the terms of the shared care agreement, resolution should be sought via the PCT Senior Pharmacist and the Director of Pharmacy

Traffic Lights/Shared Care

The Traffic Light/Shared Care system has been developed by the Northamptonshire Prescribing Advisory Group and has been agreed by Kettering and Northampton General Hospitals, Northamptonshire Healthcare NHS Trust and Northamptonshire Teaching PCT.

The aim is to facilitate consistent transfer of prescribing across the primary and secondary care interface. It will guide both hospital and general practice doctors regarding which medicines may safely be prescribed in primary care and which should continue to be prescribed in secondary care.

Further information about this area can be found in the Traffic Light Explanation document (link available on right).

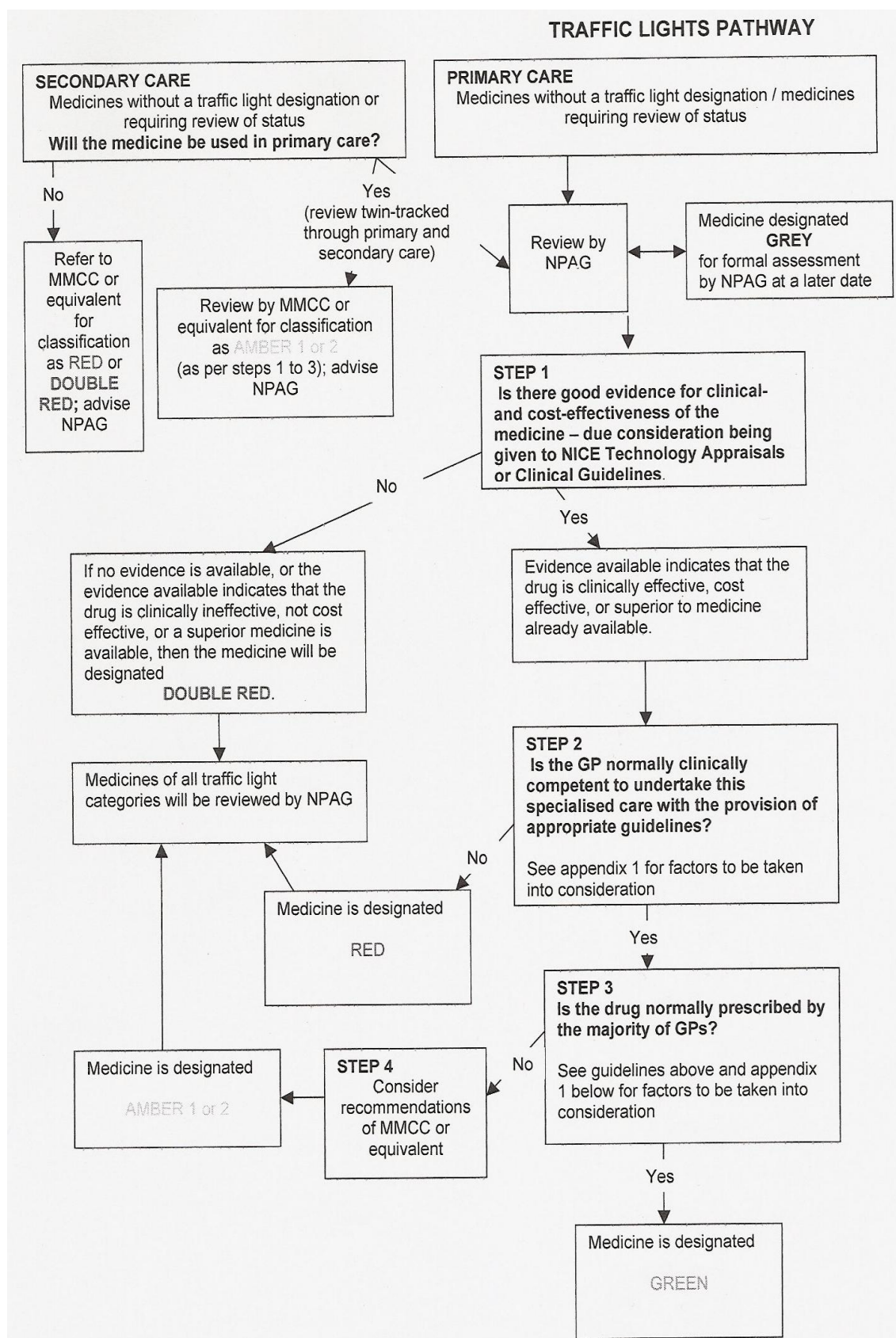
status	drug	bnf	sci
■	Acitretin	13 - Skin	
■	adalimumab	10 - Musculoskeletal / joint disorders	
■	adalimumab	1 - GI - Chronic bowel disorders	
■ ■	Aliskiren	2 - CV	
■ ■	Alitretinoin	13 - Skin	
1	Apomorphine	4 - CNS	
1	Atomoxetine	4 - CNS	
1	Azathioprine	10 - Musculoskeletal / joint disorders	
1	Azathioprine	13 - Skin	
1	Azathioprine	8 - Malignant disease / immunosuppression	
1	Azathioprine	1 - GI - Chronic bowel disorders	
■	Basiliximab	8 - Malignant disease / immunosuppression	
1	Bicalutamide	8.3.4 - Prostate cancer	
■	Bosentan	2 - CV	
■	Botulinum toxin	4 - CNS	
2	Buprenorphine (Subutex)	4 - CNS - Drug dependency	
1	Busulfan	8 - Malignant disease / immunosuppression - cytotoxic	
1	Cabergoline	4 - CNS	
2	Cabergoline	6 - Endocrine	
1	Chlorambucil	8 - Malignant disease / immunosuppression - cytotoxic	
1	Chlorambucil	10 - Musculoskeletal / joint disorders	
1	Ciclosporin	10 - Musculoskeletal / joint disorders	
1	Ciclosporin	13 - Skin	
1	Ciclosporin	1 - GI - Chronic bowel disorders	
1	Ciclosporin	8 - Malignant disease / immunosuppression	
2	Cilostazol	2 - CV	
■	Clomiphene	6 - Endocrine - IVF	
■	clopidogrel 300mg	2 - CV	
■	Clozapine	4 - CNS	
■ ■	colesevelam	2 - CV	
1	Cyclophosphamide	8 - Malignant disease / immunosuppression - cytotoxic	
1	Cyclophosphamide	10 - Musculoskeletal / joint disorders	
1	Cyproterone	8.3.4 - Prostate cancer	
■	Cytomegalovirus	5 - Infections	

1	Cytotoxics (chemotherapy) - IV	8 - Malignant disease / immunosuppression
1	Cytotoxics (chemotherapy) - oral	8 - Malignant disease / immunosuppression
1	Daclizimab	8 - Malignant disease / immunosuppression
1	Dalteparin	2 - CV
1	Dapsone	10 - Musculoskeletal / joint disorders
1	Darbepoetin alfa	9 - Nutrition and Blood
	Deferiprone ? adults only	9 - Nutrition and Blood
1	Desferrioxamine - paediatrics	9 - Nutrition and Blood
	Desloratadine	3 - Respiratory
1	Dexamfetamine	4 - CNS
2	Dihydrocodeine	4 - CNS - Drug dependency
	Disodium pamidronate	6 - Endocrine
1	Donepezil	4 - CNS - Alzheimers
1	Donepezil	4 - CNS - LD
1	Dornase alfa	3 - Respiratory
	Doxazosin M/R	2 - CV
	Duloxetine	4 - CNS - diabetic neuropathic pain
	Duloxetine	7 - O & G
2	Duloxetine	4 - CNS - depression
	Efalizumab	13 - Skin
	Eflornithine cream	13 - Skin
1	Enoxaparin	2 - CV
1	Erythropoetin	9 - Nutrition and Blood
	Escitalopram	4 - CNS
1	Estramustine phosphate	8 - Malignant disease / immunosuppression - cytotoxic
	Etanercept	10 - Musculoskeletal / joint disorders
	Etanercept	13 - Skin
	Ethambutol	5 - Infections - TB
2	Exenatide	6 - Endocrine
	Exforge	2 - CV
tb	Febuxostat	10 - Musculoskeletal / joint disorders
	Fentanyl buccal tablet (Effentora)	4 - CNS - Pain
	fesoterodine	7 - O & G
	Filgrastim	9 - Nutrition and Blood
1	Fluorouracil	8 - Malignant disease / immunosuppression - cytotoxic
1	flutamide	8.3.4 - Prostate cancer
1	Galantamine	4 - CNS - Alzheimers
1	Galantamine	4 - CNS - LD
	Glatiramer	8 - Malignant disease / immunosuppression
	Glucosamine hydrochloride (Alateris)	10 - Musculoskeletal / joint disorders
1	Gold (auranofin)	10 - Musculoskeletal / joint disorders
1	Gold (myocrisin)	10 - Musculoskeletal / joint disorders
	Gonadotrophins	6 - Endocrine
	Goserelin	6 - Endocrine - IVF
1	Goserelin	8.3.4 - Prostate cancer
2	Goserelin	8.3.4 - Breast cancer
2	Goserelin	6 - Endocrine - Endometriosis
	Grazax (oral grass pollen vaccine)	3 - Respiratory
1	Hydroxycarbamide	13 - Skin
1	Hydroxycarbamide	8 - Malignant disease / immunosuppression - cytotoxic
1	Hydroxychloroquine	10 - Musculoskeletal / joint disorders
	Ibandronic acid IV	6 - Endocrine
	ICaps (and other similar preps for AMD)	9 - Nutrition and Blood
	Imatinib	8 - Malignant disease /

■	Immunoglobulins IV	immunosuppression - cytotoxic
■ ■	Inegy	14 - Vaccines
■	Infliximab	2 - CV
■	Infliximab	10 - Musculoskeletal / joint disorders
■	Infliximab	1 - GI - Chronic bowel disorders
■	Interferon alfa	13 - Skin
■	Interferon beta	8 - Malignant disease / immunosuppression
■	Isoniazid	8 - Malignant disease / immunosuppression
■	Isotretinoin - oral	5 - Infections - TB
2	Lanreotide	13 - Skin
2	Lanreotide	8.3.4 - Acromegaly
tbc	Laraglutide	8.3.4 - neuroendocrine tumors
1	Leflunomide	6 - Endocrine
■	Lenograstim	10 - Musculoskeletal / joint disorders
■	Leuporelin	9 - Nutrition and Blood
2	Leuporelin	6 - Endocrine - IVF
2	Leuporelin	6 - Endocrine - Endometriosis
1	Leuporelin	6 - Endocrine - precocious puberty
■ ■	Levocetirizine	8.3.4 - Prostate cancer
2	Lidocaine patch (Versatis)	3 - Respiratory
■	Linezolid	4 - CNS - Pain
1	Lithium	5 - Infections
2	Melatonin	4 - CNS
2	Melatonin m/r 2mg (Circadin)	4 - CNS - Hypnotics. Sleep disorder
2	Memantine	4 - CNS - Hypnotics. Sleep disorder
1	Mercaptopurine	4 - CNS - Alzheimers
1	Mercaptopurine	8 - Malignant disease / immunosuppression - cytotoxic
1	Mesna	1 - GI - Chronic bowel disorders
2	Methadone	8.1 - cytotoxic-induced side-effects
1	Methotrexate (oral)	4 - CNS - Drug dependency
1	Methotrexate (oral)	10 - Musculoskeletal / joint disorders
1	Methotrexate (oral)	13 - Skin
1	Methotrexate (oral)	1 - GI - Chronic bowel disorders
■	Methotrexate injection ? adult use	8 - Malignant disease / immunosuppression - cytotoxic
■	Methotrexate injection ? paed use	10 - Musculoskeletal / joint disorders
1	Methylphenidate	10 - Musculoskeletal / joint disorders
1	Minocycline	4 - CNS
■	Molgramostim	10 - Musculoskeletal / joint disorders
1	Mycophenolate	9 - Nutrition and Blood
1	Mycophenolate	10 - Musculoskeletal / joint disorders
1	Mycophenolate mofetil	1 - GI - Chronic bowel disorders
2	Naltrexone	8 - Malignant disease / immunosuppression
■	Natalizumab	4 - CNS - Drug dependency
■	Non-nucleoside reverse transcriptase inhibitors	8 - Malignant disease / immunosuppression
■	Nucleoside reverse transcriptase inhibitors	5 - Infections
2	Ocreotide	5 - Infections
2	Ocreotide	8.3.4 - Acromegaly
■	Omalizumab	8.3.4 - carcinoid tumors
■ ■	Oxycodone + naloxone combined (Targinact)	3 - Respiratory
■ ■	Paliperidone	4 - CNS - Pain
1	Palivizumab	4 - Antipsychotic drugs
■	Peginterferon alfa	5 - Infections
		8 - Malignant disease /

	Peginterferon alfa	immunosuppression
1	Penicillamine	1 - GI - Chronic bowel disorders
	Pentamidine	10 - Musculoskeletal / joint disorders
	Perindopril arginine	5 - Infections
	Perindopril arginine with diuretic	2 - CV
2	Pimecrolimus ointment	2 - CV
	Pramipexole	13 - Skin
tbc	Prasugrel	4 - CNS- RLS
	Pregabalin (for Generalised Anxiety Disorder)	2 - CV
	Protease inhibitors	4 - CNS
	Pyrazinamide	5 - Infections
tbc	Qlaira	5 - Infections - TB
	Quetiapine XL (Seroquel XL)	7 - O & G
	Ranolazine	4 - CNS
	Refinamide	2 - CV
	Ribavirin	4 - CNS
	Rifampicin	8 - Malignant disease / immunosuppression
	Rifater	5 - Infections - TB
	Rifinah	5 - Infections - TB
1	Riluzole	5 - Infections - TB
	Rimactazid	4 - CNS
1	Rivastigmine	5 - Infections - TB
1	Rivastigmine	4 - CNS - Alzheimers
1	Rivastigmine patch (Exelon)	4 - CNS - LD
	Ropinirole	4 - CNS - Alzheimers
	Rupatadine	4 - CNS- RLS
	Sekivar (olmesartan / amlodipine)	3 - Respiratory
1	Sevelamer	2 - CV
	Sildenafil	9 - Nutrition and Blood
1	Sirolimus	2 - CV- pulmonary arterial hypertension
	Sodium clodronate injection	8 - Malignant disease / immunosuppression
1	Somatropin	6 - Endocrine
	Spatone	6 - Endocrine
1	Stilboestrol	9 - Nutrition and Blood
	Suboxone	8.3.4 - Prostate cancer
1	Sulfasalazine (e/c)	4 - CNS - Drug dependency
1	Sulfasalazine (plain)	10 - Musculoskeletal / joint disorders
1	Tacrolimus	1 - GI - Chronic bowel disorders
2	Tacrolimus ointment	8 - Malignant disease / immunosuppression
tbc	Tadalafil	13 - Skin
	Teriparatide	7 - Drugs for erectile dysfunction
2	Tinzaparin	6 - Endocrine
	Tobramycin (inhaled)	2 - CV
1	Tolcapone	5 - Infections
	Tramadol + paracetamol combined (Tramacet)	4 - CNS - Parkinson's Disease
1	Triptorelin	4 - CNS
tbc	Vildagliptin	8.3.4 - Prostate cancer
	Viral hepatitis	6 - Endocrine
	Zoledronic acid IV	5 - Infections
		6 - Endocrine

Medicine Use Protocol



Methods of Cost Control

Prescribing Incentive Scheme 2009/10 - "Going Green Crib Sheet"

The following will give you a very brief summary of what you need to do to help you go / remain green on each indicator. For further detail please read "The Rationale and Evidence Base behind the Cost Minimisation Indicators"

Ulcer-healing costs NIC per 1000 STARPU

- Use generic omeprazole (capsules) or lansoprazole (not Fastabs) as your PPIs of choice
- Avoid esomeprazole, pantoprazole and rabeprazole
- Step down and / or stop PPIs where possible

Angiotensin II antagonist items as % of total renin angiotensin drug items

- Only use A2RAs if ACEs are not tolerated.

Simvastatin and pravastatin as % of all statin items

- Use simvastatin (preferably 40mg) as your statin of choice
- If increasing the statin dose, use simvastatin 80mg

Rosuvastatin costs NIC per 1000 STARPU

- NICE guidance indicates only a very limited place for rosuvastatin
- Use simvastatin as above

Ezetimibe costs NIC per 1000 STARPU

- Only use ezetimibe as per NICE guidance i.e. a fairly limited role – statin intolerance, familial hyperlipidaemia and "consider" in type 2 diabetes with existing CV disease or albuminuria

Clopidogrel costs NIC per 1000 STARPU

- Follow local and national (NICE) guidance on clopidogrel use
- Ensure that practice clinical systems are annotated with when clopidogrel needs to be stopped for each patient eg 12 months after NSTEMI
- In the case of GI intolerance use aspirin plus omeprazole 20mg capsules rather than clopidogrel

Antibiotic items per 1000 STARPU

- Try to reduce inappropriate antibiotic use for viral or self-limiting infections
- Consider using delayed prescriptions as per NICE guidance

Cephalosporins and quinolones as % of all antibiotic items

- Where possible, the use of these antibiotics should be avoided, especially in patients with risk factors for *C. difficile* infection.

Blood glucose testing strips NIC per 1000 ASTROPU

- Ensure that patients with type 2 diabetes who are not on insulin are using blood glucose testing appropriately and that, if they are doing it, they understand why and what to do with the results

NSAIDs ADQ per STARPU

- Reduce the volume of NSAID prescribing ie the number of people taking NSAIDs and the duration of prescriptions

Diclofenac costs per 1000 STARPU

- Diclofenac 150mg per day appears to be associated with CV risk similar to coxibs
- IF an NSAID is necessary, use ibuprofen (<1200mg per day) or naproxen instead of diclofenac.

"Double red" drugs NIC per 1000 ASTROPU

- Do not initiate those drugs which have been categorised by NPAG as "not recommended for prescribing"
- Refer any requests to prescribe from secondary care to your prescribing adviser

Fluoxetine, citalopram and sertraline as % of all "SSRI and related antidepressants"

- Use fluoxetine or citalopram as the first-line antidepressants
- Use sertraline for patients with CHD

Amlodipine as % of all dihydropyridine calcium channel blocker items

- Use amlodipine as your first-line dihydropyridine calcium channel blocker.

Salazopyrin EN (branded) as % of all sulfasalazine EC items

- Prescribe enteric coated Salazopyrin as brand NOT generic

Examples of Successful Cost Control



Tablet Press



The prescribing newsletter for GPs, nurses and pharmacists in
Northamptonshire Primary Care Trust

Issue 33

June 2009

- **National Audit Office report on prescribing cost efficiency**

Northamptonshire came 10th out of 152 Primary Care Trusts for the level of prescribing savings achieved in 2008, spending over £5million less than would have been the case if work in four key therapeutic areas had not been undertaken.

The National Audit Office report "Prescribing costs in primary care", published in May 2007, was accompanied by potential savings that PCTs could achieve, without affecting patient outcomes, through a more consistent use cost-effective medicines in four therapeutic areas – statins, PPIs, clopidogrel and ACEs/ARBs.

At the end of 2008 the Department of Medicines Management at Keele University was commissioned to calculate the actual savings that PCTs had achieved. The savings were calculated by comparing each PCT's actual expenditure, in the four therapeutic areas considered, with what the PCT would have spent, if the relative proportions of different medicine formulations prescribed in the 12 month period August 2005 to July 2006 (the benchmark for the NAO report) had remained the same during 2008.

The savings calculated represent savings that have been obtained through changing prescribing patterns, rather than changing prices for medicines, over the time period considered.

There are some caveats around the way the savings were calculated and also around PCTs' starting positions, but there's not much doubt that this is an impressive result for us.

http://www.nao.org.uk/publications/0809/prescribing_savings_in_2008.aspx
- **Better Care, Better Value Indicators**

The NHS Institute for Innovation and Improvement has introduced the following new Better Care, Better Value prescribing indicators for PCTs. These are largely based on the NAO report indicators, as above:

 - Increasing low cost prescribing for lipid modification
 - Increasing low cost proton pump inhibitor prescribing.
 - Increasing low cost prescribing for drugs affecting the renin-angiotensin system.

All these indicators are covered by the PCTs Prescribing Incentive Scheme and we score fairly well on all 3 markers, but particularly well on the ACE marker, where we are 7th out of 152 PCTs.

Data for quarter 3 2008/09 is now available for these indicators.

<http://www.productivity.nhs.uk/RenderReport.aspx>
- **ACEIs are still first line choice for diabetic nephropathy**

Dr Warren Pickering, renal physician at NGH, attended the last NPAG meeting to discuss the role of ACEIs and ARBs in diabetic nephropathy. It was strongly agreed by the group that there is no evidence to suggest moving away from the current NICE guidance (CG73) on CKD, which states -

 - Treat with ACE inhibitors first; move to ARBs only if ACE inhibitors are not tolerated.
 - Inform of the importance of reaching the optimal dose, and of monitoring to achieve this safely.
 - Titrate ACE inhibitors/ARBs to the maximum tolerated therapeutic dose before adding a second-line agent.
 - Test eGFR and serum potassium before treatment starts and repeat after 1–2 weeks of treatment and after each dose increase.
- **Glyceryl Trinitrate ointment for Anal Fissures.**

In the last 12 months the PCT spent over £37,000 on glyceryl trinitrate ointment for anal fissures. Practices are reminded that, where possible, this should be prescribed as glyceryl trinitrate 0.4% ointment, which will be dispensed as the proprietary product "Rectogesic" and costs £32.80 for 30g, rather than glyceryl trinitrate 0.2% which has to be made as a "special" and may cost up to an astonishing £350 for 20g.

The Rationale and Evidence Base behind the Cost Minimisation Indicators

For 2009-10 the cost minimisation indicators are:-

- Ulcer-healing costs NIC per 1000 "Gastrointestinal STARPU"
- Angiotensin II antagonists as % of total renin angiotensin drug items
- Generic simvastatin and pravastatin as % of all statin items
- Clopidogrel costs NIC per 1000 "Cardiovascular STARPU"
- Antibiotic items per 1000 "Infections STARPU"
- Blood glucose testing strips NIC per 1000 ASTROPU
- NSAIDs ADQ per STARPU
- "Double red" drugs NIC per 1000 ASTROPU
- Fluoxetine, citalopram and sertraline as a % of "SSRI and related antidepressants" items
- Amlodipine as % of all dihydropyridine calcium channel blocker items
- Cephalosporins and quinolones as % of all antibiotic items
- Diclofenac costs per 1000 "NSAID STARPU"
- Salazopyrin EN (branded) as % of all sulfasalazine EC items
- Rosuvastatin costs NIC per 1000 "Cardiovascular STARPU"
- Ezetimibe costs NIC per 1000 "Lipid-regulating STARPU"

The indicators will be measured quarterly using the previous 3 month's data, except for the antibiotic (x 2) and double red markers, which will be based on the previous 12 month's data to avoid seasonal variations.

Ulcer-healing drugs

- This indicator is intended to promote regular review of ulcer-healing drug therapy in line with the NICE guidelines on dyspepsia¹.
- Generic omeprazole (as capsules) is the PCT PPI of choice. Esomeprazole is particularly expensive.
- It is less expensive to prescribe 2 x 20mg omeprazole capsules than it is to prescribe 1 x 40mg.
- Lansoprazole Fastabs are expensive and should be reserved for patients with PEGs or swallowing difficulties.
- Generic prices are subject to some instability due to Category M. For this reason it will be necessary to keep the targets for this indicator under review throughout the year.
- Despite the generic price decreases, ulcer-healing drugs still cost the PCT over £2.5 million in the last year and very large numbers of people take these drugs. Reviewing these patients and stopping or stepping down treatment, where appropriate, is probably just as important as the choice of drug.

- Consider a review of PPI use in patients who have regular courses of antibiotics (e.g. patients with COPD) because evidence suggests that these may be linked with the development of diarrhoea associated with *Clostridium difficile*.

Angiotensin II antagonist items as % of total renin angiotensin drug items

- ACE inhibitors are the renin-angiotensin system blocking drugs of choice.
- Angiotensin II antagonists should only be used where an ACE inhibitor is not tolerated, usually due to cough^{2,3}.
- ACE inhibitor-induced cough is typically dry, non-productive and worse when lying down.
- There is no evidence that angiotensin II antagonists are preferred to ACE inhibitors in patients with type 2 diabetes with microalbuminuria or proteinuria^{4,5}.
- NICE Hypertension guidance advises that ACE inhibitor induced cough may occur in up to 20% of cases and therefore the green target has been set at this level. It should be remembered that not all of the coughs will be ACE inhibitor induced; for example, heart failure may in itself cause cough. Discontinuation rates in trials have been 1-10%.⁶
- There is no evidence to support co-prescribing of ACE inhibitors and angiotensin II antagonists in hypertension and only weak evidence in heart failure^{7,8}, (in the CHARM – Added study⁹, mean doses actually achieved were considerably less than even the lower target doses in the NICE Heart Failure guideline) although this dual use may occasionally be seen in patients with chronic renal failure. However, this is likely to be a very small proportion of total angiotensin II antagonist prescribing and should not unduly affect the overall position of a practice within this marker. Any practice that considers that secondary care-led dual prescribing for renal failure or heart failure is affecting their overall rating in the scheme, would be considered favourably as an appeal, if a practice-based audit supported this view.
- ACE inhibitor induced cough is not dose-related^{10, 11}. There is no evidence that if more patients are titrated up to higher doses of ACE inhibitors that more cough will occur requiring substitution with an angiotensin II antagonist.

Simvastatin and pravastatin as % of all statin items

- The main aim of this indicator is to maintain and increase the level of simvastatin 40mg prescribing.
- NICE recommends¹² using simvastatin 40 mg as first-choice statin for primary prevention in people at 20% or greater 10-year cardiovascular disease (CVD) risk. In primary prevention, **no specific lipid targets** are given (i.e. a “fire and forget” approach).
- Simvastatin 40 mg is also recommended as first-choice statin for secondary prevention. According to the full guideline (page 190), modelling suggests that titration with simvastatin 80 mg could be **considered** for secondary prevention patients whose total cholesterol does not decrease to less than 4 mmol/L as long as titration stops at simvastatin 80mg. More than half of patients will not attain these levels and modelling suggests that it is not cost-effective to try to take more patients to a 4mmol/L target using higher cost statins such as atorvastatin or rosuvastatin.
- **Does NICE recommend a lipid target of 4 mmol/L (total cholesterol) and 2 mmol/L (LDL cholesterol)?** No, it does not. In primary prevention no lipid targets are given at all – simvastatin 40 mg is the first-choice drug with the option to use a lower dose “or [an] alternative preparation such as pravastatin” if there are potential drug interactions, or simvastatin 40 mg is contraindicated. No further monitoring is recommended by NICE (although, pragmatically, monitoring may be required for purposes of the QoF).
- In secondary prevention, simvastatin 40 mg is also the first-choice drug, with pravastatin as the named alternative. Clinicians are advised to **consider** increasing to simvastatin 80 mg in secondary prevention patients if a total cholesterol of less than 4 mmol/L or an LDL-cholesterol of less than 2 mmol/L is not attained. However, this should take into account the patient’s informed preference, comorbidities, multiple drug therapy, and the absolute benefit and risks of treatment. The evidence from trials of high-dose statins in stable CVD (**TNT**¹³ and **IDEAL**¹⁴) suggest only limited benefits from high-dose treatment, but an increased risk of side effects. NICE also suggests that “a drug of similar efficacy and acquisition cost” to simvastatin 80 mg could be considered. However, only higher-dose atorvastatin has clinical outcome data but its acquisition costs are substantially greater at present.

- An 'audit' level of total cholesterol of 5 mmol/L is recommended by NICE for assessing progress in populations or groups of people with CVD. This is in recognition that more than half of patients will not achieve a total cholesterol of less than 4 mmol/L or an LDL-cholesterol of less than 2 mmol/L.
- NICE recommends that patients with ACS should be offered a high-intensity statin, that is a statin used in doses that produce greater cholesterol lowering than simvastatin 40 mg, for example simvastatin 80 mg. However, lipid targets in ACS are not specifically stated, nor is guidance given on the duration of high-intensity statin treatment if it is used.

Clopidogrel

- This indicator is intended to promote evidence-based use of clopidogrel and to avoid unnecessary clinical risk and excess costs due to over prescribing.
- NICE guidance on clopidogrel covers the following areas
 - Clopidogrel in non-ST-segment-elevation acute coronary syndrome¹⁵
 - Clopidogrel and modified-release dipyridamole in the secondary prevention of occlusive vascular events¹⁶
- Local guidance on duration post-stent and post STEMI should be referred to in these situations.
- Aspirin intolerance

Where licensed, clopidogrel may be appropriate for use in patients who cannot receive aspirin, e.g. those suffering from aspirin induced bronchospasm. However, clopidogrel is contraindicated in patients with active bleeding such as peptic ulceration. The incidence of gastrointestinal haemorrhage in CAPRIE¹⁷ was 2% for clopidogrel compared with 2.7% for aspirin 325mg (note the dose).

Clopidogrel does not have greater GI safety than aspirin. Aspirin plus a PPI has been demonstrated to have greater GI safety than clopidogrel.¹⁸

Antibiotic volume

- Optimising antibiotic prescribing is a national priority.^{19, 20}
- Antibiotic resistance is an inevitable consequence of the use of antibiotics and inappropriate prescribing must be minimised to delay its development and spread.²¹
- Delayed antibiotic prescriptions work well, are straightforward to implement, reduce unnecessary prescribing and are supported by NICE²². Local experience and evidence of this is available and the Prescribing team are able to support implementation.
- PCT antibiotic guidelines can be found at <http://tinyurl.com/9o5zog>

Blood Glucose testing strips

- In the last 12 months, blood glucose testing strips cost the PCT £1.7 million.
- The published evidence for the value of regular blood glucose monitoring is poor, particularly in type 2 diabetics who do not use insulin.
- In fact, evidence suggests that self-monitoring of glucose in many patients with type 2 diabetes using oral hypoglycaemics may not improve HbA1c levels at all, may cause distress, worry and depressive symptoms in the patient and increase prescribing costs unnecessarily.^{23, 24} Regular assessment of HbA1c levels may be all that is necessary for medication review and dosage adjustment.
- Self monitoring is most appropriate for patients with type 1 or type 2 diabetes who use insulin and adjust their dose as a result of blood glucose testing.
- The NICE guidance on type 2 diabetes states that "self-monitoring should be taught if the need / purpose is clear and agreed with the patient". Patients should be given adequate training in self-monitoring techniques, and patients and health care professionals should be clear about what they hope to achieve by self-monitoring blood glucose.⁴⁴
- Two new studies^{25 26} suggest that newly diagnosed people with type 2 diabetes are unlikely to gain any benefits from monitoring their blood glucose themselves. Self-monitoring of blood glucose (SMBG) may also result in a lower quality of life. In people with established type 2 diabetes, SMBG approximately doubles the net health-care costs with no benefits and a decrease in quality of life. SMBG in newly diagnosed patients and those with established type 2 diabetes should now be reserved for certain people treated with insulin and, conceivably, in some very specific circumstances (e.g. patients who are at risk of hypoglycaemia during intercurrent illness or fasting).

Non Steroidal Anti-Inflammatory Drugs

- The ADQ (Average Daily Quantity) marker is an indicator that compares the volume of prescribing. It is more reliable than items in this situation because it is not affected by prescription duration.
- All NSAIDs, including COX II inhibitors, are associated with adverse events and should only be prescribed where there is a demonstrable clinical need.
- Diclofenac 150mg/day appears to be associated with an increased risk of thrombotic events, similar to that of the coxibs, whereas low dose ibuprofen (= < 1200mg / day) and naproxen 1000mg/day appear to be associated with a lower risk ^{27,28}.
- In a population the size of Northamptonshire PCT, the following hospital admissions could be expected annually due to NSAID side-effects – **105 due to upper GI bleed, 58 due to acute renal failure and 128 due to congestive heart failure.**²⁹
- Don't use an NSAID unless you have to, particularly in the elderly. Employ non-drug interventions where possible, rubefacients (Algesal) or topical NSAIDs. Topical NSAIDs may be effective for short term use (<2 weeks) but there is insufficient evidence to determine the effectiveness of long term use³⁰. Piroxicam gel is the least expensive.
- Paracetamol (4g daily, taken regularly) works for many and won't cause the adverse effects associated with NSAID use.
- If you have to use NSAIDs, use them wisely – safest drug (ibuprofen or naproxen) in the lowest effective dose for the shortest period. NSAID users should be a high priority for medication reviews: think about heart failure, hypertension and renal issues routinely.
- Use of a PPI (omeprazole 20mg) with any NSAID significantly reduces the risk of GI side-effects. Benefits from gastroprotection largely depend on the individual patient's risk of GI complications.

"Double red" drugs

- The PCT wants to see new drugs used only where these have demonstrable additional benefit, over the drugs they replace. We want to see these available to all patients that need them.
- The PCT has developed, via the Northamptonshire Prescribing Advisory Group, a system that limits the use of new drugs, where no clear benefit will accrue, or for which there is insufficient current evidence. Particular examples might include stereoisomers or modified-release versions of existing drugs that are nearing their patent expiry date.
- Double red drugs are those drugs, often newly launched, categorised by the Northamptonshire Prescribing Advisory Group as being unsuitable for prescribing in either primary or secondary care. For further details see http://www.northants.nhs.uk/Clinical_Care/Prescribing/Traffic_LightsShared_Care/tle.isp
- Under this indicator, practices will be monitored on adherence with this guidance that there should be no (or realistically, minimal – reflected in the targets) prescribing of double red drugs.

Antidepressants

- Fluoxetine, citalopram and sertraline are considerably cheaper than most other SSRIs and related antidepressants.
- The NICE guidance on Depression states ³¹
 - Consider using a generic form of SSRI. Fluoxetine or citalopram, for example would be reasonable choices because they are generally associated with fewer discontinuation/withdrawal symptoms [than tricyclics].
- NICE also advises that sertraline has the best evidence base for the treatment of depressed patients with ischaemic heart disease.
- Whilst prescribers are advised to follow NICE guidance re appropriateness of prescribing an antidepressant at all, particularly in mild depression, if they decide to prescribe one they are advised to choose fluoxetine, citalopram or sertraline first-line.
- If, after these first-line options have been tried, an alternative is needed, mirtazapine is a less expensive option than venlafaxine or duloxetine.

Amlodipine as % of dihydropyridine calcium channel blockers

- Amlodipine is now approximately one fifth of the cost of other dihydropyridine calcium channel blockers such as nifedipine and felodipine.
- Amlodipine is supported by good evidence from clinical trials such as ALLHAT.³²

- The Prescribing Advisory team will provide dose equivalences and will facilitate switches.

Diclofenac items as % of all NSAID items

- Any changes from diclofenac prescribing should be done on an individual patient review basis; **large-scale switches are not advocated.**
- The December 2007 Drug Safety Update from the MHRA³³ contained important messages regarding the safety of NSAIDs. MeReC Extra³⁴ also focuses on the same subject, but in more detail.
- **There are a number of messages within the MHRA and MeReC bulletins but the updated information was that diclofenac 150mg/day appears to be associated with a similar excess risk to that of coxibs**, whereas low-dose ibuprofen ($\leq 1200\text{mg/day}$) and naproxen 1000mg/day appear to be associated with a lower risk.
- This information has emerged gradually over the last couple of years, following a number of observational studies and RCTs, particularly the MEDAL³⁵ programme, showed that diclofenac **150mg/day** had a similar CV risk to etoricoxib i.e. about 3 events per 1000 patients per year. There is less evidence for the risks with lower doses of diclofenac.
- Although the risks to an individual are low the widespread use of diclofenac in the UK (it accounts for 45% of all NSAID items) necessitates the need to review its place in therapy i.e. low-dose ibuprofen or naproxen should be considered before diclofenac, particularly in people at risk of CV disease who require an NSAID. .
- Patients already receiving diclofenac, especially patient with risk factors for CV disease should be reviewed as it may be appropriate to consider alternatives:
 - Stop the NSAID (see above)
 - Change from diclofenac 150mg/day to ibuprofen 1200mg/day. This will reduce both their GI and CV thrombotic risk. High doses of ibuprofen (e.g. 2400mg/day) are not prescribed frequently in clinical practice, and the relative risks versus diclofenac are unclear.
 - Change from diclofenac 150mg/day to naproxen 1000mg/day would reduce their CV thrombotic risk, but may slightly increase their risk of GI complications. However, if the opportunity is taken to introduce a PPI (omeprazole 20mg od), the GI risks will also be reduced. There is less evidence for the balance of risks with lower doses of diclofenac and naproxen.
- When reviewing the treatment of patients already receiving diclofenac, some patients, after discussion, may decide to continue treatment with diclofenac (this should be noted in the patient's records).
- Diclofenac should still be considered as the 3rd line NSAID of choice in patients with low CV risk. This may seem surprising, but the thrombotic risk to an individual from diclofenac is very small (about 3 events per 1000 patients per year) as discussed above
- Do not use COX-II inhibitors in patients with established CV disease. Caution is required in those at high risk of developing CV disease.
- Lack of data on CV risk with other agents, e.g. meloxicam and etodolac, should not be interpreted as an absence of risk and increased use of these agents is NOT encouraged.
- As this is a difficult message to communicate clinicians are strongly advised to read both the MHRA bulletin and the MeReC Extra to get a fuller perspective on this issue. There is also a NPCi podcast on this subject, which lasts about 20 minutes and puts the individual and population risks into perspective very well. <http://www.npci.org.uk/podcast/>

Salazopyrin EN

- Branded enteric coated Salazopyrin EN is at least 50% less expensive than the generic enteric coated sulfasalazine³⁶.
- This is a consequence of Category M pricing but the differential has been maintained for many months.
- Most patients are unlikely to notice any difference as many pharmacies will dispense the branded product anyway.
- This switch will NOT count against practices' generic % rates.

Rosuvastatin

- There is a 244-fold variation in the prescribing of rosuvastatin across the PCT practices.

- The aim of this marker is to reduce prescribing in those practices using large amounts of rosuvastatin in order to bring prescribing into line with NICE guidance.^{11, 51}
- Until the JUPITER³⁷ trial, no published RCTs of rosuvastatin had shown a benefit in terms of people living longer or better. Indeed, rosuvastatin had been shown to be ineffective in two trials of people with heart failure (GISSI-HF³⁸ and CORONA³⁹), despite most of the participants having ischaemic heart disease.
- The absolute benefits and harms demonstrated by JUPITER are that for every 1000 people who took rosuvastatin 20mg daily for 2 years, 8 people avoided having an MI or a stroke or dying from CV causes, but 6 people developed diabetes who would not have done otherwise.
- The dose used in JUPITER was 20mg/day. The MHRA have advised caution⁴⁰ in initiating this dose: patients should start on 10mg (5mg for Asian patients and those with pre-disposing factors for myopathy), including patients switched from other statins, and the dose should be titrated up after a four week trial.
- NICE guidance on risk assessment and lipid management⁴¹ and on type 2 diabetes⁴² (including lipid modification) was published in May 2008. In primary prevention of people without diabetes, **NICE recommends simvastatin 40mg as first choice drug and dose for most people, with no lipid target.** If simvastatin 40mg is not tolerated or is contraindicated, alternative statins may be used, such as pravastatin.
- Simvastatin 40mg is also recommended in people without diabetes with established CV disease, although patients and prescribers should **consider** increasing to simvastatin 80mg if a total cholesterol of less than 4mmol/L or an LDL cholesterol of less than 2mmol/L is not attained. However, these figures are intended to **guide** treatment, they are not targets patients are expected to attain. Most patients would not achieve these levels on 80mg simvastatin and modelling suggests that it is not cost-effective to try to take more patients to target using higher cost statins.
- Furthermore, a single cholesterol measure may well under- or overestimate a person's true average cholesterol by up to 14%⁴³.
- Within NICE guidance, rosuvastatin might be considered when other statins are not tolerated or are contraindicated, and in patients with acute coronary syndrome or patients with type 2 diabetes who have established CV disease or increased albumin excretion rate. With regard to the latter group, NICE recommends initiating treatment with simvastatin 40mg, but to consider intensifying with a higher intensity statin or ezetimibe▼ to achieve at total cholesterol of less than 4 mmol/L or an LDL of less than 2 mmol/L.
- Amongst other factors, when considering the choice of second line or intensive statins in line with NICE guidance, prescribers may wish to bear in mind the potential effect of the expiry of the patent on atorvastatin (currently reported to be November 2011) on the future acquisition costs of these medicines.

Ezetimibe

- There is a 33-fold variation in the prescribing of ezetimibe across the PCT practices.
- The aim of this marker is to reduce prescribing in order to bring it into line with NICE guidance.^{12, 49, 50, 51}
- Ezetimibe▼ lowers LDL-cholesterol levels. Although this might be expected to reduce the risk of cardiovascular events, until recently there have been no published data to say whether or not ezetimibe alone or added to a statin helps people live longer or reduces their chance of having a cardiovascular event. Concerns about translating cholesterol-lowering effects directly to cardiovascular outcome data have been expressed following the recent randomised controlled trial, ENHANCE⁴⁴. This did not find a reduction in carotid intima medial thickness with the addition of ezetimibe 10mg to simvastatin 80mg in people with familial hypercholesterolaemia.
- The Simvastatin and Ezetimibe in Aortic Stenosis (SEAS) trial⁴⁵ is the first study of ezetimibe looking at clinical outcomes to be published. This compared simvastatin 40mg plus ezetimibe 10mg daily, with placebo in people with asymptomatic stenosis of the aortic valve. However, the SEAS study unexpectedly raised concerns about the safety of ezetimibe, because there was an increased incidence of cancer in the active treatment group.
- The unexpected finding of an increased risk of cancer with simvastatin plus ezetimibe in SEAS was explored further by the Clinical Trial Service Unit & Epidemiological Studies Unit (CTSU) Oxford University.

- The CTSU authors concluded that the available results from other trials of simvastatin plus ezetimibe do not support the hypothesis generated by SEAS (i.e. that ezetimibe plus simvastatin increases the risk of cancer). The accompanying [editorial](#)⁴⁶ strikes a more cautious tone. It notes that although the 95% CIs derived from the analysis rule out (at conventional levels of statistical significance) the possibility that the combination increases the risk of cancer by more than about 12%, they cannot exclude a relative increase of as much as 84% in the risk of cancer-related death. The editorialist says that using interim data from SHARP and IMPROVE-IT is problematic, and that additional data are needed to adequately address whether simvastatin plus ezetimibe is associated with an increased risk of death from cancer. He suggests such data should be provided by completed randomised trials that have been prospectively designed to address these safety issues.
- In addition there remains no good evidence that ezetimibe either alone or added to a statin reduces the risk of cardiovascular events compared to a statin alone. There was a 22% relative reduction in risk of ischaemic cardiac events seen in SEAS from the combination compared with placebo, but this is in line with what we would expect to see from simvastatin 40mg alone.
- With no direct evidence of benefits and some remaining, but unproven, questions about safety, one must consider cost. Adding ezetimibe to statin therapy substantially increases the cost to the NHS. NICE guidance on ezetimibe⁴⁷, lipid modification¹², type 2 diabetes⁴⁸ and familial hyperlipidaemia⁴⁹ advises to use ezetimibe monotherapy only if statins are contraindicated or not tolerated, and to use ezetimibe in combination with a statin in some limited circumstances-
 - It can be **considered** as an add-on therapy in those with type 2 diabetes with existing CV disease or albuminuria
 - Familial hyperlipidaemia

Cephalosporins and quinolones

- *Clostridium difficile* infection can occur following treatment with antibiotics that disrupt the normal microflora of the colon, allowing colonisation of the pathogen. *C. difficile* is a leading cause of iatrogenic outbreaks of diarrhoea and increases mortality and healthcare costs.
- Patients most at risk from *C. difficile* infection are the elderly, immunosuppressed and debilitated.
- Broad-spectrum antibiotics are most strongly implicated in *C. difficile* acquired diarrhoea, particularly cephalosporins and quinolones. Where possible, the use of these antibiotics should be avoided, especially in patients with risk factors for *C. difficile* infection.
- A 3-day course of either trimethoprim 200mg bd or nitrofurantoin 50-100mg qds remains the first-line treatment for simple urinary tract infections (UTIs).
- For management of complicated UTI refer to the antibiotic guidelines for primary care prescribers in Northamptonshire.⁵²
- Catheterised patients will almost certainly have bacteriuria; antibiotic therapy will not eradicate this and will select resistant organisms.⁵⁰

¹ NICE clinical guideline on Dyspepsia. August 2004.

² The place in therapy of angiotensin II receptor antagonists. MeReC Bulletin 2003; 13: 21-24

³ NICE guidance on hypertension (www.nice.org.uk).

⁴ Clinical guidelines and evidence review for Type 2 diabetes. Blood pressure management. Sheffield: SchARR, University of Sheffield (www.nice.org.uk)

⁵ Hypertension in type 2 diabetes – targeting angiotensin DTB 2005; 43: 41-48

⁶ Meyler's side effects of drugs. 2006

⁷ MeReC Bulletin 2003; 13: 21-24

⁸ DTB 2005; 43: 41-48

⁹ McMurray JJ, *et al.* Lancet, 2003; 362: 767-771

¹⁰ ACE Inhibitor-induced cough: ACCP Evidence Based Clinical Practice Guidelines. Chest 129 (1): Jan 2006, 169S-174S.

¹¹ ATLAS study. Circulation 1999; 100:1-7

¹² NICE Clinical Guideline 67: Cardiovascular risk assessment and the modification of blood lipids for the primary and secondary prevention of cardiovascular disease

¹³ http://www.npc.co.uk/MeReC_Extra/2005/no17_2005.pdf

¹⁴ http://www.npc.co.uk/MeReC_Extra/2006/no21_2006.pdf

¹⁵ NICE guidance No 80. Clopidogrel in non-ST-segment-elevation acute coronary syndrome. July 2004

¹⁶ NICE consultation appraisal document on Clopidogrel and modified-release dipyridamole in the secondary prevention of occlusive vascular events. Nov 2004

¹⁷ CAPRIE Steering Committee. A randomised, blinded trial of clopidogrel versus aspirin in patients at risk of ischaemic events. The Lancet 1996;348:1329-1339.

Drug Supplier Discounting



Reimbursement levels excluding VAT and inclusive organisations applying to your account, via this Discount Notification Schedule, are as follows:

Products	EMU	% Reimbursement
Casodex Tabs 150mg 28	1	8.5
Casodex Tabs 50mg 28	1	8.5
CRESTOR Tabs 10mg 28	44	23
CRESTOR Tabs 20mg 28	16	23
CRESTOR Tabs 5mg 28	1	23
Nexium Tabs 20mg 28 Comm	45	25.5
Nexium Tabs 40mg 28 Comm	3	25.5
Symbicort Turbohaler 100y 120 Dose	3	21.28
Symbicort Turbohaler 200y 120 Dose	12	21.28
Symbicort Turbohaler 400y 60 Dose	1	21.28
Zomig Nasal Spray 5mg 6 .1ml	2	8.5
Zomig Rapimelt Tab 2.5mg 6	3	8.5
Zomig Rapimelt Tab 5mg 6	3	8.5
Zomig Tabs 2.5mg 12	3	8.5

Appendix 2: Questionnaire

Questionnaire

Dear Dispensing Practice

My name is Joseph Bilbie, an MSc student at Cranfield University. I am currently working on my dissertation which is the final part of my degree programme.

For my dissertation I am trying to address the question as to whether the principle of a decision support system could be used to improve the decisions of Dispensing Practices over where drugs are purchased.

The term decision support system within my study refers primarily to an IT based system of some sort that would help support Dispensing Practices by enabling them to reduce their drug purchasing costs and improve Practice profits.

My primary objective is to establish whether a decision support system could be used within the context of Dispensing Practices to enable best practise of drug purchasing. I am addressing this question by learning about Dispensing Practices in regards to how they purchase drugs as well as their rationale and influences, behind these purchasing decisions. I am also investigated current decision support systems that have been used in other industry sectors to establish whether they could be adopted within a Dispensing Practice environment.

To help identify whether a decision support system would be suitable within a dispensing Practice environment and to answer the question of the dissertation I require information from those who make the drug purchasing decisions currently within dispensing practices.

I would really appreciate your help by filling out my questionnaire which will take no longer than 8 minutes to complete and will contribute greatly to my primary research. The information I receive will have a direct impact on the results of my study and will contribute to the current knowledge already within this subject area. The names of the Dispensing Practices and all participants will not be published and will remain anonymous.

Thank you for your contribution to this study and your assistance towards my degree.

1. Do you have a decision support system in place for drug purchasing? (*excluding your clinical system or electronic wholesaler ordering system*) **YES / NO**. If you have answered YES what system/systems do you use?

Own spreadsheet/comparison tool

Commercial specialist/comparison system

Peer recommendation

Wholesaler comparisons

Buying group

Other (*Please state*)

.....

2. How many drug suppliers do you have? **1-3, 4-6, 7-9, 10-12, 13-15, 16+**

3. Which are your main suppliers?

AAH Pharmaceuticals Ltd

Alliance Healthcare

F. Maltby & Sons Ltd

Mawdsley-Brooks & Co. Ltd

Phoenix Healthcare Distribution Ltd

P.I.F. Medical Supplies Ltd

Sangers (Maidstone) Ltd

Sants Pharmaceutical Ltd

4. What is your monthly drug spend?
5. How much do you spend on average with your main suppliers?
.....
6. Do you buy brands and generics from the same supplier? **YES / NO**
7. How many suppliers do you buy generics from? **1, 2, 3, 4, 5, 6, 7, 8, 9, 10+**
8. Do you buy parallel imports? (*excluding shortages of UK lines*) **YES / NO**
9. Do you buy through an electronic purchasing system? **YES / NO**
10. Do you buy from drug representatives? **YES / NO**
11. Do you buy from tele-sales operations? **YES / NO**
12. Do you compare price lists? **YES / NO**. If you have answered NO please move to question 15
13. How many Pricelists do you compare? **1-3, 4-6**
14. How time expensive do you find the act of comparing prices for drugs?

Not very expensive
Expensive
Very expensive

15. What reasons do you buy from a supplier?

Drug representative
Price
Service
Quality
Rebate
Delivery
Educational hospitality
Return policy
Convenience
Supply limitations

16. For those reasons you have chosen in question 15, please rank them in order of priority. (1 for most important)

Drug representative.....
Price.....
Service.....
Quality.....
Rebate.....
Delivery.....
Educational hospitality.....
Return Policy.....
Convenience.....
Supply limitations.....

17. When considering profit made through the dispensary, in which group do you currently fit?

15%-18%
19%-21%
22%-25%
26%-29%
30%+
Don't Know?

18. If decision support systems were available to buy drugs, would your Practice consider using them?

Yes

No

Don't know

19. If decision support systems were available commercially would your Practice purchase such a system?

Yes

No

Don't Know

******Thank you for your participation******

Appendix 3: Drug wholesale pricelists (Sandoz/Phoenix October 2007 & KwikPharma October 2007)

Appendix 4: Practice purchasing data