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PATIENT-EDUCATION AND COMPLIANCE IN NON-INSULIN-DEPENDENT DIABETES MELLITUS

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Thesis submitted for the award of Doctor of Philosophy


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This prospective study investigated many compliance-related aspects involving a population of Type II (non-insulin-dependent) diabetics, who attended the out-patients' clinic of a District General hospital. The investigations were undertaken from both qualitative and quantitative perspectives; activities within the clinic were observed and knowledge levels concerning diabetes mellitus were measured.

A teaching programme was constructed, drawing on general educational principles; each stage was subjected to analysis and evaluation. Information, teaching and counselling skills were incorporated and a quality assurance model described.

Two groups of subjects - one diagnosed less than one year (n=20), the other diagnosed more than one year (n=18) - were entered into a teaching programme; weight change was chosen as the study variable. Three interventions were planned for each subject. No statistically significant differences were found between the study groups and an historical control group, but clinically significant trends towards the target weight were recorded. Following the intervention study, a clinic-specific video was made, which was positively evaluated by subjects after it was viewed in their own homes.

An innovative method of analysis was applied to health
belief attributes, including vulnerability and social support — dynamic concept analysis (Kontiainen, 1973) — and models were constructed to determine whether there were common patterns of interview response from which prediction of compliance with clinical advice could be deduced. From the analysis it was concluded that computerised models could be constructed, which would be used in the clinic setting to predict, and subsequently monitor and guide, the behaviour required of individuals with NIDDM. The home viewing of clinic-specific videos would provide an adjunct to effective management through the dissemination of information outside the immediate physician-patient interaction.

The main aim of Type II diabetes management is control of body weight. A means of depicting movement out of the obesity grading (Garrow and Webster, 1985) was devised, which could be utilised in a collaborative way by the health care professional and the diabetic person.

From this longitudinal study it was concluded that the unique educational needs of individuals must be met by a range of inter-linked skills, methods and materials, if a solution to the non-compliance problem is to be found.
ACKNOWLEDGEMENTS

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CHAPTER ONE

RATIONALE FOR THE STUDY

Introduction

Epidemiological studies show that there are health concerns which must be addressed through more effective communication. Disease has been causally linked with health hazards, eg smoking (Royal College of Physicians, 1984) and excessive consumption of alcohol (Social Trends 1989), and there is a strong association between dietary habit and cancer, obesity and diseases such as diabetes and hypertension (Muir & Parkin, 1984). In the United Kingdom each year 50-100 per million of the population undergo by-pass surgery for atherosclerotic disease, much of which is related to dietary indiscretion and smoking. Improving the general health of populations by informing, counselling and educating could release resources for further research into the causes of disease which are not yet understood, eg congenital disorders, malignancy and degenerative disease. This knowledge places an obligation of responsibility for effecting change on all involved in health care activities.

It is not a one-way process. Higher levels of educational attainment, media campaigns focused on specific health issues and the publicity given to medical litigation have raised levels of political awareness concerning the possession of medical and related knowledge. Individuals are asked to make increasing financial contributions to health care through direct and indirect taxation and they demand in return more information
concerning avoidable hazards associated with ill-health, as well as more general information about avoidable illness. These changes are more pronounced in a society in transition from a post-industrial era, in which information was not generally accessible and protective institutional care was the norm, to one in which information technology, the individual and self-help predominate.

Each restructuring of the National Health Service emphasises the balance to be struck between resource-efficiency and cost-effectiveness. As a result of successive reorganisations, a shift in the nature of health care provision can be demonstrated. Ill individuals now spend less time in hospital and consequently less time is available in these institutions for interpersonal communication concerning recovery, rehabilitation and preventing recurrence of the illness. If, as a result, patients slip through the safety net of information provision and education opportunities, the consequences will be detrimental to the partnership between patient and health-care professional. Readmissions to hospital will increase, avoidable long-term complications may occur and known complications may be accelerated. Relationships between individuals and health professionals will suffer and professional integrity will be compromised as trust in the efficacy of treatment will be eroded.

This situation will not materialise if individuals know that there are alternatives to the established but imperfect system. The trend towards focused community care means that
individuals will seek information and advice in health centres, out-patient clinics and in their own homes. Methods of delivering the message must be adapted to meet the changing needs. Use must be made of communications technology such as films, interactive video, computer-assisted programmes and other audio-visual aids to widen access to information which will allow individuals to make informed decisions concerning health matters. If an educational bridge is to span the gap between ignorance of health hazards and a healthy community, then the role of the educator must also be legitimated.

This can be achieved, in part, by health care professionals demonstrating a serious commitment, not only to the affective aspects of the relationship, but also to the acquisition of the technical skills necessary to devise, disseminate and evaluate educational materials intended specifically for the purpose of establishing an information partnership. Those professionally concerned with people with health problems do not automatically have the role of educator conferred upon them. Patients continue to look to medical practitioners for information, when the opportunities for other health care professionals to convey information in educationally appropriate ways are greater. Nurses, for example, spend more time with patients and relatives in health centres, out-patient departments and the community. When responsible professionals are seen by society to acknowledge education as a key factor in health care provision and their teaching activities can be causally related to illness prevention, then the full potential of this important role will
A recent (1990) Department of Health document suggests that nurses are inappropriately employed on non-nursing work in clinics and that the numbers of those so engaged should be reduced. In addition these nurses may be stressed by performing unskilled and mundane tasks (Parrott, 1990). The alternative is for nurses to extend and develop their role to encompass teaching and informing skills in appropriate settings.

**Provision of Information**

Webb (1990) described a traditional model of care in which the health professional is dominant and the patient passive; the respective roles are described in terms of power and the patient's lack of it. The physician historically assumed a dominant role which the patient expected and accepted; he assumed also, a responsibility for the protection of the patient, by filtering the information that was offered and thus reinforcing the dominant role. This reluctance to convey all available information was based on the genuine belief that such information could have adverse effects; this was especially so where medication was concerned. Compliance with treatment may decrease as knowledge, for instance of possible side-effects, increases, particularly where the side-effects appear to outweigh the benefits offered by the treatment (see Health Belief Model, p 28). Ley (1988) shows that the majority of individuals believe they should receive information concerning their own lives - even
the most emotionally charged information. Patient participation in its fullest sense would suggest that possession of negative, as well as positive, aspects of diagnosis, treatment and prognosis would be the expectation of most people. According to Ley, a major change in the climate of opinion can be demonstrated, especially concerning malignant disease, but in diabetes mellitus (the subject of this study), effective self-care and management of the condition will only be achieved if the diabetic is able to make knowledgeable decisions derived from an understanding of the full range of possible outcomes of the disease process. This raises an important issue, whether it is acceptable to increase awareness of complications which may not occur or are only remotely possible; effective management does mean that this information must be available.

In this context, an important function of information provision is the protection it affords to the medical practitioner. In a socio-political climate in which the threat of litigation arising from a perceived lack of information concerning risk is a dominant concern, increasing the information flow protects practitioners, especially where informed consent is a legal obligation. This is no less a concern for the nursing profession. In the U.S.A., nurses are contractually obliged to adopt the role of patient educator, and career advancement is dependent upon effective demonstration of this aspect of care. Objective measurement of nursing activities, arising from a trend towards greater accountability for practice, must lead to contractual obligations in the United
There is a growing body of research and literature which suggests that patient education has positive effects in acute care settings. Good evidence exists to show that anxieties can be relieved, the need for analgesia reduced and earlier ambulation after surgery can be achieved (Johnson & Rice, 1978; Hayward, 1975; Boore, 1978); but long-term adherence to exacting requirements in chronic conditions such as diabetes mellitus remains problematic. In these circumstances individuals may not comply with medical advice or may follow therapeutic regimens only partially, despite what appears to be an adequate level of knowledge; knowledge may promote understanding, but individuals behave in individual ways which may defy adequate explanation in the literature and in reality. Possession of knowledge does not, of itself, imply understanding and it cannot be assumed that knowledge conveyed is knowledge received; an educational approach is thus supported.

Non-compliance has been described as the most-documented and least understood health-related behaviour (Becker & Maiman, 1975; Becker & Rosenstock, 1984). The temptation to focus on patients' behaviour in an effort to explain the non-compliance problem has deflected attention from other important issues.

**The Social Cost of Compliance in Diabetes Care**

The advice which the non-insulin-dependent diabetic (NIDD) must follow is primarily social; it is concerned with eating,
drinking, exercise and hygiene; by definition it will require the support of others to ensure its effectiveness. The psycho-social perspective has been studied extensively, but no attention has been given to the problem of changing the behaviour of others who enable the diabetic to achieve the aims – optimal metabolic control, avoidance of complications and a near-to-normal lifestyle. There is considerable evidence from cardiac and stroke patient studies, that the significant other (wife/husband), needs to be involved in all stages of the condition. Evidence suggests that wives suffer increased anxiety equivalent to that of the partner, experience more episodes of illness (Mayou et al, 1978) and a perception of social loss associated with sustaining long-term support (Anderson and Bury, 1988). Because he/she lives with and shares the stresses of a diagnosis of diabetes, the spouse must be deliberately drawn in and be part of any teaching and learning activities.

Social stigma is still sometimes associated with this condition although this may be less apparent in Type II diabetes. Some employment opportunities are not open to diabetics - the right to drive a car may be problematic and insurance difficulties may be experienced. Suspicion is still engendered in a population which is generally inadequately enlightened regarding diabetes, by unexpected behaviour such as hyper- and hypoglycaemic episodes. Perception of this social cost may cause the diabetic to conceal the condition and create socially difficult situations where compliance with dietary restrictions,
for example, may become impossible.

At the activities of daily living level, there is financial cost involved in diagnosis. Some recommended food items are expensive. Most Type II diabetics (ie NIDD), are elderly and must use costly and unreliable forms of transport to attend clinics. Moreover, clinic visits create anxiety and uncertainty; despite adequate organisation, waiting times are unpredictable. Information can be confusing if offered in such settings. Clinic attendance is therefore an unreliable indicator of compliance.

These examples suggest that the strength of this cost variable may be perceived to outweigh the indeterminate benefits of compliance. Factors which are outside the immediate control of the individual may militate against compliance and cause false and unfair labelling.

**The Importance of Body Weight in Type II Diabetes Mellitus**

Evidence suggests that obesity interferes with the peripheral uptake of insulin. In the initial stages of Type II diabetes, pancreatic production is falling off (Smith, 1989), but there is a tendency for weight to increase with ageing. Type II diabetes is a condition commoner in the elderly. There is considerable evidence that glucose levels in the blood will be contained within normal limits if body weight can be
controlled within the normal range for age\(^1\). Near-normoglycaemia may retard, or even prevent, the possible complications associated with diabetes mellitus (Literature Review pp. 17-18).

Weight control is the salient feature in effective management; this knowledge determined the choice of weight measurement as the main variable in the experimental part of this study.

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\(^1\) The most commonly used guide for assessing ideal body weight (IBW) is Metropolitan Life Insurance tables. The patient's weight can be compared with the IBW. For each decade after the age of 24, actual body mass increases by 1 Kg/m\(^2\).

Between the ages of 25-34 years, body mass index is 20-25

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- **Mild obesity** = 25-30
- **Moderate obesity** = 30-40
- **Severe obesity** = > 40

The risk of developing diabetes increases X2 with mild obesity, X5 with moderate obesity and X 10 with severe obesity (Horton and Jeanrenaud,1990).
CHAPTER TWO

DIABETES - FROM CLASSIFICATION TO COMPLICATION AND CONTROL
A LITERATURE REVIEW

Descriptions of recognisable symptoms of diabetes mellitus are found in early literature (MacFarlane, 1990) and the condition has generated extensive clinical and research interest (Gill, 1990). The life-saving recognition of the hormone, insulin, in 1921 by Frederick Banting and Charles Best, dramatically altered the prognosis of diabetes mellitus and the dynamic nature of research concerning its aetiology and pathology is reflected in changes in classification of the disease. The association of risk factors with complications has led to control becoming a key concept in the management of diabetes mellitus.

It is not only through the biological sciences that the research thrust has been pursued. Joslin, a leading authority in the field, wrote in 1969 of education being the treatment for diabetes; the challenge of this hypothesis has been accepted in research and practice. Key components such as information-provision, teaching and counselling, have been identified in the context of patient-education (Wilson-Barnett, 1988) and their differences and similarities explored. Effective management of diabetes mellitus may be achieved through a combination of these activities. Support for this contention is sought in the following review.
**Introduction**

Diabetes mellitus is a disorder of carbohydrate, fat and protein metabolism, characterised by relative or absolute insulin lack (Reckless, 1985).

The World Health Organisation (1980) permits a diagnosis of diabetes in asymptomatic individuals with a fasting plasma glucose more than 140 mg/dl (7.8 mmol/litre) and an oral glucose tolerance test more than 200 mg/dl at 2 hours (more than 11.1 mmol/litre). A further classification, of impaired glucose tolerance, is described with an oral glucose tolerance test between 140-199 mg/dl (7.8 - 11.1 mmol/litre) (Harris MI et al, 1985).

**Classification**

Historically, diabetes mellitus has been classified as either of juvenile-onset (insulin-dependent) or maturity-onset (non-insulin-dependent). However as the aetiology and disease process have become better understood, both genetically and immunologically, it has been recognised that some non-insulin-dependent diabetics may require insulin but not be dependent on it for survival. Diabetes with onset in middle age is a complex and probably heterogeneous disorder (Tattersall & Scott, 1987) in which impaired insulin secretion and insulin resistance can be demonstrated and the prescription of insulin will be dependent on the physician's interpretation of the clinical picture. Type I has become synonymous with IDDM and Type II with NIDDM but Turner
et al (1986) suggest that this is still a vague classification, including in Type I as it does, any patient who has neither a demonstrable immunological disturbance nor whose diabetes is of classical juvenile onset. However they concede that it is useful in as far as it overcomes the contradictory and confusing label of an insulin treated person with non-insulin-dependent diabetes.

According to the British Diabetic Association, more than 600,000 people in the United Kingdom, 1-2% of the population, have diabetes; 70% of that population are classified as Type II, but again a distinction between those who are prescribed insulin and those who are not is difficult as the progress to insulin dependence is often gradual. Tattersall & Scott (1987) state that nearly a third of insulin-dependent diabetics are diagnosed after the age of 30 years, while Knight & Kesson (1986) affirm that 80% of diabetics, the majority of whom are NIDD, are over the age of 40. Maturity, therefore, is not a criterion for classification although the risk of developing diabetes doubles with every decade of life. 26% of those over the age of 85 years in the United States of America are diagnosed as diabetic and many diabetics probably remain undiagnosed. There are no general screening programmes in the UK and diabetes is frequently diagnosed by chance, for example in the course of a medical examination for a job or insurance cover.

The cautious approach to classification derives from the limited knowledge of the aetiology and pathogenesis of diabetes.
While two major types have been identified, there is considerable evidence that it is not a single entity disease (Pirart, 1978), and Fajans et al (1978) state there is a different pattern of inheritance. Galbraith (1979) suggests a genetic predisposition to diabetes which is slightly stronger in Type II, although the mode of inheritance remains unknown. Genetic susceptibility appears to be conferred by the presence of HLA antigens in Type I (Cudworth & Woodrow, 1976) which is not apparent in Type II, while viral infections, particularly Coxsackie B have also been implicated in Type I (Galbraith, 1979).

Obesity appears to be a significant factor in the pathogenesis of Type II diabetes, but less so in established diabetes (in populations where obesity is rare, diabetes is often rare as well). Keen et al, (1978) state that sound evidence of this significance is scanty and contradictory. In an extensive study of 12,000 known diabetics, the mean Body Mass Index was found to be lower than that of a control group; he suggests that the discrepancy may be because by the time diabetes is established, earlier obesity may have been corrected. This explanation must be treated sceptically in view of the apparent difficulty that diabetics experience when attempting to lose weight after diagnosis. There is also a relationship between ageing and obesity and ageing and glucose intolerance. Type II diabetes is a disease strongly associated with increasing age and thus may be coincidental with obesity.
The subject of this study is Type II diabetes, but the following presentation of the complications of the disease process as a unitary concept is justified by the assertion that although the aetiology may be different, the outcomes are potentially as serious and life-threatening.

Macrovascular disease accounts for about 75% of all deaths in diabetics (Ganda, 1980); diabetic retinopathy, a microvascular complication is the most common cause of blindness in England and Wales in those aged 30-64 years (Kohner et al, 1982).

Epidemiological and pathophysiological studies (Janka, 1985) suggest an association between diabetes and disease of blood vessels, described under the headings:-

Macroangiopathy - disease of coronary, cerebral and peripheral vessels.
Microangiopathy - neuropathy, nephropathy and retinopathy, although neuropathy may be due to factors other than microvascular disease.

Colwell (1980) describes macrovascular disease as similar to atherosclerosis, with a similar pathology in non-diabetics, but proceeding in diabetics at an accelerated pace, the microvascular disease process involving basement membrane thickening, coagulation and obliteration. He suggests that diabetics are:-

Five times more prone to gangrenous changes
Seventeen times more prone to renal disease
Twice as prone to coronary disease
Twenty five times more prone to blindness
- than the normal population.

With the exception of nephropathy, there is no evidence that complications are less severe in Type II diabetes than in Type I. The prevalence of complications for Type II compared with Type I is essentially the same (Nyberg et al., 1985). Macrovascular disease is a major cause of premature death and disability among Type II diabetics (Gill, 1986). He accounts for different long-term complications by suggesting that individuals may succumb to macrovascular disease before, for instance, significant nephropathy becomes apparent. Blindness occurs in all types of diabetes.

Duration of disease is associated with complications. Microangiopathy is correlated to duration of disease - (Hanssen et al., 1986), and is more prevalent in persons with prolonged duration of the disease. Pirart's 1978 study found the incidence of macrovascular disease to be unrelated to the severity of hyperglycaemia, but that the incidence and prevalence of peripheral and coronary atherosclerosis increased strongly with age, whatever the duration.

Jarrett (1984) states that Type II diabetes is associated with, but is not the cause of, coronary heart disease; the degree of atherosclerosis appears to be greater in diabetics even shortly after diagnosis. He advances a "chicken and egg"
argument - does atherosclerosis predispose to diabetes? In the context of risk factors in macrovascular disease (1985) he cautions that interventions predicated against determinants incriminated as risk factors, eg obesity, may not be effective in reducing risk.

Smoking is associated with complications and has a deleterious effect on the progression of atherosclerosis, renal and eye disease (Ganda, 1980); Gill (1986), in a survey of those attending a diabetic clinic, discovered that 62% were smokers, while Horsley et al (1987) found that 40% of 1021 newly-diagnosed diabetics smoked.

The Concept of Control

It is a central tenet in the management of diabetes that persons with the disease can live normal lives despite the chronic and incurable nature of their condition, but in order to achieve this state, restrictions and modifications are sometimes necessary. Therapeutic regimens may range in complexity from simple dietary restrictions related to ideal body weight, to regular and precise monitoring of blood glucose levels and self-administration of insulin by injection. While achievement of a normal life is dependent on the day-to-day management of the condition, underpinning the short-term activities are the possible long-term consequences of failure to achieve control and the long-term benefits of success.

The ideal state for a diabetic person is the maintenance of
a blood glucose level as near to normal as can be achieved (normoglycaemia). Relative or absolute lack of insulin may lead to abnormally high levels of glucose in the blood plasma. Insulin (which must be administered by injection in Type I, IDDM), maintains glucose homeostasis, by removing glucose from the circulating blood. Insulin increases peripheral glucose uptake by stimulating glucose transport across the cell membrane and increases glycogen synthesis - glycogen being the storage form of glucose; in addition it inhibits gluconeogenesis. In Type II diabetes (NIDD) insulin requirement is relative to the capacity for insulin production and/or uptake.

There is evidence (Reaven, 1978), that obesity is associated with a decrease in the number of receptor sites on target cells and cellular resistance to insulin uptake. The desired state, normoglycaemia, may be obtained by careful maintenance of ideal body weight; in addition, oral hypoglycaemic agents may be prescribed to stimulate pancreatic production of insulin or to promote insulin uptake. Although it has not been conclusively established that there is a causal relationship between obesity and diabetes or that benefits accrue from near-normoglycaemia, the weight of evidence and medical experience does suggest that some factors which may influence control are important when prescribing optimum therapeutic interventions. In 1989, the American Diabetes Association recommended achieving weight loss in the obese, maintaining an ideal body weight, optimal nutritional status and control of blood glucose levels (American Diabetes Association, 1989b). Shillitoe and Christie (1986) state
that such factors as the supportiveness of family members, their attitudes to diabetes and coping strategies for daily stress are central to control and management of the disease.

A complex interaction exists between, on the one hand, physiological, biochemical and psychological factors which will trigger the release of insulin and promote or prevent its utilisation and, on the other, the physical, psychological and social relationship between the organism and the environment. Hauser and Pollets' (1979) critical review gives some support to this statement. The nature of the relationship between control and the consequences is not always clear or supported by evidence.

Studies show that two years of near-normoglycaemia retards or arrests progression of microangiopathy in kidney, retina, autonomic and peripheral nerves (Hanssen et al, 1986). Lesions are responsive to good diabetic control.


The relationship between regimen, control and health consequences cannot be presumed (Glasgow et al, 1985). However Pirart's (1978,) influential, prospective study of 4,400 subjects with diabetes, suggests that an increase in control decreases the
incidence of complications and that the triopathy is a function of duration and severity of the disease, but more precisely of hyperglycaemia; he writes of "striving towards normoglycaemia" (p.26).

Cochran et al (1979) suggest that careful management, producing good metabolic control, favours longevity in IDDM and that complications are not inevitable. Tchobroutsky (1978, p.143) concludes, in his review of the relationship between control and the development of microvascular complications, that "strict control is worthwhile in patients with long-life expectancy and no psychological, social or cultural handicap" - the proviso, with all it implies, weakening the contention. Janka (1985) suggests a beneficial relationship between prolonged periods of control and microvascular complications but finds less evidence for a relationship between control and macrovascular complications. This is supported in some respects by Nielson and Ditzel (1984). Microvascular complications are probably dependent on quality of control; macrovascular complications are unrelated to long-term hyperglycaemia.

Finally, Wright (1989) states "we now know that many of our middle-age patients will live with their diabetes for many years and if they keep their blood sugar under good control they will avoid some of the long-term complications which can be so distressing in some patients who have had diabetes for many years" (personal communication).
Non-Compliance - Problems of Definition

A review of the literature indicates a trend away from the use of the word, compliance, to define the concept. Becker and Maiman (1975) use compliance in operational terms, to define the extent to which patient populations adhere to instruction. Blackwell (1976, p. 513), reviewing treatment adherence in psychiatry, states - "In America the coercive connotation of the word compliance has led to increased use of adherence as an alternative."

Sackett and Haynes' (1976), seminal work in this area characterises the concept as the extent to which the patient's behaviour (in terms of taking medication, following diets or executing other life-style changes) coincides with the clinical prescription. As a research problem, Blackwell (1976) states adherence is an inadequately studied subject. He refers to an appraisal of 185 studies carried out by Sackett and Haynes in 1976; in only half of the studies was compliance described in a manner adequate to permit independent replication. Becker and Rosenstock (1984, p.200), in the context of consumer rights state "frequently proposed alternative language includes adherence, drug omissions and therapeutic alliance ".

King (1984, p.54), regards compliance as a controversial concept and prefers to use "to obtain cooperation", while Edel (1985), in the context of nursing diagnoses, suggests that by eliminating non-compliance as a diagnosis, nurses can direct their interventions towards therapeutic alliances with patients.
Ryan & Falco (1985, p.685), in a study to define the characteristics of the nursing diagnosis of non-compliance, suggest "a person's informed decision not to adhere to a therapeutic regimen", a definition which takes sensitivities into account and acknowledges the changes which have taken place in the relationship between health professionals and the consumers and the apparent shift of responsibility for control of treatment. Kontz (1989, p.54) makes the most acerbic comment - "nursing has tried to rename compliance, by calling it adherence, collaboration and therapeutic reliance, yet regardless of the term used, the issues surrounding compliance remain the same".

The Nature of the Problem

Resler (1983) describes levels of activities which are the responsibility of those who teach diabetics about the condition.

First level activities include those which are essential for the protection of life and prevention of acute complications. The IDD and sometimes the NIDD must learn the psycho-motor skills of handling injection equipment and injection techniques in a context of safety and hygiene. He must handle what may be alienating substances - blood and urine - and conduct exact monitoring procedures, balancing insulin requirement against his interpretation of test results and continue these activities regularly throughout his lifetime. Both Type I and Type II persons must master the classification and calorific value of food and learn the significance of symptoms of high and
low blood glucose levels.

At the second level are those negotiable factors which are important for the maintenance of health, the prevention of long-term complications and the optimal function of all systems, i.e. regulation of eating habits, effective exercise and the maintenance of a constant body weight. The diabetic may need to modify his alcohol intake, stop smoking and even improve his personal hygiene, skin and foot care.

Becker and Rosenstock (1984) proposed a possible reason for non-compliance. As medical science has developed and the boundaries of knowledge have been pushed back, patients' expectations of care have been increased beyond what can be accomplished. Disease is multi-causal and reflects complex interactions between the physical, social, psychological and environmental. Regimens have increased in complexity with wider variety of, for instance, medications. Patients are asked to modify lifestyles, smoking and eating habits etc. - to what end? In the case of diabetes there is no cure and no certainty of prevention of complications, although the onset may be delayed and severity of complications may be lessened.

Moreover, the changes in lifestyle required may be intimately connected with beliefs that individuals hold about health and illness. In their 1975 Health Belief Model, Becker and Maiman seek to explain compliance in terms of beliefs which act as motivational factors. The model proposes a subjective
readiness to take action determined by the individual's estimate of how vulnerable he is to the disease, how seriously he views it and his evaluation of the proposed behaviour in terms of feasibility and effectiveness, weighed against his perception of the physical, psychological, financial and other costs involved in the proposed action.

Stone (1979) highlighted the number of independent variables dealt with by the model and the consequent drawbacks to planning interventions. It can be argued that the complexity of this psycho-social model reflects the complexity of the therapeutic regimen under discussion and can be used to demonstrate relationships between variables and take account of important factors such as professional, social and family support.

Problems of Prediction

The majority of studies in non-compliance have been conducted at the doctor/patient level, probably because of the professional responsibility medical practitioners assume for the safe and effective delivery of therapeutic care. The primary contributions to compliance research are from medicine and psychiatry (Koltun and Stone, 1986); consequently the major portion of the following discussion derives its substance from the medical model, ie how professionals, rather than the client, perceive the problem of non-compliance.

Demographic variables such as age, sex, educational level, socio-economic status, race or religion have either no or low
association with compliance (Peck, 1978). Becker and Maiman (1975) and Ley (1982), exploring socio-behavioural determinants of compliance, show that compliance is not consistently related to sex, intelligence, education or marital status. In the context of health-related behaviours, diverse variables can influence, but are not considered to be direct causes of, non-compliance (Becker and Rosenstock, 1984). Many authors consider these findings to be encouraging, since many variables are immutable - "it would be difficult to deduce from them any remedial methods to increase the rate of compliance" (Peck, 1978, p.349).

However there does appear to be a relationship, for example, between medication errors and extremes of age, and between non-compliance with therapeutic regimens and individuals with psychiatric disorders (Blackwell, 1976).

Attempts have been made to relate non-compliance to personality but Ley (1979) summarised his findings as showing no relationship between personality characteristics and non-compliance. Davis (1966) suggested that clinicians tended to blame non-compliance on the patient's personality and expressed little desire to understand, and little sympathy for, the uncooperative patient, demonstrating perhaps that the personality theory is a function of clinical frustration with an apparently insuperable and complex situation. Moreover health professionals themselves reflect the non-compliant behaviour demonstrated by individuals generally, with attitudes and
performance not unlike patients (Blackwell, 1976; Ley, 1982); they are also poor predictors of compliance (Kasl, 1974), may share pessimism concerning unfavourable outcomes and convey it subliminally to their clients. If they do not believe in the efficacy of the advice they offer, they are unable to teach therapeutic behaviour with conviction. While there may be treatment consensus, the physician's attitude to rigorous control may reflect the uncertainty described in the relationship between metabolic control and complications, or his own attitude to the quality of life (Dunn, 1986). Dracup and Meleis (1981) describe the counter-roles played by health professionals and others.

**Defining the Problem of Compliance in Diabetes Research**

The adequacy of an operational definition for research purposes is problematic. Sackett & Haynes' 1976 analysis of compliance studies questions the adequacy of the definitions in terms of replication of studies; Becker & Maiman (1975) state operational definitions vary among investigators. If there is concern, for example, in areas such as compliance with medication regimens, where behaviour is measurable in terms of pill counts and therapeutic effect, how much more of a problem is the measurement of compliance or adherence in diabetes care where there may be no specific prescription, many behaviours to be modified, varying intrapersonal levels of compliance and intangible long-term outcomes. Wise (1983) describes the aims of diabetes treatment as - (1) to achieve a blood glucose as near
as possible to that of the non-diabetic (2) to minimise or avoid "so-called complications" - the principles for achieving these aims being diet, insulin and exercise.

This simple statement concerning treatment underestimates the complex nature of the activities necessary to achieve the aims and demonstrates the problematic nature of a unitary construct of compliance with a therapeutic regimen in diabetes management (see The Nature of the Problem - p 21).

Glasgow et al (1985) argue that a construct validity problem also arises when applying Haynes' 1979 (p.1) definition - "the extent to which a person's behaviour, in terms of medication, following diets or exercising life style changes, coincides with medical advice", because physicians may operate different criteria for compliance and the intra-subject focus of care will change over time. Diabetes is a condition which affects individuals in all age groups with varying degrees of severity; the needs of individuals may be highly specific and may change as the condition responds or fails to respond to factors aimed at control - consequently emphasis may shift from eg, dietary compliance to medication. Drury (1984, p.233) writes "diet, insulin, monitoring, hypoglycaemia are the hard core of the curriculum", but as Glasgow points out (p.300), for some aspects of the regimen a prescription may never have been given "thus half the definitions become unavailable in research terms". It may not be possible to compare the actual with a known standard, if the therapeutic standard is only loosely defined and may vary
between physicians. Moreover, is the label of non-compliance appropriate if the individual correctly follows advice regarding his diet and exercise regimen, but neglects the monitoring aspect of self-care and does not succeed in modifying his smoking habit?

A further confounding variable is the strong movement towards self-management. Drury (1984, p.233) "core curriculum... is expanded to make the patient responsible for his well-being, enabling him to make frequent appropriate adjustment to treatment"; Glasgow et al (1985, p.300) "encouraged to play an active role in managing disease"; Hillson (1987,p.7) "you command your diabetes, it does not command you". Glasgow suggests that the study of within-subject change alleviates some of the problems associated with across-subject studies with different regimens, when the person's own behaviour is used as a baseline for comparison, instead of comparison of behaviour with a prescription.

**Conclusion**

The purpose of a literature review is to find patterns and relationships in empirical work which clarify theoretical positions and give direction to new research (Melnyk, 1988).

This review has explored two main concerns - the relationship between complications associated with diabetes and factors which may delay their development, and the problems of predicting non-compliant behaviour.

The study will explore some of the interacting factors...
which influence health care outcomes and the predictive ability of some variables within a modified health belief framework.

There is a trend away from intervention studies which emphasise the knowledge aspect of patient education. While essential knowledge is an important determinant of successful self-management, other factors such as beliefs and attitudes must be considered. Shillitoe and Christie (1986) state that a single-minded approach through information-giving is unlikely to result in behaviour change; moreover the link between metabolic control and the level of knowledge in diabetes care is not clearly established (Kasl, 1974).

Becker and Maiman's (1975) Health Belief Model is a psycho-social formulation developed to explain health-related behaviour and individual decision making under conditions of uncertainty. The model describes a subjective state of readiness to take action, determined by the individual's estimate of how vulnerable he is to the disease (in this study the complications), how seriously he views it, and his evaluation of the proposed behaviour in terms of its costs and benefits.

There is substantial empirical evidence supporting health belief dimensions overall (Janz & Becker, 1984) and specifically related to diabetes - for example, seriousness (Alogna, 1980; Cerkoney & Hart, 1980), costs and benefits (Harris et al, 1987; Cohen, 1983). However the model does not account for the role played by the expert (Stone, 1979); clearly those health care
professionals responsible for conveying the message cannot be excluded from the problem. This dimension gives direction to this study which explores ways in which informing, teaching and counselling skills can contribute to the solution of the non-compliance dilemma.
CHAPTER THREE
THE DESIGN OF THE STUDY

People diagnosed as Type II diabetics, the study population, are to be found mainly in the upper age groups of society and do not normally require admission to hospital on initial diagnosis. The condition is usually monitored in community settings by health care professionals and by the diabetic person him/herself.

The design of the study needed to recognise that participants are subject to multiple social influences on activities of daily living which cannot be controlled experimentally, but that it is these activities which constitute the study variables. It was therefore decided to adopt a quantitative and qualitative approach, which would combine a quasi-experimental study with case study data and dynamic concept analysis.

The design integrates two major theoretical considerations (Fig 1):-

(i) an educational process which draws on general education principles.

(ii) illumination of Health Belief Model (Becker & Maiman, 1975) variables through the dynamic concept analysis (Kontiainen & Hobrough, 1991).

Two levels of evaluation are derived from the combined approach (Fretwell 1985) and the methods chosen -

outcome - the quantitative data

process - data obtained from semi-structured prospective interviews and the conceptual models.
OUTCOME -

1) Preliminary survey (n=22)
2) General questionnaire (n=81)
3) Experimental study in compliance -
   - Group A (n=20)
   - Control (n=15)
   - Group B (n=16)

PROCESS -

4) Interview data
   - Dynamic concept analysis
   - New material created
   - Evaluated
A Feasibility Study and Preliminary Survey

Feasibility Study

The setting - a diabetic Out-Patients' Department clinic.

From 50 to 70 diabetic patients attend the clinic every Tuesday morning between 9am and 12.30pm. The health care team consists of 2 consultant physicians, a senior registrar, a dietician, a clinical nurse specialist and a chiropodist. The out-patient nursing staff provides the nursing support eg taking blood specimens, weighing patients, testing urine, while a voluntary worker/member of the British Diabetic Association provides information, gives out advice leaflets and sells books on dietary guidance, recipes and on the general management of diabetes.

The clinic operates in cramped conditions, with a small waiting area. Facilities for refreshments are available in the main waiting area of the out-patients' department, where new appointments are also made and prescribed drugs are dispensed.

Specimens of blood are taken in a closed clinical area but patients are weighed in a public corridor which runs the length of the clinic. Patients are called by a nurse when the consultant signifies he is free, or more informally by the doctor himself. A tolerant atmosphere prevails, but uncertainty is created by unpredictable waiting times, lack of management continuity and, especially in the elderly, inability to interpret
All the patients will have been seen by a member of the team by the time the clinic is complete; some of the dietician's clients may be in need of dietary advice and reinforcement only, while others require additional supplies necessary for the management of their condition.

The Type II diabetic patient is referred to the diabetic clinic:-

through his own GP who may consider that the management of the diabetic condition needs to be reviewed and he either does not have the expertise (eg dietary or medication management) in the specialty, or he thinks the patient may manage his own condition more effectively if seen on a regular basis in the clinic, or from a hospital where he has been recently treated and where diabetes has been diagnosed as an inadvertent finding, or through a visit to an optician where diabetes is suspected from retinal changes seen on examination.

Clinics provide for both sexes, all ages, newly diagnosed and long-standing diabetics, Type I (IDD) and Type II (NIDD), and those who may not have had their condition confirmed. One clinic every 6 weeks is designated for younger diabetics (under 35 years) and this clinic is usually less busy than the more general clinics as described.

The consultation.

In established cases, the interval between clinic visits is...
largely determined by the control the client is able to exert over his condition. For example, the limits within which he is able to maintain his blood glucose levels and control his body weight, or by the presence of signs and symptoms which indicate known complications associated with the condition. The consultation time was observed to be between 7 and 15 minutes per patient; many of the diabetic patients are well known to the two physicians regularly in attendance and the consultation will consist of general enquiry regarding management of everyday events involved in their care. Patients normally keep a record of blood glucose and urine testing results; these are examined and commented upon or advice given where necessary. A more in-depth assessment may take place if there are indications that this is required, for example the patient may remark that his vision is occasionally blurred, a symptom which may require adjustment of present treatment, some reassurance, referral to another specialty, or a shorter than usual interval before the next appointment.

The patient may be accompanied by a spouse or parent, who is free to take part in relevant discussion and sometimes may be a crucial member if, for instance, the patient is blind or relies upon his partner for monitoring support.

The information available from the patient's medical records

- Normal demographic details-address, age, marital status
- Clinical information
  - Weight/height (if young adult or first visit)
  - Specific to diabetes (either from patient's own record of management or obtained by the clinic nurse) - urine testing, blood glucose/HbA1c; details of
medication - oral agents or insulin regimen
Clinical comment (related to management of condition);
hypoglycaemic incidents; injection sites if IDD;
weight variations; indicators of complications -
circulatory (smoking); visual acuity; skin; blood
pressure
Patient's own comment (if pertinent to management) and
advice given
Date of next visit (referral to other specialist, eg
dietician, chiropodist etc.).

Diabetes Audit - the Patient's Needs

The activities undertaken in clinics have been under recent
review as the philosophy of diabetes management changes.

Hill (1986) suggested that knowledge assessments should be
carried out and norms set for a clinic as part of a systematic
audit of diabetes care. Shillitoe (1988) has observed that
hospital-based clinics tend to be impersonal, inefficient and
time consuming. A position statement developed by the Committee
on Professional Practice of the American Diabetes Association,
published in Diabetes Care (1989), defined basic care for people
with diabetes. The initial visit should include a comprehensive
medical history and a physical examination. Continuing care was
considered an essential feature in a management plan which should
be reviewed to determine progress in meeting goals and
identifying problems. The review should include nutritional
evaluation, weight control, exercise regimen, control of blood
glucose, assessment of complications and psychological
adjustment. In addition, knowledge of diabetes and self-
management skills should be reassessed at least annually. The
management plan should be formulated as an individualised
therapeutic alliance between the patient/family, the physician and other members of the health care team, to achieve the desired level of diabetes control. Insulin-dependent (Type I) diabetics may receive this optimum support; the nature of the condition means that reports of hypo/hyperglycaemic incidents create teaching opportunities; the age of the patient may also determine the level of teaching input; Type I diabetics tend to be younger and are often accompanied by a parent.

In this study however, no structured method of assessing knowledge and self-management skills or creating learning opportunities was observed for Type II patients visiting the clinic. The exception was the dietary instruction, which the newly-diagnosed diabetic received at the end of an initial clinic visit, when he/she was already overloaded with information about the condition.

Observation was carried out with the permission of the physicians and patients - in the waiting area, the dietician's and clinical nurse specialist's clinics and during the patient's consultations with the physician.

Liaison was established with the Medical Records department and permission obtained to examine medical records prior to the commencement of each clinic, and with the Medical Secretary's department to examine records after the clinic visit. The purpose of the study was discussed with all nurse members of the diabetic clinic staff. Medical ethical committee permission was obtained.
Twenty two semi-structured interviews were obtained from a convenience sample n=22 (9 male, 13 female): criteria – Type II diabetics diagnosed more than 6 months and more than 55 years of age.

(a) More than 6 months, less than 3 years diagnosis ...
(b) More than 3 years, less than 8 years diagnosis ...
(c) More than 8 years diagnosis ...

Aim - to gain a general impression of the extent and nature of the difficulties diabetic persons encounter. Specific factors which are most frequently quoted in the compliance and diabetic literature – adherence to dietary advice, maintaining weight control and cessation of smoking – were addressed and psycho-social concerns expressed by subjects were included in the data.

Question 3 – Responses to the questions suggested that eating habits had changed – 59% (13).

All respondents cited refined sugar and fat intake as the main change and of those who had made no changes, the majority already followed an acceptable pattern of eating. One respondent, who admitted eating excessively, mentioned sausages and cream cakes; cultural factors influenced non-adherence in another (an Italian who liked pasta, dumplings etc.).
Question 4 - Difficulties concerning weight - 54% (12).

Those who acknowledged a weight problem appeared to have been successful in losing some weight, but were still considerably overweight, both in their own judgement and as assessed by the clinician or dietician - in most cases between 13 and 26 Kg in excess of desirable body weight. There seemed to be an inconsistency between the diabetic's own account of his eating habits and his weight gain.

Question 5 - Exercise - 54% (12).

Regarding exercise, cross-subject diversity (especially social circumstances) was highlighted; activities ranged from walking dogs (3 persons), gardening and housework (male and female respondents), attending to the needs of an elderly or invalid spouse, to "walking round the flat".

The elderly diabetic person may have multiple pathology, eg he/she may have respiratory problems, arthritis, be generally less mobile, or incapacitated as a result of what may be a specific diabetes complication, (one respondent's activity was restricted as a result of a toe amputation). Eye defects may also physically restrict activity in those who wish to be more active and even in this small sample, there were accounts of falls and fractures.

Question 6 - Smoking habits - 13% (3) still smoking.

Smoking habits had changed, although those who had given up (3) did so, not as a result of the diagnosis of diabetes, but because of advice about pre-existing pathology, eg a cardiac
amputated, had responded to the advice of the consultant surgeon at the time of the recent amputation, although he had been smoking, and been a diabetic, for over 60 years.

**Question 7 - Drinking habits - 36% (8).**

A number of those interviewed drank alcohol. For two of those who did drink, it was a daily occurrence of two and four pints of beer a night respectively.

**Question 8 - Literature - 49% (10).**

A number of respondents had read about diabetes. This ranged from "Knowing About Diabetes" (Wise, 1983), and leaflets available in the clinic on specific aspects of care, eg of the feet and eyes, to educational material produced by the BDA and available to members of the Association. A disquieting response, "What is there to know?" (3) could be construed as low-level understanding, satisfaction with what may be perceived as adequate management, or a genuine, but naive, enquiry. Long duration of diabetes did appear to distance the diabetic from the current literature and raises a question concerning the effective targeting of information.

**Question 9 - 32% (7).**

A desire to share experience and to learn from others in similar situations was expressed.
Although the possible complications of diabetes were not introduced into the interviews and the word complications was not used by the interviewer, nevertheless some anxieties were expressed which suggested underlying knowledge concerning complications and anxiety about their implications. The majority of those interviewed mentioned their eyes, either to describe symptoms experienced, or simply to talk about their fears of deterioration in visual acuity, particularly where it related to some other important aspect of their life, eg the need to drive a car or to pursue a pastime such as needlework or reading. Similarly, some respondents were worried about foot problems and a fear of insulin injections was expressed, especially where IDDM was already present in the family. One person feared a change of personality, which she believed a friend had undergone when diabetes was diagnosed.

A number expressed unhappiness and one, considerable anger and frustration that she had increasing symptoms of possible complications, ie deteriorating eyesight and a loss of peripheral sensation, which she was convinced could have been prevented if she had received adequate information when first diagnosed more than twenty years ago. Worries were also expressed concerning a spouse who is a NIDD, but who ignores the condition, while one respondent stated that the diabetes was not serious because she did not have to administer insulin, a contention which may correspond to a lay perception that a drug injection involving physical discomfort implies a degree of seriousness, while an oral medication does not (Gill, 1986).
Conclusion Within the Framework of the Health Belief Model

Concern about health matters

While the diabetic who adheres totally to all recommendations may develop complications, there is no certainty that the non-adherent, persistently overweight, person will do so. Many will remain symptom-free throughout their diabetic life. This is a major factor which may militate against a high degree of motivation to comply. Most thoughtful individuals require evidence that activities which curtail pleasurable experiences, will be beneficial.

Perception of vulnerability

To what extent should the individual be made aware of complications if there is no certainty that they will develop? Fear arousal may indeed be counter-productive as a motivating factor, especially if there is no certainty of its effectiveness. On the other hand, early assessment of the individual diabetic's need for knowledge about the condition is of primary importance.

Perception of severity

There is a lay perception that NIDDM is less severe and longer-term complications less serious than IDDM (Gill, 1986). This impression may be reinforced by the diabetic/health professional; IDDs receive more attention during clinic visits and community follow-up and are subject to more physiological monitoring. Attempting to lose weight or maintain control over weight, the main feature of Type II management, is not readily
labelled therapeutic and may not be perceived as such by family and friends involved in social support.

**Costs and benefits**

The financial burden of dietary changes and compliance may be comparatively modest; the BDA (1982) recommendations which supported an increase in the proportion of carbohydrates in the diet mean that sometimes cheaper food products are appropriate and expensive, refined foods can be avoided. The costs of adherence, however, are not simply financial; the social significance of the shared experience of eating is important in human relationships and the nature of domestic relationships must be considered when assessing the feasibility of dietary changes.

**Cues to action**

"Motivation, perception of severity, vulnerability, cost/benefit barriers - are the filters of data, the cues are the data" (Di Matteo & Di Nicola, 1982, p.139). Data includes the nature and content of the doctor/patient relationship and the obligation, implicit in a continuing professional relationship, to follow advice. Mass-media campaigns for general health care and maintenance are also cues to action which infiltrate all aspects of daily living.

However, individuals may not have access to all that they could know about their condition and levels of awareness must vary as in the general, non-diabetic population, beliefs may be erroneous or based on uncertain knowledge which reflects the dynamic nature of modern diabetes management.
The Health Belief Model explains beliefs at the level of individual decision making and may predict subsequent health-related behaviour. Compliance with therapeutic regimens may change beliefs eg the individual who feels generally better when he has lost weight, may change his original belief that losing weight will not help control his diabetes, although the relationship between weight loss, feeling well and long-term complications is difficult to conceptualise.

On the other hand, it is presumed that belief is an antecedent of a predisposition to comply/adhere, but an attitude eg which predisposes to acceptance of expert advice, may be separate and distinguishable from a general set of beliefs which the individual holds about himself and his present condition. These are complex issues which must be considered in the context of chronic and incurable conditions such as NIDDM and the demands made on an individual of a lifetime's adherence to constrained patterns of daily living.

The main study will address some of these issues.
The Main Study

Finally, in order to obtain information about the general level of knowledge of those attending the clinic, a 15-validated-item questionnaire (Dunn et al, 1984) was administered to a random sample of the clinic population (n=81) over a period of 4 weeks. All patients at that time were subjected to routine blood glucose monitoring; lists of blood glucose recordings of all clinic attenders (12 weeks), completed the collection of data from which a general impression of the style and management of the diabetic clinic could be inferred.

Description of Study Methods

To obtain the sample for the experimental study, the plan was as follows:-

All medical records for clinical attendance were "pulled" by medical records department staff prior to the clinic. The records were inspected for potential subjects who fulfilled the entrance criteria for the study:-

Non-insulin dependent diabetics -

Group 1 : diagnosed less than 1 year, over 55 years of age

Group 2 : diagnosed more than 1 year, over 55 years and receiving no medication other than oral hypoglycaemic agents.

At the same time an historical control group for Group 1 was obtained from Medical Records.

This longitudinal study took place over a period of 18 months - from 8th August 1988 to 26th February 1990 - during which time 77 potential, 5-hour teaching clinics took place.
A semi-random sample of the clinic population of newly-diagnosed NIDDs was obtained by identifying alternate patients - if there was only one that week, he/she became a potential subject.

Very early in the study, it became obvious that this method would not generate enough subjects over the proposed time span. A diabetic clinic in another Health District was considered for inclusion. Consent was obtained from the diabetic consultant and letters were sent to fourteen possible subjects. Responses indicated that the geographical position and time constraints precluded use of this alternative source. One month into the study it was decided that all newly diagnosed NIDDs should be considered as possible subjects, ie a convenience sample.

A clinical profile form and a map showing the way to the teaching area were inserted in the front of the medical notes to indicate to the physician that this patient was a potential subject in the study.

The clinical profile - a clinical assessment form was piloted in the clinic prior to the main study; minor changes in the layout of the form were subsequently made (Appendix A). Decisions were made about the content and sequencing of individual teaching programmes from this profile, which was an assessment by the physician and/or other members of the health care team. Congruence with medical management could thus be ensured.
Information about ideal body weight, actual body weight, target body weight (ie the aim for that patient) and other relevant clinical details such as blood pressure, smoking and exercise habits, were included. The target weight was discussed with the subject who brought the profile to the teaching session.

The nature of the study was explained and consent obtained for inclusion of the subject in the study. A semi-structured interview was conducted by the researcher and the planned individualised sequence of teaching was commenced (Chapter 4). Two further sessions were discussed and appointments for them were made. If the diabetic clinic appointment interval was longer than 3 months an additional appointment at a shorter interval was agreed. Each session's length was approximately 30-45 minutes. Brief notes were made at the time and a case history was subsequently derived from this information.

A further inspection of the patients' medical records was made after the clinic sessions to ascertain the reasons for potential subjects' non-entry into the study, eg through non-attendance at the clinic, because he/she did not wish to proceed, or because some other pathology was being investigated. A check was also made at this stage on the subjects' recorded weights and the date of next clinic appointments.
CHAPTER FOUR

UNDERSTANDING DIABETES

On Developing a Course

This chapter describes the development and integration of the education and experimental processes.

The terms "course" and "programme" have been used interchangeably in the study so far; both terms may be employed, but programme is frequently used where the entire teaching/learning activity is to be encompassed; it is obvious that not all teaching or learning in the world of the diabetic person can be contained within a programme, thus a course, a small "series of organised sessions within a programme" (Hobrough et al. 1990, p.11) best describes the educational endeavour.

Patient education must be a purposive activity pursued within an identifiable theoretical framework. Curricular design and development experience in the field of general education is helpful when considering the approach to be taken to a patient-teaching programme.

Kelly (1982) stresses the importance of planned innovation, to meet the challenge of a changing society and the integrated and coherent nature of that activity. He emphasises the
dynamic characteristics of the setting, the learners and the teachers, which, it will here be suggested, are applicable to clinical activities, health care professionals and patients.

Stenhouse (1975), defined a curriculum as an attempt to communicate principles in a form open to initial scrutiny and capable of effective translation into practice. This chapter will draw on key concepts in this definition - communication, accountability and the practical nature of the activity in developing a patient-education model.

In a previous study, where the role of the nurse as a patient-educator was analysed (Wilson, 1986), the application of an adapted systems curricular model (Chadwick & Legge, 1984) was described. A similar approach will be elaborated in the following pages. The model develops, in a cyclical form, the conventional linear elements, aims and objectives, content, method and evaluation (Tyler, 1949). The systematic interrelationship which exists between the elements in this model will illuminate the process of designing, implementing and evaluating this course. This early model possesses the positive attributes of clarity and unambiguity (Hobrough, 1990) appropriate to an activity which has clinical implications.

An outline plan which incorporates the study variables and the key concepts identified from the literature, provides the introduction to this analysis (Figure 2).
Figure 2 - Outline plan incorporating key concepts and variables from the literature

PHILOSOPHY
General -
Societal trends
NHS changes (p 1)
Community care

Specific -
Development of knowledge about diabetes (p.11)

AIM
1) Near to normal life with diabetes (p.27)
2) Complications-retarded, arrested, prevented (p.14)

SETTING
Environment appropriate

EVALUATION
Ideal body weight
Actual body weight (p.139)
Knowledge/understanding (p.55)

HEALTH BELIEF FRAMEWORK (p 28)
- Seriousness
- Vulnerability
- Social Support
- Benefits/costs
- Physical
- Psychological
- Social

CONTENT
Essential
Important
Desirable (p 60)

METHODS (p.81)
- Adult learning
- Self-direction
- Self-motivated
- Past experience
- Self as resource

MATERIALS (p 85)
- Literature
- Visual aids
What are the principles which must inform the course and determine the aims?

Professional relationships in diabetes care now focus on a therapeutic alliance between the patient, the family, the physician and other members of the health care team (American Diabetes Association, 1989). Standards set for management of the condition include teaching and learning. Patient-teaching is an integral part of patient care (Jenny, 1978). The existence of professional associations in the United States and the United Kingdom and the continuing growth of units promoting self-care activities are proof that physicians want diabetics to understand about their bodies (Drury, 1984).

Historically this was professional knowledge not considered to be within the domain of the patient and even now it can be argued that outside the specific area of diabetes care this philosophy does not predominate. In a 1991 study undertaken by the Consumers' Association, of one thousand patients in outpatient settings, one in five did not receive information about their condition or prescribed drugs, even though they wanted this information. It is the nature of present knowledge about diabetes management that has determined the changed perspective.

Evidence for the relationship between good monitoring behaviours, compliance and outcomes must motivate professionals to provide stimulating and varied approaches to teaching and learning which acknowledge the adult and his vulnerability. Many centres subscribe to this philosophy, with residential
educational centres (Etzwiler, 1978), designated teaching areas and day-centres (Beggan & Drury, 1985).

Aim

Drury (1984, p.233) captures completely this philosophy for a course:-

The aim should be -

to provide the possibility for the best possible control in the circumstances of this particular patient..............to minimise complications by a programme which neither distorts his life nor impedes his reasonable expectations.

The elderly diabetic, the subject of this study, has been neglected in diabetic education (Knight & Kesson, 1986) but knowledge about Type II diabetes (NIDDM) supports the view that this is a patient at risk.

However, over-emphasising risk and seriousness may be counter-productive in the context of learning, by raising personal anxieties to a level at which the individual may not function effectively. Knight and Kesson suggest that some individuals in this older age group may even believe diabetes to be synonymous with cancer. The fear arousal which this potential confusion of thought may inspire, serves to illustrate key concerns in the planning of this patient-education course:-

1) Firstly, what are the relationships between the principles, the aim and the purpose of the course.

2) Is an objectives model appropriate.

3) How can the sensitivities described above be respected, taking an objectives approach.
The overall purpose of this course is educative, but there are some parts which can be described as informing and counselling and thus distinguished from the educative. Information may simply be provided in the form of eg. leaflets about the condition; counselling is concerned with finding solutions to problems through self-knowledge, while teaching is concerned with creating a learning environment.

The newly-diagnosed diabetic is central to the course. He is a vulnerable adult with needs which he may not yet recognise or acknowledge. He is an individual with his own experience in the world and a repertoire of personal coping strategies which may be activated by the skilled teacher but must not be exploited or manipulated beyond the point at which persuasion could be defined as coercion.

The androgogical perspective has been tacitly acknowledged; the learner is a diabetic whose condition is described as of maturity onset; the study population is between the ages of 40-75 years. The concept of adult education emphasises self-directedness and the role that past experience plays in determining learning outcomes. Diabetics must acquire essential skills and reach levels of proficiency if they are to assume control of the condition and the effect that it may have on their activities of daily living. These essential skills can be described in behavioural terms eg. the ability to test urine accurately after demonstration of the skill and the opportunity to practise it X number of times. It can be argued that these
activities require no understanding other than that needed for any basic skills acquisition, eg dipping a test stick in urine, observing colour change, recording the result.

Objectives

Behavioural objectives are thus the antithesis of adult education concepts, but diabetics must be seen to have mastered skills for their immediate personal safety; longer-term well-being in this context can be addressed through other approaches. It is concluded that behavioural objectives need to be set for specific skills acquisition, if the health care professional is to discharge his professional responsibility.

While acknowledging the behaviourist implications of objectives (Mager, 1962) and the apparent paradox of their use in an adult education context, the main area of contention is concerning worthwhile knowledge. This is not an issue here, where the worth of some knowledge has been established because it is essential for near-normal living (p 56). However, the range of information/counselling/education need between subjects may be wide and for this reason a hierarchy of course objectives was decided upon. This would allow information to be offered at a rate commensurate with the subject's possibly reduced ability to assimilate large amounts of new information on a single occasion and at a cognitive level appropriate for perceived need. The physical unsuitability of the clinic setting as a creative, psychologically safe, learning environment has been described (p 32) and cognitive levels are based on assumptions, which may
alter as more becomes known about the subject during the study.

Resler's (1983) hierarchy of teaching responsibilities for diabetes care, describes:-
Level 1 - immediate and essential need to alter present health status
Level 2 - longer-term preventative behaviour associated with retarding/preventing known complications
Level 3 - conceptual understanding of the condition which will promote 2 above

The precision suggested by a hierarchy such as that proposed, would be difficult to sustain as a hierarchy in practice. There must obviously be a net-working of objectives from all levels, which would highlight the individuality of the subjects and their practical application and would ultimately meet the broad aim of the course.

The following objectives operationalise what were considered to be the essential elements of diabetes care, integrated within criteria for judgement of the soundness of objectives (Gronlund, 1970) as follows:-

1. Is it real and understandable?
2. Is it defined in terms of learner behaviour?
3. Is it achievable?
4. Is it reasonable?
A) **Monitoring activities**

The diabetic person will be able to:-

1) test his urine accurately following oral advice and illustrated instruction from a booklet provided.

2) state whether glucose is present and record its presence-absence in a monitoring record book.

3) explain the presence of glucose in urine.

4) act to reduce the presence of glucose by adjusting the type, amount, time of food/fluid intake.

B) **Knowledge**

The diabetic person, as an adult learner, will already know the general relationship which exists between body weight and food intake. He/she will be able:-

1) to engage in dialogue about the glucose/carbohydrate/fat content of foods.

2) to demonstrate the relationship between food intake and presence of glucose in urine, by discussion of the basic classification of foods into groups which may be taken freely, in moderation, or are restricted.

3) to explain the relationship between urine excretion, food and fluid intake.

4) to explain the relationship between an ideal body weight, insulin and the use of glucose for energy.
If the objectives so far described are successfully achieved the behavioural outcomes will be:-

1) accurate monitoring and recording and appropriate action as a result of urine testing.

2) maintenance of an ideal body weight through appropriate eating habits.

3) maintenance of blood glucose levels through a combination of (1) and (2).

These objectives describe mainly Level 1 activities which allow the individual to function, but overt behaviour may not necessarily demonstrate permanent change or result in increased understanding. The objectives should encompass the ultimate aim for the individual and the course. The person is the sum of all his domains - cognitive, psycho-motor and affective; objectives must also address beliefs about, and attitudes to, diagnosis and future management of his life with diabetes if the aim is to be attained.

Jennings (1988) suggests that understanding is fundamental to treatment and that there are benefits accruing from improving knowledge, but how the diabetic perceives the situation will determine his ultimate behaviour. Long-term management is a complex issue, because the relationship between metabolic control and the known complications associated with the condition is uncertain. Even more problematic is a relationship between attitudes/beliefs and metabolic control.
Attitudes and Beliefs

The notion of an interaction between teaching, informing and counsellng activities was introduced earlier; a key feature in all these activities is promotion of personal coping strategies through understanding. The health care professional may seek to persuade on the basis of good evidence, but must ultimately accept the individual's right to make choices. Skilled helping allows the individual to explore alternatives.

Becker and Rosenstock (1984) partially explain non-compliance by the perceived failure of medical science to keep pace with society's expectation of a disease-free future. In the context of diabetes mellitus that is particularly salient; human insulins can now be manufactured by advanced bioscientific techniques while implants of insulin delivery systems and pancreatic tissue transplantation are available, but production of an oral substance which will replace insulin is still out of reach. Given this situation and the uncertain nature of the relationship between metabolic control and possible complications, a different approach was needed regarding the diabetic person's attitude to his condition - Eisner's (1985a) expressive objective - identifying a theme around which skills learnt earlier can be brought to bear. The expressive objective accounts for diversity and individuality, key variables identified in this study. Eisner states that an expressive objective should evoke and not prescribe - meaning is personalised and evaluated through reflection. These sentiments
fulfil the criteria where the theme identified is that of self, self-esteem through the challenge of self-management and the mastery of self-monitoring skills.

The final objective therefore states - that with the support of health care professionals and access to available knowledge, the individual will be able to explore his personal strengths and the meaning diabetes has for him.
The following figure summarises the discussion up to this point:

Figure 3 - On developing a course - The aim and objectives
Content

Paterson (1990) suggests simple general advice for newly-diagnosed diabetics while Coles (1989) questions the usefulness of anatomy and physiology of the pancreas, biochemistry of glucose metabolism and patho-physiology and proposes instead an activities of living model. The simplicity of the content is related to the clarity with which it is presented; the nature of the essential knowledge, described earlier, does allow for both these aspects to be considered. It is at the level of non-essential knowledge, that which is considered necessary for understanding, where this seemingly scientific knowledge may be appropriate. If there is an area of uncertainty, it can be argued that it is the sequencing of content, the way in which the content is structured and the framework in which it is offered, which are key factors. Diabetes self-management is concerned with everyday activities; the content in this course was set within the study context of a semi-structured interview (Method p 78) and the substantive aspects of the condition incorporated into an activities of living framework.

A conventional linear approach to content for a course is through the objectives, but where essential knowledge is to be imparted, a two-way relationship exists and the content will, to some extent, determine objectives, the key issue being the type of approach to be adopted (p 53), ie behavioural or expressive.

Rowntree (1982) suggests sources from which pragmatic decisions concerning content can be derived eg. from those who
practise professionally, who teach the subject and/or are engaged in research. Some of these are included in the following discussion. The content must reflect both professional knowledge and experience, current thinking and practice; it must be reputable and credible. A consensus on principles of care was obtained from the clinical team responsible for the clinic population—two physicians, a dietician, a clinical nurse specialist and a chiropodist. The consensus was substantiated by analysis of the literature (Chapter 2), a small sample interview and the results of a random questionnaire to the clinic population.

From these sources of information and advice, it was concluded that the validity criteria were satisfied i.e the material is true and authentic at this time. Some aspects of the disease process cannot be refuted, there is a relative lack of insulin or an inability to use that which is produced effectively. Basic physiological knowledge can be substantiated. The nature and characteristics of foodstuffs can also be verified and, to the extent that the field of knowledge in this area has been developed, evidence does associate the body weight variable with effective utilisation of insulin.

Nichols and Nichols (1973) suggest that another criterion, significance of the content, must be satisfied. In general education the discussion has centred mainly on whether the learning is concerned with facts and absolute knowledge or
the exploration of ideas and concepts which promote understanding. In this patient education course, it has been established that a hierarchy of teaching responsibilities is appropriate; there is essential immediate knowledge, but understanding, by assimilation of knowledge into existing cognitive structures, requires abstractions to be made accessible. On the one hand there is content with immediate significance and, on the other hand, content where the implications are intermediate to long-term but no less significant.

The following pages contain the content of the course; Figure 4 relates the content to the objectives for the course.
UNDERSTANDING DIABETES
AN INTRODUCTION TO DIABETES

All body cells need GLUCOSE which is mainly obtained from the food we eat. The cells can only have access to this glucose if there is sufficient INSULIN present to help the glucose to enter the cell. In DIABETES MELLITUS there is not sufficient insulin available to allow this to happen; glucose cannot reach the cells and in an effort to regulate the amount which remains in the circulating blood some will be removed from the body in the urine.

In NON-INSULIN DEPENDENT DIABETES:—
Either normal amounts of insulin are produced but it is not used efficiently
Or not sufficient insulin is produced by the organ responsible for this—THE PANCREAS.

Although the condition cannot be cured, symptoms can be dramatically improved. Many diabetics need only take an active interest in understanding the action of the food they eat and MODIFYING their EATING HABITS accordingly. at the same time appreciating the importance of MAINTAINING AN IDEAL BODY WEIGHT

Diabetics can lead a normal, happy and active life.
If the body cannot use glucose

You may feel generally tired and unwell as cells only work efficiently if they receive the glucose they need. You may feel thirsty and your skin may look dry if large amounts of urine are passed to remove some of the glucose which cannot reach the cells, from the body.

There is normally NO GLUCOSE IN URINE but a simple test will indicate whether glucose is present. Higher than normal levels of glucose in the blood, if allowed to persist, can bring about unwanted changes in the state of small blood vessels which serve important structures such as the retina of the eye and the kidneys.

You can help to control your diabetes by increasing your understanding of all aspects of the condition.

Cigarette smoking is harmful.
Understanding the food you eat

All foods are a source of ENERGY which is usually measured in CALORIES.
You will only gain weight when your energy intake exceeds your energy output - when you eat more than your body needs.
Cells use glucose to produce the energy needed for all cell activity, which continues even when we are sleeping or resting; additional supplies are needed when we EXERCISE.
All foods contain one or more of the following substances -
CARBOHYDRATES.
FATS
PROTEIN.
All foods can be used by the body as an energy source, carbohydrates are more rapidly digested and absorbed and are preferred by the body for this purpose.
There are two main types of carbohydrate -
sugary - rapidly absorbed - "bad" eg. sweets, sugar, cakes etc.
starchy - less rapidly absorbed - "good" eg. cooked dried beans, wholemeal bread, brown rice etc.
and one which is in between - eg. white bread, cornflakes etc.
If, as in Non-insulin dependent diabetes there is insufficient insulin or it is not being used efficiently, rapidly absorbed carbohydrates will cause a rapid rise in blood glucose levels, which is not desirable.
If you need to reduce your weight

Losing weight means eating less than you think you need, perhaps less high calorie food, especially those foods which contain fat.

Many foods we easily recognise as fats eg butter, margarine and the fat on meat but there is less obvious fat in protein-rich food such as milk, cheese and lean meat.

You can reduce your weight by increasing the kinds of food you eat which are rich in fibre and reducing the amount of fat you eat. Fats contain twice as many calories as carbohydrates or protein. Too much fat can cause circulatory problems. Avoid sugary foods.
Maintaining an ideal body weight

If you do not need to lose weight, you will need to maintain your normal calorie intake but to consider the kind of food you are eating; this will mean removing the sugary carbohydrates from your menu and substituting starchy HIGH FIBRE foods. As the calorie values for the same weights or portions of different foodstuffs will vary, it may be useful to obtain a calorie counter;* this will enable you to make appropriate EXCHANGES without reducing your calorie intake.

eg. plain yoghurt = 15 calories per oz.
flavoured yoghurt = 25 calories per oz.
salad cream = 110 calories per oz.

*The British Diabetic Association has produced a book - Countdown which will provide this information.
High fibre foods

These foods take longer to digest and are only slowly converted into glucose in the body. Because they remain in the stomach longer they will satisfy hunger better than foods such as sweet biscuits and cake; this will be helpful if you are eating less than you are accustomed to eat. High fibre foods are good for everyone; they help to prevent constipation by giving bulk to the food we eat — wholemeal bread, breakfast cereals such as Shredded wheat, Weetabix and All-bran, potatoes cooked in their skins are some examples. Many high fibre foods such as baked beans, cooked lentils and dried beans are protein rich foods and can replace meat in a meal. This will reduce the amount of animal fat consumed and help to maintain a healthy blood circulation.
Exercise.

Regular and appropriate exercise should be part of everybody's normal daily routine. Any activity such as sport, gardening, walking the dog, will allow the body to use glucose efficiently and lower the level in the blood. A regular exercise routine will, in time, contribute to weight reduction. Exercise is easier if you do not smoke as you will be able to expand your lungs and breathe more easily.
Some general points

You are heeding all the advice you have been offered but you must always be aware that it is important to pay extra attention to some seemingly unimportant everyday activities. The feet rely on small blood vessels for their nourishment; this supply is vulnerable to pressure from shoes which do not fit. The chiropodist can advise you if you have shoe-fitting problems. Feet should always be carefully washed and dried, every day. Socks, tights or stockings should be clean and also fit properly. Toenails should be cut with care; corns and callouses must be treated by a chiropodist. Do consult your doctor if you notice any change in the colour of your toes or you have a minor abrasion which does not heal.
In the diabetic clinic you are offered a special opportunity to protect your eyes; regular examinations can be carried out in the Guildford area and the result of the examination will be reported to Dr. Smith. In this way it is hoped to discover, at an early stage, any changes which could cause visual problems if they were allowed to go undetected.

Smoking is harmful to the blood circulation of diabetics and non-diabetics; the products of cigarette smoking damage small blood vessels but diabetics may be more vulnerable to these effects.
**KEY WORDS**

<table>
<thead>
<tr>
<th>CONCEPTS</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. An introduction to diabetes</strong></td>
<td>A3, B3</td>
</tr>
<tr>
<td>Glucose</td>
<td></td>
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<tr>
<td>Insulin</td>
<td></td>
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<tr>
<td>Ideal body weight</td>
<td></td>
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<tr>
<td>Modifying eating habits</td>
<td></td>
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<tr>
<td><strong>2. If the body cannot use glucose</strong></td>
<td>A1</td>
</tr>
<tr>
<td>No glucose in urine</td>
<td>Attitudes/</td>
</tr>
<tr>
<td>Unwanted body changes</td>
<td>beliefs</td>
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<tr>
<td>Control of diabetes</td>
<td></td>
</tr>
<tr>
<td><strong>3. Understanding the food you eat</strong></td>
<td>A4</td>
</tr>
<tr>
<td>Understanding</td>
<td></td>
</tr>
<tr>
<td>Digestion/absorption of CHO</td>
<td>B1 - 4</td>
</tr>
<tr>
<td>Calorie</td>
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<td>Sufficient/efficient</td>
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<tr>
<td>Glucose</td>
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<td>Insulin</td>
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<tr>
<td><strong>4. If you need to reduce your weight</strong></td>
<td>B1, B2</td>
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<tr>
<td>Fat, fibre</td>
<td></td>
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<td>CHO, protein</td>
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<tr>
<td>Reduce weight</td>
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<tr>
<td><strong>5. Maintaining an ideal body weight</strong></td>
<td>A4</td>
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<tr>
<td>Normal calorie intake</td>
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<tr>
<td>Food exchanges</td>
<td>B4</td>
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<tr>
<td><strong>6. High fibre foods</strong></td>
<td>A4</td>
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<tr>
<td>Digestion</td>
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<tr>
<td>Healthy blood circulation</td>
<td>B1, B3</td>
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<tr>
<td>High fibre foods</td>
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<tr>
<td><strong>7. Exercise</strong></td>
<td>B4</td>
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<tr>
<td>Weight reduction through exercise</td>
<td>Attitudes/</td>
</tr>
<tr>
<td>Smoking harmful</td>
<td>beliefs</td>
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<tr>
<td><strong>8. Alcohol</strong></td>
<td>B3</td>
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<tr>
<td>Not consumed on an empty stomach</td>
<td></td>
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<tr>
<td><strong>9. Some general points</strong></td>
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<tr>
<td>Hygiene</td>
<td>Attitudes/</td>
</tr>
<tr>
<td>Foot care</td>
<td>beliefs</td>
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<tr>
<td>Heeding advice</td>
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<tr>
<td><strong>10.</strong></td>
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<tr>
<td>Eye care</td>
<td>Attitudes/</td>
</tr>
<tr>
<td>Smoking/blood circulation</td>
<td>beliefs</td>
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</table>
Rowntree (1982) suggests other media sources from which decisions concerning content can be made; these fall into the category of what the learner can be involved in.

The British Diabetic Association is a registered charity supported by voluntary donations whose aims are to educate and inform. Its activities range from raising and distributing funds for research and organising professional conferences, to running educational holidays for children, teenagers and their families. Its education service provides audio-visual cassettes and a wide range of leaflets about general Diabetes management.

In addition and complementary to the content already described, a video cassette programme consisting of an introduction to diabetes, advice on food and foot care and living with diabetes through the eyes of a celebrity, Sir Harry Secombe, was included as part of the education package. A food values leaflet completed the content. These items were produced under the auspices of the British Diabetic Association.
I. Type II Diabetes

2 doctors discuss diabetes and together they highlight the fact that 80% of diabetes is of the Type II non-insulin taking variety. The two doctors describe the essential differences between Type I and Type II diabetes. In discussion with two patients, various aspects of treatment are stressed, including the role of diet, the great importance of adequate exercise and the use of tablets by some diabetics. The long-term complications of Type II diabetes are mentioned, but the doctor finishes on a note of encouragement while stressing that much of the success of managing diabetes lies in the patient's own hands.

II. Food

At a round-the-table discussion, two dieticians explain many of the principles of food and diet to Type I and Type II diabetics. By means of questions and answers the dieticians explain about the different foods, calories, carbohydrate portions or exchanges, the importance of high fibre foods, the role of alcohol and how to limit fat intake.

III. Foot Care

In this scenic programme, comparisons are made between the stresses and strains on the feet of a heavy hill walker and those on the feet of a diabetic. The doctor watches a keen walker on a snowy Peak District hillside and goes on to explain why nerve damage and circulation problems make sores on the feet a distinct possibility if diabetic control is poor. The importance of wearing the correct shoes and taking proper care of the feet, particularly in the case of older diabetics who frequently suffer from problems of the feet, is emphasised.

IV. Sir Harry Secombe Lives With Diabetes

Sir Harry Secombe has had diabetes for two years. In this talk with a doctor, Sir Harry discusses many aspects of being a diabetic. Problems of diet are stressed and he makes the important point of how much better he feels since he has paid more attention to diet and not depended totally on tablets. Sir Harry is clearly well aware of the complications of diabetes and how, by good control, they may be prevented. His wife explains how she helps her husband with his diet and medical care, stressing the importance of a family approach to the treatment of diabetes. Diabetics will find it reassuring to discover how a very active and famous personality such as Sir Harry copes with his diabetes and continues to lead a virtually normal life.
The criteria of interest and learnability. An assumption may be made that the diabetic person will be interested in, that is, take notice of, the content because he/she is intimately involved and that he will learn for the same reason. This assumption is not supported in the compliance literature or in everyday life. Nichols and Nichols (1973) suggest that content must be available in appropriate forms; form has application to both content and to method and materials for the delivery of content. Given the importance of the content, aspects such as sequencing and strategies for teaching/learning relate to method as well as to content. Similarly, materials can stimulate interest in the content and promote learning, while factors such as design, colour and layout, have an interest value and contribute to the learnability of the content.
Figure 5 summarises the foregoing discussion:

Figure 5 - The content

<table>
<thead>
<tr>
<th>AIMS</th>
<th>OBJECTIVES</th>
<th>CONTENT</th>
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<tbody>
<tr>
<td></td>
<td>Literature</td>
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<td>Text Books</td>
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<td>Scientific Journals</td>
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<td>Educ Service of EDA</td>
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<td>Experts</td>
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<td>Physicians</td>
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<td>Nurses</td>
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<td></td>
<td>Dieticians etc.</td>
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<tr>
<td></td>
<td>Other Material</td>
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<td></td>
<td>Video Cassette</td>
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<td></td>
<td>Information Leaflet</td>
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<td>Clients</td>
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<td></td>
<td>Questionnaire</td>
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<td></td>
<td>Interview Responses</td>
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</table>
Method

In Chapter 3 the experimental part of this study was outlined; the following is an account of the educational experiment which integrates the experimental method with the educational process and illuminates the relationship between the three elements - the aim, the objectives and the content.

A quasi-experimental perspective was adopted which facilitated both quantitative data analysis and generation of additional case-study material for dynamic concept analysis.

A semi-structured but highly differentiated, interactive context was devised for each subject, to provide a setting for the ultimate expressive objective (p 58). The initial assessment was based on demographic information obtained from earlier perusal of medical records for the random selection of the subjects and on the clinical profile provided by the diabetes clinic team.

Context - the inappropriateness of the outpatient clinic for the practice of holistic patient care, was described in Chapter 3; a physically safe and non-intimidatory environment was considered an essential methodological prerequisite for this study. The interaction between the provider and the receiver in any clinical setting must reflect fundamental principles. The relationship is professional but interpersonal and there are obligations of both confidentiality and accountability. Having invited the subjects away from the overt clinical setting of an
out-patients' clinic, the purpose of the study was explained and consent for entry into the study obtained; privacy was maintained at all times.

Egan (1986) described the role of the skilled helper and the environment in which the role may be effective. He distinguishes between levels of helper, from the formal professionals to individuals who possess no training, but are in positions where they feel able to help another; he contends that the world is full of informal helpers, but questions the effectiveness of that help on the grounds of weak, non-lasting results of interventions. As well as suggesting ways in which individuals may be equipped to help more effectively, he proposes a problem-management model which identifies stages of helping, exploring the present situation and the action necessary to change the present to the preferred. This flexible strategy was adapted to each stage of the educational intervention (Figure 6).
Figure 6 - A Flexible Model for Behaviour Change

(After Egan 1986)
Core values, which are the essence of the professional relationship and the caring aspect of the educative role, established the affective context for the aim of the course. These values have considerable application in respect of the caring professions (Mayeroff, 1972; McFarlane, 1982; Campbell, 1984) and are conceptually linked to a psychologically safe learning environment (Rogers, 1969). Values, identified by Egan as specific to the helping role include respect, defined as an orientation towards, and a translation of attitudes into, concrete behaviour. Although respect is not articulated, in the context of this course, it could be demonstrated and was made explicit in the freedom the subject had to accept or reject information and make informed decisions concerning self-monitoring activities. A further relationship was established between this core value and acknowledgment of the adult learner as an individual who is self-directed and whose past experience may determine the action he will take.

The second core value which influenced the way in which the study and the course were conducted, ie the method, was genuineness, defined by Egan as not over-emphasising the role. The participant role, consciously adopted by the teacher/researcher (MW), was that of facilitator and guide, through the maze of information and advice which is available but not always accessible in an educational sense. Essential knowledge was offered, but the emphasis was on what the diabetic perceived as his/her need, with subsequent tailoring of the content to meet that need, mediated through the individual
profile completed by the diabetic team. A personal action plan was completed as a result of discussion about the effect of a diagnosis of NIDDM on the individual's life. A near-to-normal life is implicit in the aim of the course, but the pattern which had hitherto been normal for the individual must be disrupted after a diagnosis of a non-curable condition is made. He/she may not feel vulnerable to the complications associated with the condition and may believe that the benefits derived from following advice will be outweighed by the costs of compliance eg. following a modified diet or carrying out regular self-monitoring activities. Figure 7 illustrates the course development with incorporation of activities of daily living and the health belief variables.

Non-insulin-dependent diabetes mellitus is often described as maturity-onset diabetes. In addition to the adult nature of the relationship, the subjects were also mature chronologically, the mean average age of those entering the study was 59.4 years, SD 8.8. There is evidence that increasing age is negatively correlated with knowledge about diabetes (Miller et al, 1978). There are also age-related changes which cumulatively affect learning ability (Dali & Gresham, 1982), and older people may need more time to process information. A constant amount of information was offered over-all, but the time allotted to each subject, + 45 minutes, was variable and dependent on perceived need.
Patients spend only limited time in consultation with health care professionals; in this study setting, medical appointments were arranged at 15 minute intervals. Ley (1988), suggests that in clinical settings oral information is not understood or remembered. Individuals are often anxious, absorbing only the immediate significance of a new diagnosis, eg of diabetes mellitus, while important advice concerning management of the condition, if offered at the same time, may not be retained. If the clinician is not knowledgeable about the best way to structure information, sound objectives may not be translated into effective communication. Salient written material can supplement and reinforce oral information, but to be effective it must be understood and remembered.

A set of teaching cards was compiled from the course content and made into a loose-leaf booklet; an additional card was included on which a personal action plan could be written. Some basic design principles were observed; simple typescript, lower case lettering and an uncluttered layout were used and the needs of elderly subjects whose eyesight, for instance, may have deteriorated, were considered. Colour is an important aspect of life and can make visual material more attractive; green is considered calm and restful and was selected for the cards with the intention of inducing this feeling. To complete each card, a line drawing was added, which focused on the main message the card was meant to convey. Adjunct aids may promote learning if
they are used in a limited way (Sowden and Harden, 1985).

The readability of written instructional material is an important consideration in its use (Leichter et al, 1981) and written materials often reach levels that exceed reading ability (Taylor et al, 1982). Formulae have been devised to assess readability and interest of written materials but these are based on the length of sentences and words - short words and sentences equate with increased reading ease. If an item contains words and phrases such as carbohydrates, non-insulin-dependent diabetes, modifying eating habits, ie essential words, such calculations could lead to erroneous conclusions for the target population. If too much simplification is attempted, essential knowledge may be lost. For this reason it was decided that multi-syllable words should be included and the use of such a formula eg Flesch, 1948, would not be appropriate.
The teaching cards were used in conjunction with the audio-visual programme as follows:

<table>
<thead>
<tr>
<th>SESSION</th>
<th>TEACHING CARD</th>
<th>VIDEO-CASSETTE</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>(BDA)</td>
</tr>
<tr>
<td>I</td>
<td>An introduction to Type II diabetes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding the food you eat</td>
<td>Type II Diabetes</td>
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<td>If the body cannot use glucose</td>
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<td>II</td>
<td>If you need to reduce weight</td>
<td>Food</td>
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<td>Monitoring an ideal body weight</td>
<td>Sir H Secombe -</td>
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<td>High fibre foods</td>
<td>Living with</td>
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<td>Diabetes</td>
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<tr>
<td>III</td>
<td>General points - feet, eyes</td>
<td>Foot care</td>
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<td>Smoking, alcohol, complications</td>
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Knight and Kesson (1986) suggest that only 50% of the present British Diabetic Association range of videos is applicable to the elderly population and that elderly people may not feel comfortable with audio-visual material as an educational tool; there is no evidence to support this contention. The evaluation processes and the latter part of this study will explore some of the reasons for this statement.
Figure 7 - Summarising the interrelationship between method, materials and evaluation:

AIMS

- Establish appropriate physical/psychological setting
- Techniques for goal-setting (Egan, 1986)

MATERIALS

- The adult learner
- Core values

METHOD

- Activities of daily living
- Identification of health belief variables

Audio-visual cassettes
Adjunct written info.

Quality assurance
Standard for care

EVALUATION
Eisner (1985, para. 13), in the context of general education, writes that "education is not merely a process of changing people but a process of improving life, there are consequences of actions for which we are responsible and should be accountable." Eisner continues - "to evaluate is to be aware of what one values, what one does and what the consequences of what one does yields." Redman (1984) contends that evaluation must go beyond measurement in that it involves making a value judgement about teaching and learning. Lawton (1973) suggests that sound judgement must precede accurate measurement. Assuring quality in the field of health care delivery is a key present-day issue for many of the reasons discussed earlier, eg the changing pattern of health care delivery, the emphasis placed on cost-effectiveness of services and greater awareness that personal taxation contributes to health care activities.

Quality assurance is a key concern of both health care professionals and educationalists. Recent initiatives aim to improve standards within a quality assurance framework, eg education and training, through further education in industry (Fido, 1988) and the organisational needs of nursing management (SW Thames RHA, 1991). Recent NHS reforms identify health care as a product and a provider/purchaser divide. Clearly, contractual arrangements for the delivery of care will lead to close examination of all the activities which comprise patient
care, including education and information provision. Essentially quality assurance is based on the statement of a standard, the rationale for the standard and the criteria for its achievement.

Paulen (1981), outlining a framework for quality assurance, states that the first step in the process of assuring high quality care is to clarify values. Two discrete evaluative aspects were identified - worth (what one values) and effectiveness (the consequences of what one does). Effectiveness will be mainly evaluated through analysis of the quantitative data in Chapter 5, but forms part of this debate, which concerns the worthwhileness of the process and is set in a quality assurance framework (Figure 8).

Non-compliance with therapeutic advice had been clearly identified as a major cause for concern and the potential benefits accruing from adherence to self-monitoring regimens in diabetes care have been described. The preliminary interview data and questionnaire responses demonstrated a desire for information and an unacceptably low level of knowledge about diabetes mellitus. Responsibility in this study setting implied a duty to make information available in accessible educational forms. Patient education is an essential part of care and the quality of that care cannot be evaluated unless an acceptable standard for the teaching-learning process has been considered.

In this study, the philosophical statement/aim which identified the importance of the individual, was operationalised through a process of communication, information, advice and
informed choice (1). A structure, process, outcomes model (Donabedian, 1966), expressed the standard through which quality would be assured (2). **Structure** - the physical and psychological settings through which provision was made for this course. **Process** - the counselling, informing, teaching, activities, involving the subject, daily living activities and social support mechanisms. **Outcomes** - normal blood glucose levels, ideal body weight, acceptable monitoring performance and individual satisfaction expressed through subjects remaining in the study.

These measurable outcome criteria (3) only partially completed the quality assurance circle, although they are an important aspect of the worth of the activity and of demonstrable practical application. The aim had intrinsic values expressed through the concept of self, which informed the structure and determined the processes. These interpersonal processes of communicating, counselling etc. may only ultimately be evaluated in terms of long-lasting behaviours which prevent or retard the complications associated with diabetes mellitus. This prospective aspect of qualitative evaluation will be incorporated into the conceptual analysis in Chapter 5.
Figure 8 - Quality assurance framework for evaluation

Quality Assurance - Operationalised patient/individual (Lasting behaviour change. Influence on complications.)

- access to information, advice, informed choice.

Standard for Care

Structure
Non-clinical, safe environment.
Accessibility, physical and psychological

Process
Counselling. Family/social support.
Teaching. Daily living activities.
Informing. Acceptable monitoring activities.
Communication Ideal body weight

Outcomes
Body weight variable. Remaining in study. (3)

Criteria
Lasting behaviour change.
Interpersonal communication.

(1) (2) (3)
CHAPTER FIVE

DYNAMIC CONCEPT ANALYSIS

Concept mapping (Novak and Gowin, 1984) was initially considered as a method for analysis of information about the subject's perception of diabetes mellitus and his understanding of the modifications needed for effective management, obtained from the interviews.

Concept mapping is a technique for representing meaningful relationships between concepts (Novak and Gowin, p.15). A concept map is a hierarchical construction but in its simplest form two concepts only may be linked by a word to form a proposition. In its more complex form, the authors describe a concept map as a visual road map showing pathways which may be taken to connect concepts through propositions. The approach has wide application in general education settings, for example in evaluating learning misconceptions (Novak and Gowin, p. 124). Hobrough (1987) describes effective concept mapping approaches with groups engaged in field studies. Similarities may also be discerned between the method and the ways in which learners may be encouraged to manage and process information obtained from lectures etc.

Knowledge and understanding of diabetes are essential for self-management. Uncovering thought processes may reveal errors and misunderstandings which can be addressed through an approach which has the potential for negotiation and renegotiation of
meaning. Negotiation implies that hierarchies can be structured and propositions reformulated, with subjects who are actively engaged in the process.

Interview data obtained in a clinical, diagnostic context imposes an obligation for guidance and facilitation on the interviewer. In this study the key concepts, compliance, weight management, social support, vulnerability and attitude were derived from preliminary studies described earlier, the subject literature, research findings and the experience of clinical experts. A set of predetermined concepts, for which content validity will be claimed but for which there is no clear evidence of a hierarchy of clinical significance, was constructed.

Predetermined concepts conflict with the open concept-mapping approach described. A purpose of this study is to explore the validity and reliability of these concepts within a health belief framework and to investigate possible relationships between patterns of behaviour and beliefs, rather than to map pathways for individual subjects to follow. For these reasons an alternative method of analysis is now considered, which does not preclude individual application at a later stage.

In analysing human behaviour, it is possible to manipulate variables, measure outcomes and reach conclusions which are quantitatively acceptable but which do not convey the qualitative nature of the information in a manner which will have meaning for those for whom it is intended.
Dynamic concept analysis is a method of integrating information about complex situations which may be quantitative or qualitative. A conceptual model is constructed which enables identification of relationships between different variables and provides a picture of the ways in which different aspects or attributes of a concept may be related.

The method was described by Kontiainen in 1973 and 1989 and further developed by Kontiainen and Hobrough (1991) in studies involving students' and their supervisors' perception of the characteristics of their respective roles. A further study in the context of decision-making about the transfer of individuals from special to less-secure hospitals was undertaken by Roscoe in 1988.

Kontiainen and Hobrough describe five different ways in which concepts may be related to one another:

1. There is no direct relationship - A \( \rightarrow \) B
2. There is a one-way relationship - A \( \rightarrow \) B
3. There is a two-way relationship - A \( \leftrightarrow \) B
4. There is a relationship between two concepts but it is indirect, i.e., through a third concept - A \( \rightarrow \) B \( \rightarrow \) C
5. There is a relationship through a longer chain of relationships, e.g., D \( \rightarrow \) E \( \rightarrow \) B

Information concerning types of relationships is entered into an information structure using chosen concepts to form a conceptual model. An information structure is defined as a matrix
of concept relations where the information needed for conceptual analysis and for constructing conceptual models is available in a coherent form. A conceptual model is a network of concept relationships as in 5 above; different types of relationship from 1-5 may be present in the model. A conceptual model will show the role and function an attribute has in a given concept (Kontiainen and Hobrough, 1991).

The following discussion describes the process of application of this method of analysis to this study data and the inferences derived from the analysis.

The first stage in the process is to specify the concepts to be used in the analysis, then to build an information structure of the relationships between attributes of each concept.

It was decided to identify the variables of the study (concepts) considered to be central to the prediction of likely compliance-related behaviour, to provide the basis for the information structure. These variables are supported by research findings and the literature (Literature Review - p25) For each concept a positive, neutral or negative attribute provides a sub-set (Figure 10). Each attribute is derived from an interpretive approach to the interview data.

Concept 1 - Compliance

The central concern of the study is compliant
behaviour, around which all other variables will be related by
types of relationship described. Typical, persistent pictures
may illuminate these relationships and suggest ways of
manipulating attributes and constructing ideal matrices, so that
predictions may be made about compliant behaviour.

Attributes  - l(a) Positive compliance - is construed from the
subject's initial agreement to take part in the study, to be
interviewed and to undertake a teaching programme which
implied a commitment to attend, after three routine visits
to the diabetic clinic. In addition, any positive statement
regarding willingness to comply, complemented this initial
assessment of positive compliance.

- l(n) Neutral compliance - the subject made no
commitment to attend further sessions, was sceptical of his
ability to stay within treatment recommendations, but did
not completely reject the possibility.

- l(b) Negative compliance - again, the subject
made no commitment to attend further sessions, but believed
he would not comply for social or personal reasons which he
made explicit.

Summary of compliance attributes

<table>
<thead>
<tr>
<th>Attend sessions</th>
<th>+ve (a)</th>
<th>neut (n)</th>
<th>-ve (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability/willingness to comply</td>
<td>+</td>
<td>+</td>
<td>-</td>
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</table>
The principal measurable outcome in the experimental part of the study is weight-loss or maintenance of an ideal body weight. Effective management of Type II diabetes equals management of body weight (see p.9).

Attributes - 2(a) Positive - refers to the subject's need to lose weight; he/she is more than the desirable weight according to the clinical judgement of the physician at the initial consultation.

- 2(n) Neutral - refers to maintenance of present ideal body weight

- 2(b) Negative - refers to the subject's need to gain weight, a rare objective in patients who are NIDD. Loss of weight is a clinical indicator that the subject may need to commence insulin injections and may not relate to the intention to comply; weight may be lost, or not gained, despite following dietary advice. This negative attribute will be seen to apply to one subject only (No 35) and will be referred to in discussion.

Concept 3 - Social Support

This is a factor motivating individuals who may need to make changes in their eating pattern and monitor the content and the amount of food they eat.

Attributes - 3(a) Positive social support - refers to factors such as the sex and the marital status of the subject. NID diabetics tend to be older (entry criterion for the study more than 55 years of age), will have been married for some
years and know the dietary habits of the spouse. He will be motivated to promoting his well-being and adhere to advice regarding appropriate dietary behaviour. Alternatively a married female diabetic subject is more likely to control the eating behaviour in her household and be more able to change her eating habits, adapting and modifying needs where she considers it necessary. The presence of a spouse at the introductory teaching session would indicate positive social support in this study. He/she will have accompanied the spouse to the clinic and given psychological support by his or her physical presence during this traumatic period.

- 3(n) Neutral social support - refers to any statement by the subject suggesting a lack of awareness of the significance of the type of food eaten and a lack of interest in this aspect of management of diabetes.

- 3(b) Negative social support - refers to any relationship which could suggest difficulty in respect of weight management. For example, a spouse is a good cook whose pride is the presentation of cordon bleu food, high in calories and fat content, which the diabetic enjoys and sees as an important aspect of a fulfilling marital partnership. Another example is a family whose members are not willing to modify eating habits and the diabetic wishes to continue previous eating habits, pursuing a perceived normal life.
Concept 4 - Vulnerability

Perception of the likelihood of developing known possible complications of diabetes mellitus. Vulnerability is part of the cost-benefit equation described by Becker's Health Belief model.

Attributes - 4(a) Low vulnerability - refers to a lack of awareness of complications and/or a stated wish not to be given this information.

- 4(n) Positive (moderate vulnerability) - refers to a subject who may, or may not, have experienced early symptoms such as visual changes or peripheral paraesthesia. He may express some concern regarding a worsening of the symptom, but not have expressed an overriding anxiety which clouds attention to other information aspects.

- 4(b) High vulnerability - refers to behaviour or questions concerning, eg complications experienced by a relative, such as an amputation or loss of sight. High anxiety may result in reduced motivation to comply (the Yerkes-Dodson effect).

Concept 5 - Attitude.

Refers to beliefs about the efficacy of treatment recommendations to promote a near-normal life with diabetes mellitus.

Attributes - 5(a) Positive attitude - refers to any positive statement by the subject which implies active commitment to proposed management recommendations, eg urine monitoring and record keeping and expressed interest in the diabetic
literature.

- 5(n) Neutral attitude - refers to a non-committed approach to management and to learning more about the condition.

- 5(b) Negative attitude - refers to doubts expressed regarding efficacy of treatment recommendations.

The ethno-methodological approach to the teaching-learning process involved the creation of a psychologically safe, accepting environment. Case histories, which contained clinically privileged material, were compiled for all subjects, who freely disclosed information concerning major life events, such as bereavement experiences, family trauma and disappointments. Although the interview was semi-structured and the information was systematically gathered, subjects could not be discouraged from disclosing personal details of the type mentioned. Much of this material is not considered to be ethically usable here.

The interaction between life events and the objective aspects of life with diabetes mellitus, raised questions concerning interpretation of the data. Each subject's history was subjected to a content-sifting process, according to the criteria supplied. To obtain a measure of inter-rater reliability, a small sample of the data (n=5) was submitted to impartial analysis according to the criteria; congruence was achieved. Table 1 depicts the attributes ascribed to each subject and Figure 9 illustrates the analysis overall (n=38).
Table 1 Attribute for each subject from interview data

| SUBJECT | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  |
|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ATTRIBUTE | C N NC | L M G | Y N No | L M H | + N - |
| Compliant | Loss | Yes | Low | Positive |
| Neutral | Maintain | Neutral | Moderate | Neutral |
| Non-Compliant | Gain | No | High | Negative |

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<tr>
<th>CONCEPT</th>
<th>COMP-LIANCE</th>
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</table>
Figure 9 - Interpretation of interview data - frequency chart

n = 38

Concepts - COMPLIANCE  WEIGHT  SOCIAL SUPPORT  VULNERABILITY  ATTITUDE

Attributes - COMPLIANT  NON-COMPLIANT  LOSE  MAINTAIN  YES  NO  LOW  MODERATE  HIGH  +ve  -ve
The generalisability weakness evident in a case study approach may be present in this analysis; however the analysis is only a contribution to the overall problem and cross-linking with other study data will highlight the complementary nature of this approach. Some socio-clinical detail from the histories is included in the following discussion.

**The second stage - building an information structure of concept relations.**

The relationship between conceptual categories can be derived from different sources, eg from the subject literature, research findings, the judgement of experienced practitioners and hypotheses of studies from which the data for the information structure are obtained (Kontiainen, 1989).

The sources will determine the level of subjectivity of the model; however, if relationships are supported, as in this study, by research findings and the literature, Kontiainen suggests this will reduce the subjectivity of the model.

Five concepts were entered into the structure, because they were considered to encompass the main areas of investigation in this study. They reflected the chief concerns and tested the study hypothesis, that an ideal profile for predicting compliant behaviour can be constructed.

**Concept 1. Compliance (p 94) - avoiding long-term complications by keeping blood-glucose under control (Wright, 1989).**
Concept 2. Weight (p 96) - if body-weight can be controlled within the normal range for age, there is considerable evidence that glucose levels in the blood will be contained within normal limits (Smith, 1989).

Concept 3. Social support (p 96) - supportiveness of family members is central to control and management of the disease (Shillitoe & Christie, 1988).

Concept 4. Vulnerability (p 98) - the health belief model proposes a subjective state of readiness to take action, determined by the individual's estimate of how vulnerable he is to the condition - in this study, to complications of the condition (Becker & Maiman, 1975).

Concept 5. Attitude (p 98) - essential knowledge is an important determinant, but other factors such as beliefs and attitudes must be considered (Shillitoe 1989).

Attributes are sub-sets of the concepts and convey the quality and/or content of the concept (Fig. 10). There is a total of fifteen attributes, three for each concept.
<table>
<thead>
<tr>
<th>CONCEPT</th>
<th>ATTRIBUTE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Compliance</td>
<td>1a Compliant</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1n Neutral*</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1b Non-compliant</td>
<td>3</td>
</tr>
<tr>
<td>C2 Weight +</td>
<td>2a Lose</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2n Maintain</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2b Gain</td>
<td>6</td>
</tr>
<tr>
<td>C3 Social Support</td>
<td>3a Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3n Neutral*</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>3b No</td>
<td>9</td>
</tr>
<tr>
<td>C4 Vulnerability++</td>
<td>4a Low</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>4n Moderate</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>4b High</td>
<td>12</td>
</tr>
<tr>
<td>C5 Attitude</td>
<td>5a Positive</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>5n Neutral*</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>5b Negative</td>
<td>15</td>
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</table>
NOTE:-

In order to make the concepts more accessible and clinically relevant, the attributes of Compliance (Concept 1) have been changed to:- 1(a) compliant (positive) 1(b) non-compliant (negative).

Similarly the attributes of Social Support (Concept 3) have been changed to:- 3(a) Yes (positive) 3b) No (negative)

+ Each concept has a positive, neutral or negative quality, with the exception of weight which is an objective concept. Subjects are required to lose, maintain or gain weight, dependent on a clinical assessment of the ideal body weight.

++ 4n (moderate vulnerability) is the positive aspect of the attribute. Subjects who feel moderately vulnerable are more likely to take action to avoid, or try to prevent, complications, than those subjects who describe high or low vulnerability; too much anxiety has been found to result in overwhelming inaction (Harris & Linn, 1985).

* Neutral refers to:-
ln - behaviour which may or may not indicate compliance.
3n - indeterminate social support.
5n - an attitude which is neither positive nor negative.

Relationships between attributes were hypothesised and a matrix constructed (Figure 11).
Figure 11 - Matrix of relationships between concepts and attributes

<table>
<thead>
<tr>
<th></th>
<th>COMPLIANCE (C1)</th>
<th>WEIGHT (C2)</th>
<th>SOCIAL SUPPORT (C3)</th>
<th>VULNERABILITY (C4)</th>
<th>ATTITUDE (C5)</th>
</tr>
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<tbody>
<tr>
<td>COMPLIANCE (C1)</td>
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<td>lose/maintain</td>
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<td>moderate</td>
<td>positive</td>
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<td>a</td>
<td>maintain</td>
<td>neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>n</td>
<td>maintain</td>
<td>neutral</td>
<td>low</td>
<td>neutral</td>
</tr>
<tr>
<td>3</td>
<td>b</td>
<td>gain</td>
<td>no</td>
<td>high</td>
<td>negative</td>
</tr>
<tr>
<td>WEIGHT (C2)</td>
<td></td>
<td>comply/</td>
<td>yes/neural</td>
<td>moderate</td>
<td>positive/neutral</td>
</tr>
<tr>
<td>4</td>
<td>a</td>
<td>neutral</td>
<td>a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n</td>
<td>neutral</td>
<td>n</td>
<td>low/moderate</td>
<td>neutral</td>
</tr>
<tr>
<td>6</td>
<td>b</td>
<td>non-compliant</td>
<td>b</td>
<td>high</td>
<td>negative</td>
</tr>
<tr>
<td>SOCIAL SUPPORT (C3)</td>
<td></td>
<td>lose/maintain</td>
<td>a</td>
<td></td>
<td>neutral</td>
</tr>
<tr>
<td>7</td>
<td>a</td>
<td>compliant</td>
<td>a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n</td>
<td>neutral</td>
<td>maintain</td>
<td>no relationship</td>
<td>neutral</td>
</tr>
<tr>
<td>9</td>
<td>b</td>
<td>non-compliant</td>
<td>gain</td>
<td></td>
<td>neutral</td>
</tr>
<tr>
<td>VULNERABILITY (C4)</td>
<td></td>
<td>maintain</td>
<td>no relationship</td>
<td>a</td>
<td>no relationship</td>
</tr>
<tr>
<td>10</td>
<td>a</td>
<td>neutral</td>
<td>maintain</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>n</td>
<td>compliant</td>
<td>lose</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>b</td>
<td>non-compliant</td>
<td>gain</td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>ATTITUDE (C5)</td>
<td></td>
<td>lose/maintain</td>
<td>no relationship</td>
<td>no relationship</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>a</td>
<td>compliant</td>
<td>maintain</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>n</td>
<td>neutral</td>
<td>maintain</td>
<td>no relationship</td>
<td>n</td>
</tr>
<tr>
<td>15</td>
<td>b</td>
<td>non-compliant</td>
<td>gain</td>
<td></td>
<td>b</td>
</tr>
</tbody>
</table>
A description of the process of combining the attributes to form rows will serve to illustrate how the matrix is used to construct models representing each subject.

In the matrix, all attributes are listed on the left and each row shows the attributes which are most likely to combine with each of the fourteen other attributes in the matrix. Each row shows a Type 2 (1 way) direct relationship to the attribute in question, while two rows together may alter the relationship to Type 3 (2 way) relationship.

Row 1 - describes Type 2 relations on compliance of the requirement to lose weight (1a), having social support (3a), feeling moderately vulnerable to complications (4n) but with a positive attitude to the condition (5a) - (Model 1a, Figure 12).

Figure 12

Model 1a

1a - Compliant
2a - To lose weight
3a - Has social support
4n - Feels moderately vulnerable to complications
5a - Is a positive attitude
A comprehensive picture of all the relations which exist between these five attributes can be obtained using information from Matrix 1 collected into a model 1.0 (Fig. 13).

Figure 13

Model 1.0

An alternative model for Row 1, entered into the matrix, described Type 2 relations on compliance of maintenance of ideal body weight (1n), neutral social support (3n), moderate vulnerability (4n) and a positive attitude to the condition (5a).

It was hypothesised that if the subject was compliant (C1 - as defined), but needed only to maintain body weight (C2), the quality of social support (C3) may not be as evident because the need for support may not be as great. For the purposes of the structure, this would be described as neutral; this change would not directly affect vulnerability (C4) or attitude (C5).

Row 2 - neutral compliance is characterised by the need to maintain ideal body weight, neutral social support, low vulnerability and a neutral attitude.

Row 3 - characterises a potentially serious, but rare
combination of attributes, non-compliance (lb), requirement to gain weight (2b), high vulnerability (4b), no social support (3b) and a negative attitude (5b). It was hypothesised that weight loss may indicate reluctance to seek advice and ultimately comply, with lack of social support being either cause or effect in this situation. High vulnerability may relate to weight loss and the combination of signs and symptoms result in a negative attitude to the condition. This clinical scenario was entered into the matrix because of the potential seriousness of the combination of these attributes. However, no such highly negative model emerged from this study.

Three attributes for each concept were similarly related to all other attributes, eg Row 4 gives attributes characterising the weight loss requirement (4a), compliant (1a) or neutral orientation (ln), social support, which may be either present (2a) or neutral (2n), moderate vulnerability (4n) and a positive attitude (5a). A comprehensive model can be produced to depict any combination of these attributes.

The example below (Model 1.1), using information from subject 6, demonstrates this process.

Figure 14

Model 1.1
Subject 6
Group 1
The relationship between five key concepts and their attributes has been discussed. No logical relationship could immediately be hypothesised between some concepts, for example social support and vulnerability, and certain cells in the matrix have therefore been left empty. Subjects may have optimum social support (a spouse working with the diabetic to achieve near-normoglycaemia) but this will not affect feelings of vulnerability to the complications of diabetes mellitus. Research findings support the view that complications are non-specific though related; near-normoglycaemia, for example, may retard but may not prevent complications (Chapter 2).

Similarly a relationship between combinations of the attributes of vulnerability and attitude cannot be supported. A positive attitude, for example, may imply compliant behaviour and result in near-normoglycaemia, but normoglycaemia does not guarantee absolute protection from the complications of diabetes mellitus and the subject may still experience feelings of vulnerability.

One of the purposes of this analysis is to explore the potential of these concepts and this dynamic approach, to illuminate the problem. The conclusions may result in addition of information to the matrix, or subtraction from it; new ways of relating seemingly unrelated concepts may become apparent and new matrices constructed.
Stone (1979), in the context of patient compliance and the role of the expert, suggests that sufficient knowledge of human behaviour and its variations is necessary if the patient's difficulties in utilising information are to be anticipated. This suggestion is pertinent to this stage of the study, when the relationships between situations and behaviours have been used to build an information structure for the purpose of anticipating such difficulties.

The following discussion of relationships proposed between attributes is illustrative of some of the variations in behaviour, specific to the chosen concepts and the complex nature of the problem of non-compliance.

Body weight (C2) is a key concept in the management of Type II diabetes mellitus. Approximately 75% of patients with Type II diabetes are overweight (Wing, 1989); reduction in weight (2a), will lead to an improved glucose tolerance (Carpenter & Bodansky, 1990). Obesity is a powerful risk factor (Paton, 1989), but weight reduction (2a) is the best treatment for diabetes (Nuttall, 1983). Kontz (1989) discusses the social value placed on meal times; thus, actively working towards this goal (1a - compliance) is inextricably bound to a dominant social activity of daily living and the treatment for Type II diabetes can be described as social as well as medical treatment - social support is part of that treatment.

There is a familial tendency to Type II diabetes (Paton,
1989). Early conditioning may predispose to eating habits which are difficult to modify in later years. The patient's family (C3) has an important role to play in influencing compliance (la), especially weight loss (2a) (Becker & Maiman, 1980). Wishner (1978) suggested that the family which is well-informed and generally supportive (3a), will be of great help. Schlenk & Hart (1984) found a highly significant relationship between perceived social support (3a) and compliance (la) of persons with diabetes. Social support (la) is essential for buffering the discriminating effects of a diagnosis of diabetes in our society, e.g. employment practices, misrepresentation of work performance (Medical Advisory Committee of the BDA, 1984) and other daily living activities, such as obtaining a driving license or life assurance. In defining the characteristics of a nursing diagnosis of non-compliance, Ryan & Falco (1985) distinguish between personal and systems support and Shillitoe (1988) between instrumental and emotional support; in this analysis, positive social support (3a) is defined as the support, emotional or instrumental, given by a significant other, spouse, relative etc.

The American Diabetes Association (1989) advocates incorporating behavioural modification programmes and setting individuals reasonable weight goals. Wing (1989) supports this approach for weight reduction in Type II diabetes. Emotional and instrumental support are related to both the concept of weight (C2) and to compliance (C1).

Patient understanding and knowledge is mediated in the
structure through the concept of vulnerability (C4). Paton (1989) suggests that individuals understanding the relationship between obesity and risk will react positively (la) to the need to lose weight (2a); alternatively, over-emphasis on the consequences of poor control (4b), that is control achieved through reduction in body weight (2a), may result in the patient denying the consequences (4b & 5b) as part of his coping strategy (Dunn, 1987). However, perception of susceptibility (C4) - here vulnerability - is a powerful determinant of compliance (la). Harris et al (1987) found a significant correlation between compliance (la) and vulnerability (C4). The way to achieve compliance (la) is through knowledge of everyday things (Hardy & Gill, 1990) which will lessen anxiety (4b), achieve a moderate approach (4n) and a positive attitude (5a).

Alogna (1980) found older patients to be more compliant (la) and to view diabetes as more severe, suggesting here a tendency to feelings of vulnerability (4n-4b). Diabetics may be less compliant (ln-1b) if they are symptom-free or if duration of disease is associated with complications, eg visual or circulatory problems. Diabetic complications may be confounded by pathology of ageing and increase the feeling of vulnerability (4b). In turn, very high anxiety levels (4b) have been associated with poor metabolic control and anxiety linked with poor adaptation in NIDDM (Dunn et al, 1986), while good control, the aim in diabetes management, has been related to moderate anxiety (4n) (Janz & Becker, 1984). Stone (1979) writes that chronic illness elicits the lowest rate of adherence
It is reasonable to assume that initially the individual will have a positive attitude to the condition (5a), i.e. demonstrate willingness to comply with advice (1a). Attrition rates in longitudinal teaching programmes are significant (Brown, 1988) and knowledge about the condition is inversely related to the number of years since diagnosis. Knowledge may not be a measure of compliance (C1) or characterise attitude (C5) but may be a contributory factor. Patients' attitudes however are an important determinant of health behaviour. The behaviour of individuals with diabetes will be highly influenced by their view of diabetes and the meaning it has for them (C5) (Anderson, 1986). It is assumed that the view will be related to knowledge of the condition.

Cox (1985) cites motivation as a factor in health behaviour (C5). No conclusive relationship has been demonstrated between personality types (e.g. coronary prone Type A personality), and diabetes, diabetic complications and glucose control (Robinson et al, 1989), although there is a strong association between cardiovascular risk factors and diabetes mellitus (American Diabetes Association, 1989). Dunn (1986) demonstrated a relationship between emotional adjustment and personality functioning. Interpretation of this factor would be of dubious worth in the context of this information structure, without recourse to specific personality testing instruments.
Finally in a complex study of multiple identity and psychological well-being (Thoits, 1983), identity was found to be claimed and sustained in relationships with others (C3), suggesting, in the context of this information structure, that the socially isolated individual may not adjust easily to his diagnosis. If all his time and energy are channelled into a limited identity, he may fail to integrate his diabetes into his everyday life. The aim of as near-to-normal a life as possible may not be achieved.

The information structure was entered into the computer using a computer programme (Hobrough, 1989). The matrix was depicted as in Figure 11; from this matrix, the model for each subject was constructed (Figure 15). Two examples of the constructs of the model are included (Appendix B).
Figure 15 - Dynamic concept model for each subject (2 pages) - \( n = 38 \)
Figure 15 (page 2) \( n = 38 \)

Diagrams 22 to 38
Application of dynamic concept analysis

A model was constructed for each subject using information obtained from the interview data, which was subjected to interpretation as described in the discussion regarding identification of the nature of the concepts, ie the attributes (see p 94 et seq.).

\[
\begin{align*}
n &= 19 \text{ diagnosed less than 1 year} \quad \text{Group 1} \\
n &= 19 \text{ diagnosed more than 1 year} \quad \text{Group 2}
\end{align*}
\]

Examples of this process -

**Subject 25, Group 1 - Model 1.2 (see below)**

Mr 25 needed to lose weight (ideal body weight - 68Kg; actual body weight - 70Kg) 2a positive.

He was regularly monitoring his urine for presence of glucose since visiting his own general practitioner, prior to his clinic visit. He indicated his willingness to comply with advice by agreeing to take part in the study : 1a +ve. Positive social support - his wife attended the clinic with him, asking questions concerning healthy eating; she indicated she wished to lose weight herself : 3a +ve.

Mr 25's continuing employment depended on his ability to drive; he was anxious about this as he had a cousin, also a diabetic. In addition he had been told by the physician that he may need to commence insulin if he was unable to lose weight and/or reduce his blood glucose level : 4b -ve.

He expressed his belief in the efficacy of self-monitoring, in management of his diet and in his ability to lose weight : 5a +ve.
The model demonstrates -
Type 3 - 2 way positive relationship between compliance and weight loss, social support and attitude, and more complex (Type 4) relationships between these variables. Negative vulnerability (4b) is not related. The relationship between this variable and others included in the information structure is a "broken one"; no logical relationship has been ascribed to vulnerability (4) and anything else. An individual may feel or show early signs of complications indicating vulnerability, which could not be related to positive, neutral or negative social support.

There may be indirect relationships uncovered in later discussion which could lead to changes in the original information structure and contribute to discussion concerning construct validity of the method of analysis (see Chapter 7).

Subject 27, Group 1 - Model 1.3 (see below)

Mr 27 must lose weight (ideal body weight 72-81 kg, actual body weight 91kg) : 2a +ve. He demonstrated his commitment to attend all the sessions : 1a +ve.
His wife is a professional cook, concerned about healthy eating, eg serves only wholemeal bread, promotes fibre in the diet etc. and is supportive of Mr 27 : 3a +ve.

The subject expresses moderate concern regarding complications of diabetes; he has reduced visual acuity, but ascribes it partly to the ageing process : 4n moderate.

His sight has improved since urine testing showed negative reaction to the presence of glucose. He expresses a positive attitude to the effectiveness of regular monitoring, exercise and learning from the diabetes literature : 5a +ve.

Figure 17

Model 1.3
Subject 27
Group 1

The model above shows two-way positive relationships possible for the matrix, between all the variables entered into the structure (4n : moderate vulnerability, is the desired attribute, p.98).

Subject 11, Group 2 - Model 1.4 (see below)

Mr 11, a single male, mid-thirties, lives with his mother who cooks meals excessively high in carbohydrate content and does not acknowledge his diabetes : 3b -ve .

He came to the teaching session because his weight keeps increasing and the physician sent him as a last resort.
He is unable to comply with advice, not because he is unwilling, but circumstances of daily living do not permit it: 1b -ve.

He must lose weight: 2a +ve (ideal body weight 100kg; actual body weight 114kg). He feels moderately vulnerable to the complications of increasing obesity: 4n moderate, but his attitude is that no advice has been effective in helping him.

He is reluctant to test urine regularly and no longer reads any diabetic literature: 5b -ve.

**Figure 18**

Model 1.4  
Subject 11  
Group 2

The model above demonstrates negative, Type 3, relationships between compliance, social support and attitude, with compliance a possible negative mediating variable between social support and attitude; a two-way relationship between weight loss and vulnerability, but no relationship between these attributes and the remainder of the model. The other three attributes are all negative with no direct interrelationship.

After models for each subject were constructed and categorised according to duration of diagnosis, (more or less than one year), they were inspected for similarity and regrouped accordingly (Fig. 19). Consistent patterns were noted.
Figure 19 - Groupings of subjects according to attributes.

Model 1.3

\[ \begin{align*}
&2a & \rightarrow & 3a \\
&4n & \rightarrow & 5a \\
&4n & \rightarrow & la \\
&la & \rightarrow & 5a
\end{align*} \]

Gp 1 - 6,16,17,27,34

Gp 2 - 15,33

Model 1.5

\[ \begin{align*}
&2a & \rightarrow & 3n \\
&la & \rightarrow & 5a \\
&4b & \rightarrow & 5a \\
&4b & \rightarrow & la
\end{align*} \]

Gp 1 - 1,12,18,37,28

Gp 1 - 13,22,25

Model 1.2

\[ \begin{align*}
&2a & \rightarrow & 3a \\
&la & \rightarrow & 5a \\
&4b & \rightarrow & 5a \\
&4b & \rightarrow & la
\end{align*} \]

Gp 1 - 4

Gp 2 - 29, 30

Model 1.6

\[ \begin{align*}
&2a & \rightarrow & 3n \\
&la & \rightarrow & 5a \\
&4n & \rightarrow & 5a
\end{align*} \]

Model 1.7

\[ \begin{align*}
&2a & \rightarrow & 3b \\
&lb & \rightarrow & 5b \\
&4b & \rightarrow & 5b
\end{align*} \]

Gp 1 - 4

Gp 2 - 29, 30
In Group 1 (n=19), 7 subjects fitted the pattern previously described in Model 1.3 (subject 21), 5 subjects were categorised under Model 1.1 and 3 under Model 1.2. 6 subjects could not be categorised.

In Group 2 (n=19), no consistency was demonstrated (Fig.19); only two pairs of subjects, 2 and 37, and 5 and 8, show some similarities and two subjects, 29 and 30, share a model (1.7). The remainder are disjointed models which appear to originate from the attribute of neutral compliance. Mainly neutral or negative tendencies are demonstrated and a preponderance of one-way (Type 2) relationships are present in the models. This is to be anticipated in this group of long duration diabetics. Kontiainen (1973) suggests that a conceptual model shows the dynamic nature of a phenomenon at a given moment and a series of models may indicate, step by step, how a process may proceed. There is no apparent consensus between health care professionals regarding an ideal type, ie a set of characteristic behaviours which are predictive of compliance with a therapeutic regimen. Experienced physicians in this study were no exception and the following excerpt from a reply to an enquiry highlights a persistent theme throughout this study.

"I do not think one thinks in terms of ideal patients, there are just simply people who need to be treated. They come in all shapes and sizes and you try to treat them all equally. If you mean can we spot those who are going to be better at taking their treatment than others, I think that is very much "seat of the pants" stuff and guess we are probably not very good at it. Even those who do very well with the treatment receive a pat on the back and then smartly relapse".
In attempting to discover an ideal type of compliant patient and the ideal attributes which will predict desirable behaviour, it may be possible to identify the model which correlates with the study variable weight loss or maintenance. The sequence of models will demonstrate possible directions for changing behaviours. Model 1.3 (7 subjects) appears to be an ideal model; Model 1.6 possesses one attribute (3n social support) which would suggest an aspect of that person's (Subject 4) personal profile which, if it could be changed, ie from neutral to positive (3a), would move that person into the ideal type profile.

Model 1.2 (3 subjects) demonstrates strong relationships between positive variables with the exception of vulnerability, highlighting again an area which should be addressed through a planned process of supportive education.

Model 1.5, which categorises the second largest group (5) possesses one attribute, high vulnerability, which is not related to other variables and weak social support. Planning change for these persons, ie predicting good compliance, would be dependent on changing the individual's perception of his vulnerability to the complications of diabetes by counselling and educational means and including a spouse or significant other in this process.

As the individual moves through the stages, the conceptual model would change. As the analysis changes so too would the information structure; a coherent planned process may demonstrate
a need to discard a concept from the information structure and replace it with one which more nearly meets the needs of those for whom it is intended.

Hypothesis 1. That Model 1.3 is an ideal model for predicting compliant behaviour.

Operationalising the hypothesis -

1. During the experimental study, the subjects identified in Model 1.3 will have lost or maintained weight as planned.
2. The subjects will remain in the experimental programme.
3. The subject identified by less ideal models would not demonstrate the desirable loss/maintenance of body weight.
CHAPTER SIX

DATA COLLECTION, RESULTS AND ANALYSIS

A preliminary, semi-structured interview (n=22), was described in Chapter 3. The purpose of this activity was to enable the researcher (MW) to clarify the areas of concern already apparent from the literature and "known" to those who work in this specialty. This data confirmed, from a qualitative perspective, the highly individualised nature of the response to a diagnosis of diabetes mellitus, especially concerning adherence to dietary advice and self-monitoring activities.

It was hypothesised that the way in which diabetes mellitus was managed in the study population would be reflected in the measurement of random blood glucose levels. At the time data collection was undertaken, a blood specimen was obtained from a majority of those who attended each diabetic clinic and used by the physicians as a general indicator of current diabetic status. A series of 12 weeks random blood glucose recordings was obtained (n=565). The specimens were routinely obtained using BM Test-Sticks (BM-Test-Glycaemie 1-44 and a Reflolux blood glucose test meter) by a member of the clinic nursing staff.

Blood glucose level - normal value 4.5 - 7.5 mmol/l (80-100 mg/100 ml). After food the blood glucose level rarely rises above 8 mmol/litre (Wise, 1983) in non-diabetic persons.
Table 2 shows the recordings obtained during the 3+ hours of the clinic, classified within the range <4 mmol to >17 mmol/l.

Table 2  Actual numbers & percentages  n=565

<table>
<thead>
<tr>
<th>mmol/l</th>
<th>&lt;4</th>
<th>4.1 - 7</th>
<th>7.1 - 11</th>
<th>11.1 - 17</th>
<th>&gt;17</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-10 hrs</td>
<td>5</td>
<td>20</td>
<td>54</td>
<td>87</td>
<td>47</td>
</tr>
<tr>
<td>10-11hrs</td>
<td>9</td>
<td>17</td>
<td>46</td>
<td>93</td>
<td>59</td>
</tr>
<tr>
<td>11-12+hrs</td>
<td>7</td>
<td>13</td>
<td>28</td>
<td>41</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>21(4%)</td>
<td>50(9%)</td>
<td>128(23%)</td>
<td>221(39%)</td>
<td>145(26%)</td>
</tr>
</tbody>
</table>

A fine balance exists in normal circumstances between the secretion of insulin and counter-regulating hormones; this is not the case in diabetes mellitus and is acknowledged in the information given to the clinic population. Type I diabetics who are able to adjust their own insulin prescription are asked to consider >10 mmol/l as high and <3 mmol/l as low, recordings. Individuals are generally encouraged to aim for normal fasting blood glucose measurement (Manning, 1989), but may be reluctant to do this if it increases the likelihood of hypoglycaemic episodes.

From the recordings it was noted that 65% of the clinic population whose blood glucose levels were monitored, were above the level acceptable to the clinic. Only 9% of the population monitored recorded a value within normal limits. Figure 20 depicts this information in the form of a frequency graph, per
hour of clinic and the mean recording per blood glucose value. Figure 21 depicts the information as percentages of the total recordings (n=565). The comparative bar chart (Figure 22), illustrates the consistent nature of these findings throughout the total clinic duration.

The high values may be a reflection of aspects of the clinic at that time (p. 32) and of outpatients departments in general; a mid-morning snack may have been eaten where waiting times are prolonged and unpredictable, thus accounting for some of the high values between 10 am and midday (54%). Type I insulin-dependent patients were included in the series; if insulin was administered eg at 7.30am, prior to breakfast at 8am, a random blood glucose level >17 mmol/l between 11-12 midday would suggest inadequate diabetes control\(^2\), if the aim is near-normoglycaemia.

Because Type I insulin-dependent diabetics were not distinguished from Type II non-insulin-dependent diabetics, and two weeks out of the series of twelve were clinics mainly for Type I under-35 years diabetics, it is possible that a significantly large number of abnormally high values could be accounted for in these two clinics. This group accounts for a number of individuals who are considered unstable in terms of their condition, and includes young persons leading erratic, energetic and often rebellious lives.

\(^2\) Short acting soluble insulin (subcutaneous administration)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose-lowering effect</td>
<td>30-60mts.</td>
</tr>
<tr>
<td>Peak effect</td>
<td>2-4hrs.</td>
</tr>
<tr>
<td>Duration</td>
<td>5-7hrs.</td>
</tr>
</tbody>
</table>
Figure 20 - Frequency of recordings per hour of clinic
n = 565    Total = 12 clinics

Figure 21 - Blood glucose recordings as % of total recordings
n = 565

129
Figure 22 - Comparison of blood glucose recordings per hour of clinic
n = 565
A chi-square test carried out on the data obtained was not significant at the 0.001 level ($x^2 = 0.1086$, df=1). It was concluded that there was no difference between the populations of the under-30s clinics and the other clinics for which data was obtained. The findings were therefore considered not to be skewed by their inclusion.

Near-normoglycaemia is a key aim of good management; the twelve week collection may not reflect the status of this population accurately. Factors such as simply attending the clinic, interruption of a normal routine for this purpose and the inclusion in the data of both types of diabetics must be considered; nevertheless a strong tendency towards raised values has been demonstrated.

This method of monitoring was discontinued shortly after this data was collected. Only those patients who are a cause of clinical concern are now routinely monitored using an alternative method of evaluation$^3$ - HbA$_{1c}$.

$^3$Glycosylated haemoglobin (HbA$_{1c}$) is a precise method for assessing the average daily intake of glucose and is more commonly measured in those Type I patients requiring close monitoring. Normal value HbA$_{1c}$: 3.5 to 8.5% (Guthrie & Guthrie, 1983).
Before decisions could be made about the content of a patient-education course in which understanding diabetes mellitus must be the central focus, information was needed about the level of knowledge of the condition possessed by the clinic population. The instrument used for this purpose was Dunn's Diabetes Knowledge Assessment Scale C (Dunn et al, 1984), a 15-item validated scale developed from an initial pool of 89. In situations such as this survey, where comprehensive assessment would be time-consuming and unnecessary and specific patient assessment is not required, research findings suggest that rapid and reliable assessment is possible. Dunn et al (1984) argue that it is possible to sample from a large domain of knowledge and to produce a brief instrument of high validity which satisfies statistical requirements.

Conditions pertaining in out-patients' clinics have been described; patients are invariably willing to participate in research projects, but the sensitive researcher must balance collection of large amounts of data and the consequent burden placed on patients, against brief, focused, information-seeking, which risks the loss of some information but retains the participants' good-will. Of importance also is the need to fit the activity into the main function of the clinic, effective consultation and patient satisfaction.

The scale was discussed fully with the health care team prior to application and approval obtained for its use.

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4 Permission kindly given by the author - Appendix C.
The piloted questionnaire (n=10, 5 Type I IDDs, 5 Type II NIDDS) revealed no obvious difficulties regarding the format of the questionnaire or the language used (extensive testing of the scale had taken place in Australia). A mean score of 7.9 was obtained - SD 3.9; (Dunn's normative sample - $\bar{x}$ 7.52; SD 3.85).

During seven diabetic clinic sessions the questionnaire was completed by a random sample of the clinic population (n=81; Type I n=60; Type II n=21). Table 3 describes the sample.

Table 3 - Description of sample

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Average Age</th>
<th>SD</th>
<th>Duration of disease &lt;1yr</th>
<th>&gt;1yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>26</td>
<td>34</td>
<td>35</td>
<td>15.99</td>
<td>2</td>
<td>58</td>
</tr>
<tr>
<td>Type II</td>
<td>13</td>
<td>8</td>
<td>61</td>
<td>10.92</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

Type I: $\bar{x}$ score .......11.22 SD.2.26.

Type II: $\bar{x}$ score .......6.52 SD.2.44.
For further analysis, the responses were classified under the headings - Question 2, 4, 6, 10, 13, 15 (diet) 
Question 1, 3, 5, 7, 8, 9, 11, 12, 14 (general management)

Tables 4 and 5 (diet) and 6 and 7 (general management), compare the frequency of correct responses.

DIET

Table 4 - Correct response as % per question.

<table>
<thead>
<tr>
<th></th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Type I (n=60)</td>
<td>93</td>
</tr>
<tr>
<td>Type II (n=21)</td>
<td>81</td>
</tr>
</tbody>
</table>

Type I
Actual score per question.......... $\times$ 40
Correct response overall.......... 66%

Type II
Actual score per question.......... $\times$ 10
Correct response overall.......... 49%

Table 5 - Frequency of correct/incorrect responses

<table>
<thead>
<tr>
<th></th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I (n=60)</td>
<td>236</td>
<td>124</td>
</tr>
<tr>
<td>Type II (n=21)</td>
<td>62</td>
<td>64</td>
</tr>
</tbody>
</table>

A chi-square test on the data obtained was significant at the 0.001 level ($x^2 = 9.823 \ df = 1$). It was concluded that there is a difference between the two groups with regard to response to the diet questions.
Table 6 - Correct response as % per question

<table>
<thead>
<tr>
<th>Questions</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>11</th>
<th>12</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I (n=60)</td>
<td>93</td>
<td>72</td>
<td>92</td>
<td>88</td>
<td>83</td>
<td>92</td>
<td>88</td>
<td>85</td>
<td>66</td>
</tr>
<tr>
<td>Type II (n=21)</td>
<td>33</td>
<td>9</td>
<td>48</td>
<td>57</td>
<td>33</td>
<td>19</td>
<td>80</td>
<td>29</td>
<td>24</td>
</tr>
</tbody>
</table>

Type I
Actual score per question ...... $\bar{x}$ 57
Correct response overall ...... 84%

Type II
Actual score per question ...... $\bar{x}$ 8
Correct response overall ...... 37%

Table 7 - Frequency of correct/incorrect responses

<table>
<thead>
<tr>
<th>Type I n=60</th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II n=21</td>
<td>456</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>119</td>
</tr>
</tbody>
</table>

Type I ratio, correct to incorrect responses - 5.4 : 1
Type II ratio, incorrect responses to correct - 1.7 : 1

Figure 23 shows the relationship between the age of the respondents and their mean scores and compares Type I with Type II. A test of association (Spearman's rho) was carried out on the data, whereby scores from the two groups could be compared for those between the ages of 30 years to 80 years. There was no significant association between the variables ($p = .775$, n = 5), though the association was positive; the relationship may therefore have been significant if a larger sample had been used.

Figure 24 shows the relationship between the duration of the condition and the mean score for Type I and Type II diabetics.
Figure 23 - Relationship between age and \( \bar{x} \) score

\[ \begin{array}{c|cccccccc}
\hline
\text{Age - years} & 15-19 & 20-29 & 30-39 & 40-49 & 50-59 & 60-69 & 70-79 \\
\hline
\text{x Score} & \square & \square & \square & \square & \square & \square & \square \\
\hline
\end{array} \]

Type 1 \( n = 60 \)

Type II \( n = 21 \)

Figure 24 - Relationship between duration of diabetes and \( \bar{x} \) score

\[ \begin{array}{c|cccc}
\hline
\text{Duration - years} & <1 & 1 - 5 & 5 - 10 & >10 \\
\hline
\text{x Score} & \square & \square & \square & \square \\
\hline
\end{array} \]

Type 1 \( n = 60 \)

Type II \( n = 21 \)
The mean score is evenly spread across each period and directly reflects the mean overall correct response, 11.21, whereas the Type II mean per duration is influenced by one respondent (n = 2) in the 5-10 year interval who made a completely incorrect response to the questionnaire.

Some important observations must be made regarding the data described.

Firstly, a random stratified sample, with equal proportions of Type I and Type II respondents would have simplified analysis. However, on inspection of the data it is clear that the scores do not reflect a 3:1 ratio of Type I IDD to Type II NIDD.

There are aberrant responses, for example to Question 13, which suggests that this question is not reliable for application to this population. Type II respondents gave no correct answer to this question and Type I correct response rate was 1.6%, considerably below the level of the other responses from this sample. Given that the format of the question was different, as were Questions 14 and 15, it is surmised that the concept was unfamiliar, or even alien, to the sample ie that there should be "approved" foodstuffs. The concept of self-management is incompatible with having to seek permission to eat certain foods, which may be implied from this question.

It is surmised that scales such as that used may not be generalisable across cultures; clinic philosophies may be as highly differentiated as are the clinic populations. Diabetes
mellitus is a world-wide condition and diabetes literature crosses cultural divides, but the ethos of this diabetic clinic may be more laissez-faire than its counterpart in Australia.

There are, however, discernible trends, eg the negative relationship between the older age groups and the level of knowledge about the condition. The main concern, and the purpose of this survey, was to investigate the knowledge prevailing. Clearly the scores are unacceptable; even allowing for a more accessible form of Question 13, the mean score for Type II NIDDs would be 8 (53%). The data added to the considerable evidence of poor knowledge levels concerning dietary requirements and general management.

Analysis of the Experimental Data

The design of the prospective intervention study was outlined in Chapter 3. Three experimental groups were described, as follows:-

Group 1 - Type II NIDDs diagnosed less than 1 year. Convenience sample of clinic population.

Control Group - the subjects obtained by a search of medical records and a random selection of subjects diagnosed less than 1 year, 2 years prior to 1988, when the study commenced.

Group 2 - subjects with a diagnosis of Type II NIDDM of more than 1 year duration, a random sample of the clinic population.
The aim of this study was to complement the work of the diabetes team by providing additional educational support for those attending the diabetic clinic. It was hypothesised that a structured education/information intervention would promote the main aim of Type II diabetes management, achievement and maintenance of an ideal body weight.

The hypothesis was operationalised as follows - a series of three structured interventions will result in a change in body weight and, for each subject, a trend towards the ideal body weight.

Table 8 - The characteristics of the samples

<table>
<thead>
<tr>
<th></th>
<th>n=</th>
<th>M</th>
<th>F</th>
<th>x age (M)</th>
<th>x age (F)</th>
<th>x (all)</th>
<th>SD(all)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>61</td>
<td>59</td>
<td>60</td>
<td>8.15</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>8</td>
<td>7</td>
<td>66</td>
<td>61</td>
<td>64</td>
<td>9.85</td>
</tr>
<tr>
<td>Group 2</td>
<td>16</td>
<td>11</td>
<td>5</td>
<td>64</td>
<td>52</td>
<td>60</td>
<td>10.96</td>
</tr>
</tbody>
</table>

Tables 9, 10, 11, show the progress of each subject throughout the study and the point at which subjects withdrew. The body weight was recorded at each intervention; the interval between each intervention was variable but the total time each subject remained in the study was 6 months. The interval between interventions needed to be both flexible and to be negotiated, often in conjunction with the diabetic clinic appointment, because many subjects were employed and needed to take time away from their work to attend the clinic; transport arrangements were also a difficulty for some subjects.
### Group I - Within Criteria - <1 Year (n=20)

**Table 9 - Record of Weight Change (Kg)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Wt 1 (Kg)</th>
<th>Wt 2 (Kg)</th>
<th>Wt 3 (Kg)</th>
<th>Wt +/−</th>
<th>% change of TBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>F</td>
<td>68</td>
<td>67</td>
<td>65</td>
<td>62.3</td>
<td>-4.7</td>
<td>-7</td>
</tr>
<tr>
<td>19</td>
<td>M</td>
<td>61</td>
<td>77</td>
<td>69.5</td>
<td>70.8*</td>
<td>-6.2</td>
<td>-8</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>64</td>
<td>61.2</td>
<td>61.5</td>
<td>61.5</td>
<td>0.3</td>
<td>+0.5</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>51</td>
<td>69.1</td>
<td>69.6</td>
<td>70</td>
<td>0.9</td>
<td>+1.3</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>57</td>
<td>90.7</td>
<td>80.3</td>
<td>-*</td>
<td>-10.4</td>
<td>-11.5</td>
</tr>
<tr>
<td>12</td>
<td>F</td>
<td>61</td>
<td>72</td>
<td>82.4</td>
<td>81.4</td>
<td>9.4</td>
<td>+13</td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>61</td>
<td>109*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>54</td>
<td>58.1</td>
<td>56.4</td>
<td>55.8</td>
<td>-2.3</td>
<td>-4</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>53</td>
<td>68.8</td>
<td>66.4</td>
<td>66.4</td>
<td>-2.4</td>
<td>-3.5</td>
</tr>
<tr>
<td>36</td>
<td>F</td>
<td>70</td>
<td>68.7</td>
<td>69</td>
<td>70*</td>
<td>+1.3</td>
<td>+1.9</td>
</tr>
<tr>
<td>34</td>
<td>M</td>
<td>54</td>
<td>73.3</td>
<td>68</td>
<td>66.2</td>
<td>-7.1</td>
<td>-9.7</td>
</tr>
<tr>
<td>27</td>
<td>M</td>
<td>75</td>
<td>91</td>
<td>81</td>
<td>80</td>
<td>-11</td>
<td>-12</td>
</tr>
<tr>
<td>25</td>
<td>M</td>
<td>55</td>
<td>68.6</td>
<td>66.8</td>
<td>66.6</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>37</td>
<td>M</td>
<td>48</td>
<td>86.9</td>
<td>86.8</td>
<td>92*</td>
<td>+5.1</td>
<td>+5.9</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>55</td>
<td>67.4</td>
<td>66.4</td>
<td>66</td>
<td>-1.4</td>
<td>-2</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>65</td>
<td>53.5</td>
<td>53.6</td>
<td>55</td>
<td>+1.5</td>
<td>+2.8</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>53</td>
<td>86.7</td>
<td>85.9</td>
<td>86.9</td>
<td>+0.2</td>
<td>+0.2</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>63</td>
<td>68.4</td>
<td>67.3</td>
<td>65.6</td>
<td>+2.8</td>
<td>+4</td>
</tr>
<tr>
<td>1</td>
<td>F</td>
<td>48</td>
<td>61.2</td>
<td>59.6</td>
<td>60*</td>
<td>-1.2</td>
<td>-2</td>
</tr>
<tr>
<td>35</td>
<td>M</td>
<td>69</td>
<td>73.1</td>
<td>74.3</td>
<td>74.4</td>
<td>+1.3</td>
<td>+1.8</td>
</tr>
</tbody>
</table>

Mean Change: -1.3 Kg (SD 4.89)
Mean % Change: - 1.57% (SD 6.14)

*Did not attend - 25% (data obtained from notes).
Group 2 - Outside Criteria - >1 Year (n=16)

Table 10 - Record of Weight Change (Kg)

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Intervention 1</th>
<th>Intervention 2</th>
<th>Intervention 3</th>
<th>Wt +/- % change of TBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>M</td>
<td>71</td>
<td>96.6</td>
<td>90.2</td>
<td>96</td>
<td>-0.6</td>
</tr>
<tr>
<td>33</td>
<td>M</td>
<td>66</td>
<td>72.6</td>
<td>72.3</td>
<td>73.4*</td>
<td>+0.8</td>
</tr>
<tr>
<td>32</td>
<td>F</td>
<td>54</td>
<td>106.1</td>
<td>106.7</td>
<td>109</td>
<td>+2.9</td>
</tr>
<tr>
<td>31</td>
<td>M</td>
<td>64</td>
<td>82</td>
<td>80.5</td>
<td>81.5*</td>
<td>-0.5</td>
</tr>
<tr>
<td>30</td>
<td>M</td>
<td>64</td>
<td>93.3*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>M</td>
<td>56</td>
<td>90</td>
<td>87.2</td>
<td>86.3*</td>
<td>-3.7</td>
</tr>
<tr>
<td>26</td>
<td>F</td>
<td>61</td>
<td>89.6</td>
<td>86.5</td>
<td>83.3*</td>
<td>-6.3</td>
</tr>
<tr>
<td>24</td>
<td>M</td>
<td>61</td>
<td>80.2</td>
<td>81.3</td>
<td>79*</td>
<td>-1.2</td>
</tr>
<tr>
<td>23</td>
<td>F</td>
<td>50</td>
<td>91.4</td>
<td>90.2</td>
<td>92.6</td>
<td>+1.2</td>
</tr>
<tr>
<td>21</td>
<td>M</td>
<td>60</td>
<td>91</td>
<td>90.2</td>
<td>89*</td>
<td>-2</td>
</tr>
<tr>
<td>20</td>
<td>F</td>
<td>36</td>
<td>105.4</td>
<td>107</td>
<td>105.6*</td>
<td>+0.2</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>57</td>
<td>106*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>M</td>
<td>77</td>
<td>75</td>
<td>72.2</td>
<td>70</td>
<td>-5</td>
</tr>
<tr>
<td>14</td>
<td>M</td>
<td>66</td>
<td>95</td>
<td>90.6</td>
<td>90.6*</td>
<td>-4.4</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>42</td>
<td>109.3</td>
<td>114</td>
<td>106</td>
<td>-3.3</td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>75</td>
<td>86.6</td>
<td>83.9</td>
<td>85.5*</td>
<td>-1.1</td>
</tr>
</tbody>
</table>

Mean Change: -1.44 Kg (SD 2.50)
Mean % Change: -1.65 Kg (SD 2.82)

Did not attend - 75% (data obtained from notes).
Group 1 - Control - <1 Year - from Medical Records (n=15)

Table 11 - Record of Weight Change (Kg)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Wt +–</th>
<th>% change of TBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>A M</td>
<td>61</td>
<td>96.8</td>
<td>95.4</td>
<td>98.3</td>
<td>+1.5</td>
<td>+1.5</td>
</tr>
<tr>
<td>B F</td>
<td>68</td>
<td>120.7</td>
<td>114</td>
<td>108.9</td>
<td>-11.8</td>
<td>-9.7</td>
</tr>
<tr>
<td>C F</td>
<td>66</td>
<td>98.2</td>
<td>94.4</td>
<td>98.4</td>
<td>+0.2</td>
<td>+0.2</td>
</tr>
<tr>
<td>D M</td>
<td>67</td>
<td>56.7</td>
<td>58.2</td>
<td>59.6</td>
<td>+2.9</td>
<td>+5</td>
</tr>
<tr>
<td>E M</td>
<td>77</td>
<td>61.9</td>
<td>62.6</td>
<td>67.2</td>
<td>+5.3</td>
<td>+8.5</td>
</tr>
<tr>
<td>F M</td>
<td>53</td>
<td>79</td>
<td>79.8</td>
<td>77</td>
<td>-2</td>
<td>-2.5</td>
</tr>
<tr>
<td>G M</td>
<td>56</td>
<td>70.7</td>
<td>72.4</td>
<td>73</td>
<td>+2.3</td>
<td>+3.2</td>
</tr>
<tr>
<td>H M</td>
<td>74</td>
<td>88.8</td>
<td>79</td>
<td>77.8</td>
<td>-10</td>
<td>-11</td>
</tr>
<tr>
<td>I F</td>
<td>78</td>
<td>75</td>
<td>71</td>
<td>68.5</td>
<td>-8.5</td>
<td>-11.3</td>
</tr>
<tr>
<td>J F</td>
<td>53</td>
<td>80.8</td>
<td>80.4</td>
<td>80.3</td>
<td>-0.5</td>
<td>-0.6</td>
</tr>
<tr>
<td>K F</td>
<td>56</td>
<td>80.9</td>
<td>79</td>
<td>79</td>
<td>-1.9</td>
<td>-2.3</td>
</tr>
<tr>
<td>L F</td>
<td>52</td>
<td>86.3</td>
<td>86.4</td>
<td>86.7</td>
<td>+0.4</td>
<td>+0.46</td>
</tr>
<tr>
<td>M M</td>
<td>62</td>
<td>79.9</td>
<td>76</td>
<td>74</td>
<td>-5.9</td>
<td>-7.3</td>
</tr>
<tr>
<td>N M</td>
<td>77</td>
<td>65.3</td>
<td>69.3</td>
<td>66.6</td>
<td>+1.3</td>
<td>+2</td>
</tr>
<tr>
<td>P F</td>
<td>54</td>
<td>101.8</td>
<td>97.7</td>
<td>98.1</td>
<td>-3.7</td>
<td>-3.6</td>
</tr>
</tbody>
</table>

Mean Change: -2.05 Kg (SD 5)
Mean % Change: -1.83 Kg (SD 5.88)
In Group 1, the second interventions were all within one month of the initial diagnosis and first intervention. To preserve clinical confidentiality, and to link with the dynamic concept analysis, each subject in Group 1 and 2 is numbered; letters are given to the Control Group. Those subjects who left the study at any stage are identified and although not included in calculations, where they are used for illustrative purposes this is noted. Although they were lost to the experimental study, if they subsequently kept a diabetic clinic appointment, their body weight was obtained by inspection of their medical record. 25% of subjects in Group 1 and 75% of those in Group 2 left the study before completion. A twelve week observation of the did-not-attend rate for the clinic (702 appointments), was 19.5%, a phenomenon common to out-patients' departments. Individual reasons for non-attendance will be discussed in detail later in the analysis.

The Mann-Whitney U Test, a non-parametric method for unmatched pairs, was used to test the significance of the data and the following results were obtained.

**Group 1 (n=20)** - Mean body weight change: -1.3Kg SD 4.89
- Females - Mean +0.66Kg (0.85%) SD 3.76 (5.42%)
- Males - Mean -3.25Kg (3.98%) SD 5.27 (6.1%)

The null hypothesis states there will be no difference between the weight changes of the males and females. The results of the analysis were non-significant ($U=24 \ N_A=8 \ N_B=9$ Mann Whitney U Test), therefore the null hypothesis was not rejected.
Control Group (n=15) - Mean body weight change: - 2.05Kg SD 5
Females - Mean -3.69Kg (3.83%) SD 4.73 (4.79%)
Males - Mean -0.58Kg (0.08%) SD 5.1 (6.48%)

The null hypothesis that there would be no difference between the weight changes of Group 1 and the Control Group was tested. The results of the analysis were non-significant (U=100 $N_A=14 \ N_B=15$ Mann-Whitney U Test); the null hypothesis was not rejected. It was concluded that the weight changes recorded by the experimental group did not differ significantly from those of the control group.

Group 1 males who remained in the study were tested against the control group. The null hypothesis that there would be no difference in the weight changes recorded by this group and the control group males could not be rejected (Mann-Whitney U=8.5 $N_A=5 \ N_B=8$ significant at 0.01 level).

Group 2 (n=16) - Mean body weight change: -1.44Kg SD 2.5
Females - Mean -0.4Kg (0.56%) SD 3.49 (3.76%)
Males - Mean -1.91Kg (2.15%) SD 1.92 (2.33%)

Finally Group 2 subjects who remained in the study were tested against those who left the study after the first intervention ie those who did not complete were the intra-group control. The null hypothesis that there would be no difference between these two groups could not be rejected (Mann-Whitney U=17 $N_A=5 \ N_B=9$).

It will be noted that there are no statistically significant results for any of the variables tested, but figures 25, 26, 27, clearly illustrate trends towards the positive, weight losses which are of clinical significance.
Figure 25 - Change in weight variable of each subject at 3rd intervention -6/12

n = 20  Group 1  <1 year
Subject/

<table>
<thead>
<tr>
<th>Sex</th>
<th>WEIGHT GAIN</th>
<th>WEIGHT LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 (F)</td>
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</tr>
<tr>
<td>19 (M)</td>
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<td>8  (F)</td>
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<td>34 (M)</td>
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<td>5  (F)</td>
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<tr>
<td>35 (M)</td>
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</tbody>
</table>

Kg 13 12 11 10 9 8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8 9 10 11 12 Kg

Actual body weight
% of body weight
Figure 26 - Change in weight variable of each subject at 3rd intervention - 6/12

n = 16  Group 2 > 1yr.

Actual body weight
% of body weight

<table>
<thead>
<tr>
<th>Subject/ Sex</th>
<th>WEIGHT GAIN</th>
<th>WEIGHT LOSS</th>
</tr>
</thead>
<tbody>
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<td>26 (F)</td>
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<tr>
<td>10 (M)</td>
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</tbody>
</table>

Kg  4   3   2   1   1   2   3   4   5   6   7   8   Kg
Figure 27 - Change in weight variable of each subject at 3rd recording - 6/12

n = 15 Control

<table>
<thead>
<tr>
<th>Subject/Sex</th>
<th>WEIGHT GAIN</th>
<th>WEIGHT LOSS</th>
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<td>B (F)</td>
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<td>C (F)</td>
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<td>D (M)</td>
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<tr>
<td>F (M)</td>
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<td>G (M)</td>
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<tr>
<td>H (M)</td>
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<tr>
<td>I (F)</td>
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<td>L (F)</td>
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</tr>
<tr>
<td>M (M)</td>
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<td></td>
</tr>
<tr>
<td>N (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O (F)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual body weight
% of body weight

Kg: 9 8 7 6 5 4 3 2 1

Kg: 1 2 3 4 5 6 7 8 9 10 11 12 Kg
In order to subject the data to more sensitive testing, each subject's weight change was calculated as a proportion of the initial recorded weight. A scattergram for these calculations was constructed (Figure 28) for Group 1 subjects. No linear relationship was observed, but a slight tendency towards greater proportionate weight loss in three of the heavier subjects was apparent and a smaller proportionate weight gain was observed, also in three of the heavier subjects.

Similarly, Group 2 subjects (Figure 29) demonstrated no relationship between weight loss/gain as a proportion of the initial body weight. The narrow range of weight loss or gain as a proportion of initial weight is illustrated, as is the number of subjects in the heavier initial weight range. No subject demonstrated the large proportionate weight loss of those in Group 1. (Note: the (o) and (a) labelling in this figure will be explained in the following pages and further discussion of the finding is included in the clinical discussion.)

A description of each subject's weight status was derived from a calculation of the body mass index (formula $\text{Weight/Height}^2$). The Quetelet Index (Garrow & Webster, 1985) (Figure 30), illustrates the percentages of those who were obese, overweight or of an acceptable weight on entry to the study. It was observed that the major proportion of the three groups are in the categories, obese or overweight (Group 1 - 60%; Control Group - 73%; Group 2 - 81%).
Group 1

Figure 28 - Weight change as proportion of initial weight

Legend:
+ = weight gain
* = weight loss
O = obese
a = acceptable
Figure 29 - Weight change as proportion of initial weight

Group 2

+ = weight gain
* = weight loss
O = obese
a = acceptable
DNA = left study before completion
Figure 30 -

Body mass of subjects defined by height/weight (Quetelet index) on entry to the study

- Obese
- Overweight
- Acceptable
- Underweight

<table>
<thead>
<tr>
<th></th>
<th>Gp 1 (n = 20)</th>
<th>Control (n = 15)</th>
<th>Gp 2 (n = 16)</th>
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<td>Obese</td>
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<tr>
<td>Underweight</td>
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</table>
To determine whether any subjects had moved from the clinically undesirable status of obesity during the course of the experimental study, figures 31, 32, 33 were constructed from calculation of the Body Mass Index at the beginning of the study and on completion (or, in the case of those who did not complete, from the data available). Garrow and Webster (1985) suggest a classification of obesity for clinical purposes based on the Quetelet Index, in which the upper limit for the desirable range for men and women is 25, between 25 and 29.9 is Grade I, between 30 and 40 Grade II and over 40 is Grade III.

Analysis of the data using the Garrow and Webster (1985) classification, revealed the subjects who were above the desirable range at the beginning and end of the study (Table 12). From further analysis utilising the grading system, any movement across the grades could be discerned (Table 13). A further analysis by sex (Table 14) revealed a greater percentage of male to female obese subjects in Grades I and II.
Figure 31 - Calculation of body mass index and obesity grading

Group 1  n = 20

Sex/

Subject

F  22
M  19
F  18
F  17
M  13
F  12
M  9
F  8
M  7
F  36
M  34
M  27
M  25
M  37
F  6
F  5
M  4
F  2
F  1
M  35

25 - 29.9: GRADE I
30 - 40: GRADE II  obesity
> 40: GRADE III

(Garrow & Webster, 1985)
Group 2  \( n = 16 \)

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<th>Subject</th>
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</thead>
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- end of study
- 1st intervention

Figure 32 - Calculation of body mass index and obesity grading

BMI (Quetelet)
Figure 33 - Calculation of body mass index and obesity grading

Control n = 15

Sex / Subj.

<table>
<thead>
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<th>Subj.</th>
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<tbody>
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</table>

3rd clinic visit

on inspection of records

155
The different classifications for each group were analysed using chi square. The value of $x^2$ at 0.001 was not significant ($x^2=2.1 \text{ df}=4$). It was concluded that the proportions classified initially and at the end of the study, did not vary substantially. The null hypothesis that there is no difference between the groups was not rejected.

This statistical rejection highlights an important point which became increasingly apparent. A small movement across grades, which may not be significant statistically, may nevertheless have considerable impact on the individual who moves from, eg a classification of obese Grade II to obese Grade I.

Table 13 - Movement of subjects across the grades

<table>
<thead>
<tr>
<th></th>
<th>Grade I BMI 25-29.9</th>
<th>Grade II BMI 30-40</th>
<th>Grade III BMI &gt;40</th>
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<tbody>
<tr>
<td></td>
<td>initial</td>
<td>end</td>
<td>initial</td>
</tr>
<tr>
<td>Group I</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Control</td>
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<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Group II</td>
<td>6</td>
<td>7</td>
<td>8</td>
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</tbody>
</table>

* no data available for 2 subjects

Table 14 - A comparison by sex (total study sample)

<table>
<thead>
<tr>
<th></th>
<th>Grade I</th>
<th>Grade II</th>
<th>Grade III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>14%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>Male</td>
<td>27%</td>
<td>18%</td>
<td>-</td>
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</table>
Analysis of the Clinical Data

The survey of blood glucose levels in the clinical population highlights a major obstacle to the belief that individuals can live a near to normal life with diabetes mellitus. If the emphasis is on normality, individuals will expect that outcome and fail to modify those aspects of their lives which will achieve it, unless it is made apparent that they must work towards that goal. Constant physiological monitoring is not normal and the information gained from that monitoring does not appear to be of immediate benefit, either to the clinician or the patient. A more complete but less frequent patient audit may be seen to provide therapeutically useful information and a comprehensive data base for long-term preventive management to which the patient feels he/she has contributed.

There is strong evidence (p 15) of a relationship between duration of disease, constant hyperglycaemic levels and vascular complications; maintenance of near-normoglycaemia has been established as central to control of the condition. The main thrust towards near-normoglycaemia in the management of Type II diabetes in the observed clinic was through reaching and maintaining a clinically acceptable body weight. Adhering to sound dietary advice was observed to be the key feature of initial diagnosis and throughout continuing consultations.

Poor levels of knowledge about the condition, general management and appropriate foods are of major clinical
importance. On inspection of the questionnaire data, it was observed that the average age of NIDDs was 60 years (range 30-77 years). A negative relationship was apparent between knowledge, as measured by the scale, and increasing age. This may have been a simple relationship, the older the individual the less he/she knows, but it is possible that other factors could have affected the responses. Individuals often become anxious and confused in surroundings such as those described, and the immediacy of the situation where he/she is waiting to be called in to a consultation may result in an inaccurate knowledge assessment, with little time available for reflection on responses. There was an apparent relationship between duration of disease and scores, with higher scores in both groups for shorter duration, a decrease between 5-10 years and a slight increase over 10 years. It is reasonable to assume that the more recent the diagnosis of the condition, the more information the individual will have retained. There is no immediate explanation for the decrease in the middle years - if accumulation of knowledge could explain the 10 year increase, a decrease would not be expected between 5-10 years. A larger, stratified sample is needed to investigate this finding.

There were marked differences between Type I IDDs' and Type II NIDDs' responses to both general management and dietary questions. There were, overall, more incorrect than correct responses from NIDDs and extremely poor scores for dietary questions.
A comparative analysis of the questions concerning diet revealed the following - there were consistent responses concerning the substitution of foods (Question 2), but a marked inability by NIDDs to identify a carbohydrate in one list of foods (Question 6) and a non-carbohydrate in another (Question 10). Question 13 was discussed earlier; Question 15 was the only response for which scores for NIDDs were greater than those for IDDs. This response may be a function of the age of the respondents and historical beliefs about diabetes mellitus. Many elderly people will have been aware of diabetes as a relatively new disease when they were young; Type I and Type II were not distinguishable by the lay person. Foods appeared in shops labelled for diabetics; they were seen as acceptable and were always more expensive than similar foods for non-diabetics. These respondents would be more likely to respond correctly to both parts of this question because economic stringency is a perspective for many elderly diabetics. For younger IDDs cost may be only relative and not a primary consideration.

The general management responses are similarly discrepant, but suggest different explanations. Question 3 concerns the normal range for blood glucose levels and is defined in mmol/l. NIDDs are instructed in self-monitoring and advised to monitor at regular intervals the presence/absence of glucose in the urine, but the emphasis is placed on the colour scale, not the collateral estimation in mmol/l. IDDs are encouraged to measure blood glucose levels, which are a more accurate measurement if insulin is to be administered, and to converse with health care
professionals in the language of biochemistry, especially when discussing HbA\textsubscript{1c} results.

Other large differences can be accounted for by the apparent emphasis in the questionnaire on diabetes and insulin-related events (Question 9) which are outside the experience of most NIDDs. The underlying premise that understanding of Type II diabetes mellitus should be based on a global understanding of diabetes per se, is acknowledged as important. A distinction can, however, be made between knowledge which is necessary for understanding and knowledge which is essential for day-to-day management competence. Important knowledge deficits were uncovered in this small sample, which do relate to day-to-day management, eg knowledge about carbohydrates. The reliability of the responses is confounded by the clinic setting in which the data was collected, but the results support the concern expressed by many health care professionals about levels of patient knowledge. The data was used as a guide to the content of the teaching intervention and to the innovation to be discussed in the following chapter.

No statistically significant findings were derived from group comparisons within the experimental data, but a large amount of clinically significant information was obtained and trends noted.

The study highlights the difficulties of obtaining adequate control of a clinical sample. The attrition rate has been noted
but clinical information can be attached to that data to illuminate the problem of retention in the study. All subjects consented to participation, but in Group I, Subject 19 spoke very little English and did not continue; Subject 13 became redundant from his employment in a brewery, ceased drinking easily accessible alcohol, dramatically lost weight, was then diagnosed as non-diabetic and left the study. Three subjects discontinued participation in the study without giving a reason.

In Group 2, four subjects could not continue attendance for employment reasons, one because of the death of a close relative and two gave no reason.

In a meta-analysis of patient-education studies (Brown, 1988 p 228), the author suggests that it is the most successful patient-education programmes, which involve frequent contact and reinforcement, which suffer from high patient attrition rates.

It is clear that the historical control group is more stable and to have obtained a strict control group, matched pairs would have been required who would either remain or leave the study at the same point; this would not be clinically defensible or desirable. The group can however be used to make valid clinical comparisons and observations.

No relationship can be observed between the age of subjects and weight change. It is noted that in Group 1, between 60-69 years, two subjects lost weight and five gained weight; in Group 2 between 60-69 years, one subject gained, and five lost weight.
A wide variation in weight change was noted in Group 1 (-11 Kg to +9.4 Kg) and the control group (-11.8 Kg to +5.3 Kg). These are expected findings in newly diagnosed diabetics who have recent exposure to new information about diabetes and its management. They may be motivated by recent diagnosis to achieve goals and make efforts to comply (Subject 27) or, like Subject 13 be governed by events outside their control (see reasons for attrition, p 161). On the other hand, weight is gained incrementally as part of the ageing process and may have been the triggering mechanism for the onset of NIDDM, although a recent study (Deurenberg et al, 1991) suggests that even if body weight remains constant, body fat increases with age. Weight regulation may be outside voluntary control and need the prescription of chemical substances (hypoglycaemic agents) at a later stage, to achieve and maintain a desirable body weight and to control blood glucose levels. In addition some individuals may not yet be reconciled to this diagnosis and not be cognitively ready to comply with therapeutic advice.

It was observed that the range of change for Group 2 subjects was much narrower (-6.3 to +2.9 Kg). This group have acknowledged recalcitrant weight problems, many of long duration. In constructing the figures based on the BMI (Quetelet Index), this narrow range within the obese band is clearly illustrated and leads to the final part of this analysis.

No statistically significant results were obtained from calculation of the proportion of weight change for each
individual (p 148) in Group 2; a linear relationship was not observed (Fig. 29) and no association was found in Group I subjects. These findings support the wide range of apparently unrelated changes found in this group. It was observed in Table 12 that 94% of this group were originally classified as obese; Figure 32 gives immediate visual impact to this finding and demonstrates the movement of these subjects within Grade III (between 30-40 BMI). Only one subject (No 15) had moved out of the obese classification (which includes those who did not complete) by the end of the study. This finding supports the clinical observation that weight loss in the already obese diabetic is a long and arduous achievement with little immediate reward and requires both motivation and perseverance.

In Figure 29, where the grading of obesity⁵ has been related to the proportionate weight loss/gain for each subject, the task is clearly illustrated; only two subjects are within the acceptable grading. The majority of subjects are within the heavier weight range and the proportionate weight loss is at the lower end of the scale.

The nature of the task is also illustrated for Group I patients where the classification of obesity was 60% initially and 40% at the end point (illustrated in Table 12). A number of subjects in this group were not classified as obese (7: 35%),

⁵

\[
\begin{align*}
\text{a} &= \text{acceptable (upper limit for desirable range - 25)} \\
&= (\text{Grade I obesity (25 - 29.9)}) \\
\text{o} &= (\text{Grade II obesity (30 - 40)}) \\
&= (\text{Grade III (>40)}) \\
\end{align*}
\]

(after Garrow & Webster, 1985)
but as a first stage of management it was considered that the result of weight loss should be observed for the effect on glucose tolerance and be measured by urine monitoring. The weight movement for this group is illustrated in Figure 31; the control group demonstrates a similar pattern. It was noted that one subject, B, in this group was above 40 BMI, Grade III, initially, but moved into Grade II on the third recording (Figure 33).

This analysis of obesity has illuminated a way in which general body weight statements can be individualised in a precise and focused manner. The visual dimension will form part of the strategy to be discussed in the final chapter.

Finally, experimental data was combined with models derived from the dynamic concept analysis (Chapter 5); the concepts entered into the information structure were body weight (2), compliance (1), social support (3), vulnerability (4) and attitude (5). Using information obtained from the first intervention, a model for each subject was constructed. It was hypothesised that an ideal model could be constructed which would predict compliant behaviour.

The hypotheses stated (p. 125) were that during the experimental study:—
1) subjects identified by the ideal model would lose or maintain body weight as planned
2) the subject identified by less ideal models would not demonstrate the desirable loss/maintenance of body weight
3) subjects who fulfilled the "ideal" criteria would remain in the study.

The ideal model 1.3, which demonstrates strong relationships between the variables entered into the matrix, depicts the need to lose weight (2a positive), a positive attitude to compliance through a commitment to attend the series of information/teaching sessions (1a positive), the presence of social support (3a positive), moderate vulnerability (4n moderate), a positive attitude to the effectiveness of regular monitoring and exercise and to learning about the condition (5a positive). The weight variable of Groups 1 and 2 subjects (n=7) who shared the model were compared (Table 15).

Table 15  Model 1.3 (Groups I & II)

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<th>Subject</th>
<th>Wt +/−Kg</th>
<th>% change</th>
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<tbody>
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<tr>
<td>6</td>
<td>−1.4</td>
<td>−2.0</td>
</tr>
<tr>
<td>Group II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>DNA</td>
<td>−</td>
</tr>
<tr>
<td>33</td>
<td>+0.8 DNA</td>
<td>−</td>
</tr>
<tr>
<td>15</td>
<td>−5.0 DNA</td>
<td>−</td>
</tr>
</tbody>
</table>

It was observed that three subjects lost weight (substantial amounts in two cases) and one made a minimal weight gain. Three Group 2 subjects did not remain in the study, including one who did not attend the clinic again during the course of the study (further body weight recordings were not therefore available). Of the other two subjects, one gained a minimal amount of weight and the other made a clinically significant weight loss.
A similar procedure was carried out with other subjects and other models. Table 16 contains one subject (No 4), whose model 1.6 possesses one attribute (3n social support) which differs from the ideal model and has a weight gain of 0.2 Kg.

**Table 16**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Wt +/− Kg</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>+0.2</td>
<td>+0.2</td>
</tr>
</tbody>
</table>

Table 17 compares a group (n=3) with its model 1.2. There are strong, two-way relationships between positive attributes, with the exception of vulnerability; all subjects lost weight in this group.

**Table 17**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Wt +/− Kg</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>-2.0</td>
<td>-3.0</td>
</tr>
<tr>
<td>22</td>
<td>-4.7</td>
<td>-7.0</td>
</tr>
<tr>
<td>13</td>
<td>-10.4</td>
<td>-11.5</td>
</tr>
</tbody>
</table>

Table 18, model 1.5, compares subjects (n=3) with their model; vulnerability is not related to other attributes and social support is only weakly related to compliance. Two subjects gained weight and one lost weight.

**Table 18**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Wt +/− Kg</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-1.2 DNA</td>
<td>-2</td>
</tr>
<tr>
<td>12</td>
<td>+9.4</td>
<td>+13</td>
</tr>
<tr>
<td>18</td>
<td>+0.3</td>
<td>+0.5</td>
</tr>
</tbody>
</table>
A clinical manifestation of the disease process was observed through Table 19, Model 1.8.

Table 19 Model 1.8

<table>
<thead>
<tr>
<th>Subject</th>
<th>Wt +/- Kg</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>+1.3</td>
<td>+1.8</td>
</tr>
</tbody>
</table>

Some diabetics may lose weight without changing eating habits and continuing weight loss may indicate that insulin secretion is not sufficient for metabolic needs. This subject developed a sudden onset of the signs and symptoms of diabetes mellitus - weight loss, polyuria, glycosuria and persistent hyperglycaemia. The model demonstrates positive relationships between compliance, social support and attitude, but a strong relationship between weight gain, which he was initially unable to achieve, and his perception of high vulnerability to the immediate complications of his condition. This subject was prescribed insulin injections and the subsequent weight gain, which was the objective in this case, was ascribed to the medication.

It was observed that - the ideal model (1.3) did account for those subjects who could clinically be called ideal patients in terms of the attributes used to depict compliance, but the hypothesis that the ideal type would remain in the study was confounded by the Group II subjects. It has become increasingly apparent during this study that Group II subjects (who were outside the experimental criteria and diagnosed more than a year ago), are not a homogeneous group; they have highly
differentiated sets of problems and do not fit into a predictive model.

Subject 4 (Model 1.6) does allow the argument advanced in Chapter 4 to be considered. Attribute 3n (neutral social support) identified from his interview data, was a specific contemporary circumstance where events prior to the subject’s retirement from his profession were involving him in many social gatherings which were not compatible with modification of present eating habits. Movement from the present model to 1.3, the ideal, could be discussed as a focal point in clinical consultation and become an objective for this subject as he adapts to two major life changes, his condition and retirement.

Vulnerability may be the key to compliant behaviour, in this study maintenance of an ideal body weight. It has been argued that if individuals feel vulnerable to the complications associated with diabetes mellitus, they will adhere to advice which may delay or prevent the onset of complications. It is possible that oppressive feelings of personal vulnerability may lead some individuals to reject therapeutic advice. Table 17, model 1.2, suggests conversely that at least immediately after diagnosis (less than a year), compliance with advice will be achieved. Whether this adherence will persist has not been tested. An experienced physician caring for the clinic population suggests (Wright, 1991), that diabetics will follow advice in the early stages because they are frightened, but as time proceeds and no signs or symptoms of complications become
evident, they revert to old behaviours. Further investigation of this concept of vulnerability was undertaken and will be discussed in Chapter 7.

Table 18, Model 1.5 demonstrates two negative attributes of subjects who feel vulnerable and do not have appropriate social support to enable them to modify activities of daily living. This important combination may not look clinically significant and often will go unrecognised, if not highlighted as in this analysis. Discussion of the ideal model and the individual's perceived model may encourage the subject to take control of those aspects of his life which will convert his personal model to the ideal.

It has been suggested that the models can show the dynamic nature of a phenomenon and reflect the heterogeneity of subjects. The application of this method of analysis using a small sample and a specific clinical problem, non-compliance, has been outlined.

The analysis and the information structure may change as individual need changes and problems are resolved. Development of this approach may reveal the need to discard a concept and replace it with another which more nearly meets the changing needs of individuals or where it appears to lose its ability to contribute to a predictive model. Vulnerability, for example, has intrinsic negative connotations and may become an inappropriate concept as knowledge about diabetes and coherent, collaborative, educative processes are developed.
Cigarette smoking and diabetes were discussed as a management concern in Chapter 2. Smoking has a pronounced effect on the pathogenesis of atheroclerosis and may have a role in the accelerated atherogenesis demonstrated in diabetes mellitus (Ganda, 1980). Horsley et al. (1987) found 40% of subjects were smokers at time of diagnosis and Gill (1986), 62%. In this study, only 18% (7) admitted smoking. This finding may suggest a non-representative sample, drawn as it was from a relatively poverty-free, health-conscious area of south east England. Of those who did smoke, only one was newly-diagnosed (Group 1). The number of cigarettes smoked a day ranged from 20 (two subjects), to 5; all subjects had, in recent years, reduced the number of cigarettes smoked. The response is not reliable – smokers underestimate the risk to their health (Marsh, 1985) and it may also be the case that they underestimate the number of cigarettes smoked.

One subject (36) suggested that he may take up smoking to reduce his body weight – the wisdom of this action was discussed and the idea subsequently rejected.
ATTRITION from patient-education programmes has been identified as a problem, and one which may be more difficult to overcome when the population is transient as are hospital outpatients. The majority of NIDDMs are monitored intermittently in hospital out-patient clinics or in general practice settings. NIDDMs are monitored, rather than treated in the accepted sense. Patient status is not automatically conferred or accepted in the process of a diagnosis of Type II diabetes mellitus, unless there are overt signs and/or symptoms of disease, e.g., retinal, circulatory or neurological changes. The uneven power relationship which may exist between the professional and the lay person, may also be less apparent in this interaction. Individuals are empowered by the prevailing philosophy in diabetes care; freedom to live confidently with the condition is dependent upon individual mastery of knowledge about it and the transformation of that knowledge into understanding. All members of the team are responsible for the achievement of the objective.

Health care professionals become skilled and experienced communicators, but there are primary constraints on effective communication in many clinical settings. These include the time allotted to each consultation, the non-therapeutic physical environment in which consultations often take place, and the negative effect of that environment upon the capacity of
those seeking advice and support at a stressful time, to absorb information. It is imperative that strategies are devised which are complementary to the conventional patient/client interaction, make effective use of expertise and time, and are acceptable to those involved.

It was concluded from two years participant observation in this study, that the pedagogical characteristics inherent in an interaction where adults must learn and may feel they are being tested, may also be a deterrent to learning through effective communication.

The audio-visual method and material which formed part of the structured course, would be more effective as educational tools if -

a) the team who were actively engaged in diabetes management could convey the message directly to the diabetic person. The link between the educational need and clinical necessity would be strengthened and explicit.

b) the diabetic person could absorb the content in familiar surroundings (his home).

The consistent nature of the content would be guaranteed if those responsible for care delivered the message, although how it was received might vary from individual to individual. The environmental constraints identified earlier would not be present and other unidentified factors, which could have a positive effect on assimilation, might become apparent.
The supportive framework for the interaction would be -

**intrinsic**: collaborative sentiments and a personal approach would be incorporated into the material

**extrinsic**: through the follow-up system employed in the clinic and the provision of additional written information.

**Making a Population-specific Video**

The aims for this production were derived from an extensive exploration of communication with patients (Ley, 1988). In an analysis of the research into patients' understanding of what they have been told (p 173), he concludes that:-

patients often do not know the meaning of the words used by the clinician and fail to understand what they have been told by health care professionals.

There are two identifiable issues - semantics and understanding.

The **first aim** of the video was to provide information, using jargon-free language, which would simplify the subject, non-insulin-dependent diabetes mellitus (NIDDM) and its management, and promote understanding through simplification.

Ley identified a major incompatibility between the patient who would like further information and his reluctance to ask for it. Many external factors may influence this apparent paradox eg a diffidence resulting from a perception of an educational deficiency on the part of the patient, the cultural divide

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1**Definition - Video**: a film made on video tape, capable of being replayed on television.
between the professional/non-professional, or simply the possession of inadequate social skills which may not necessarily be a product of class or culture. Some of these negative interactions and the ensuing reluctance may be overcome by the physical distancing offered in this method.

The second aim arising from this finding was to demonstrate the open and accepting philosophy of care practised by the diabetes team, emphasising the advisory and supportive roles of those involved.

The author emphasised the patients' capacity for independent thought and action -

what the clinician says will be interpreted in terms of the patient's own framework of ideas

The video must identify and address its target audience, who are engaged in activities of daily living common to the diabetic and non-diabetic population alike.

The final aim was to demonstrate an empathic approach to health beliefs about the seriousness of the condition and individual vulnerability, which will allow the diabetic person to determine the benefits and costs of following professional advice and to make their own choices.

The objectives were

a) to prepare a script in collaboration and consultation with the diabetes team and patients.
The team involved were:-

2 physicians - who are responsible for the population from which the study subjects were drawn

1 senior dietician - whose role is to advise on dietary requirements

1 nurse specialist (diabetes) - whose role is to teach, support and advise patients in the community and in hospital

1 chiropodist - who is responsible for patients' foot care

b) to organise production of the video, its dissemination and evaluation.

The video was directed and produced by experienced members of the Audio and Visual Aids Department, University of Surrey, with assistance from the researcher (MW). The budget for production was kept within a £600 financial limit. This financial assistance was provided by the University of Surrey Minor Award Scheme, aimed at supporting small projects and new initiatives.

The target time planned for the production was restricted and completion of the video, which involved complex coordination of the contributions, took one year.

In outline the video contains a brief introduction to diabetes mellitus, general management principles, followed by specific information about food categories. The principles which govern the body's dietary needs are considered and ways of monitoring the effectiveness of dietary modifications are described. Complications are discussed briefly and it concludes with a commitment by the diabetes team to support the efforts made by patients to comply with the advice offered.
The reliability of the content and its clinical credibility was established by drawing on the experience and expertise of the practitioners and by reference to research-based literature.

The following illustrates the content as it was received by a patient -

UNDERSTANDING DIABETES

You and the diabetes care team

Normal function

The effect of ageing on normal function

What you can do

How you can do it

Preventing complications

Self-care
A theoretical framework and rationale for the video was constructed (Figure 34). A learning process through a problem-solving approach was incorporated, ie the problem was stated (1) in a comparison with normal function, explored through knowledge about living with diabetes (2 & 3), solution proposed through adaptation and a positive outcome predicted. Articulation between the process, content and the positive and negative aspects of the health belief model was identified. The resultant model demonstrated the beneficial effects of compliance outweighing the costs. If the viewer has a matched perception, a positive outcome, ie compliance with the adjustments to activities of daily living which are advised, would be predicted (6).
Figure 34 - Theoretical framework and rationale for the video

<table>
<thead>
<tr>
<th>LEARNING PROCESS</th>
<th>CONTENT (b) (key words)</th>
<th>ATTRIBUTES (a) (Health Belief Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Stated</td>
<td>Introduction</td>
<td>Normal/abnormal function</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seriousness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Weight management</td>
</tr>
<tr>
<td>Explored</td>
<td>(Knowledge about</td>
<td>Benefit +</td>
</tr>
<tr>
<td></td>
<td>food intake/output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Energy balance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Calories</td>
<td>Benefit +</td>
</tr>
<tr>
<td></td>
<td>(Activities of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>daily living</td>
<td>Benefit +</td>
</tr>
<tr>
<td></td>
<td>Healthy eating</td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td>(Management</td>
<td>Costs -</td>
</tr>
<tr>
<td></td>
<td>(through</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good health with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vulnerability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compliance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with</td>
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<tr>
<td></td>
<td></td>
<td>Therapeutic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PREDICTION</td>
</tr>
</tbody>
</table>
It will be noted that the complications of diabetes (1) are part of abnormal function and in a sequential problem-solving process would appear early in this model; Ley (1988), explaining fear arousal messages, suggested that they seem likely to lead to greater acceptance of recommendations (pl77). Fewer exposures lead to better results; because complications may never occur, strong fear arousal was not considered an appropriate state or response in this interaction. Ley does suggest that the relationship between the fear message and the recommendations is important; it was decided, therefore, that complications (1) should be introduced, but this item should immediately precede the final positive statement on care and management of the condition. The fear arousal nature of the possibility of disease, additional to the diabetic condition itself, may be lessened and become a positive, motivating factor.

The following pages contain the script for the video; the key concepts are identified and visual effects which supported the production are described. The numbers (1) to (5) relate to the part of the problem identified in Figure 34. Each member of the care team introduces and elaborates on a key aspect of management.
UNDERSTANDING DIABETES

A Video Programme to be Used in Conjunction With the Diabetes Booklet

M.S. Senior Physician

I am Dr and with members of the diabetic team, I should like to explain some key points regarding diabetes.

(1) Firstly it is important to know that the body has to convert sugars, which are normally present in our bodies, to a special sugar called glucose which is used with insulin, a substance produced in the pancreas, to produce energy.

(1) If there isn’t enough insulin to cope with the daily food intake, glucose in the bloodstream starts to rise and when it gets to a certain level it will come out in the urine. You may be thirsty and be passing a lot of urine. The reason for these symptoms is that a lot of glucose which would be harmful to the body is being removed.
through the urine, together with a large amount of salt water.

The type of diabetes we shall be talking about here in some detail is called NON-INSULIN-DEPENDENT DIABETES (NIDD) or MATURE-ONSET DIABETES (MOD). It is characterised by a gradual fall-off in insulin production which may go undetected for many years, particularly if you have been physically well and have not put on any weight. But what happens to most of us as we get older is that we gain weight and to maintain that weight we need more insulin.

So there comes a point where weight is gradually going up and insulin production is gradually falling off. Most diabetics with MOD still produce insulin, but not enough for their body needs at that particular weight.

As you may know, the body is
made up of cells. Now cells are the essential building blocks of all organs which need glucose in order to function effectively. They receive their supplies of glucose and oxygen via the bloodstream, but these cells only accept glucose if there is insulin present. The insulin acts like a key which unlocks the door of the cell to allow glucose in.

(1) If there are high levels of glucose in the blood, the keyhole, which is technically called a receptor, becomes blocked and the key cannot function properly; it can't let glucose into the cell.

(1) The aim of treatment is to unlock the receptors by reducing the glucose in the blood. We do this by getting you to reduce your weight in the first instance so that the insulin you do produce is
sufficient for your needs. We may also give you tablets to boost the efficiency of your pancreas to produce that insulin.

J.W. (2) When we come to talking about treatment, I think it is very important to have a clear idea of what we are trying to do. Our first priority is to enable you to maintain good health and freedom from those symptoms which have been mentioned already, things like thirst and passing urine frequently. This should be fairly easy to achieve in the short term, although more difficult in the longer term.

Now the first line of treatment for everybody is regulating what they eat. I personally don't like using the word "diet" because it seems to imply a whole list of "don'ts" rather than a list of "dos".
I like to think of teaching people to alter their eating habits where necessary. Eating, of course, is for most people a pleasurable experience and unless you can enjoy the range of foods you eat, it is highly unlikely that we, or anyone else, can persuade you to stay on that diet for any length of time.

We will advise you, eg. to eat more carbohydrate, things like potatoes and pasta, than we would have done a few years ago, but we do stress that you should be eating what are called the unrefined carbohydrates - fruit, vegetables - rather than refined carbohydrates such as white sugar out of a packet and foods which contain it such as biscuits and cakes.

We also suggest, eg, foods such as beans and lentils which are becoming more familiar in the
British diet generally, because there is good evidence that these probably help with the control of diabetes.

(2) One of the things we have to do when designing a diet with you is to make sure that you tailor your calorie intake so that you are able to reduce your weight if necessary; we can't stress too often that losing weight and then maintaining an ideal body weight is vitally important for your well being, both in the short and long term.

We can discuss with you what an ideal weight should be and there are tables to which we can refer. It is important to remember that it is not just what we eat, but also a question of how much, that is important.

We all know that cows can actually get fat eating grass
and there is very little nutritional value in grass; if we eat too much of anything we eventually gain weight. Now the person who is able to give you good advice here is our dietician, Mrs JD.

Hello - could we start by clarifying an earlier point about energy? We usually talk about energy in terms of calories, and calories denote the energy we derive from food.

The same weights of different foods have different calorie values and if we take in more calories than our bodies need we will put on weight.

Our calories are derived from three main nutrients - fats, proteins and carbohydrates. These three nutrients are broken down by digestion, absorbed into the bloodstream, and carried to the body cells. The whole

<table>
<thead>
<tr>
<th>Choc-</th>
<th>Egg</th>
<th>Apple</th>
</tr>
</thead>
<tbody>
<tr>
<td>180</td>
<td>110</td>
<td>80</td>
</tr>
<tr>
<td>Calories</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HOW MANY CALORIES EACH DAY

(2) How will you know how many calories you personally should take each day?

I can help you to work that out when I have assessed in the clinic, your level of activity during a day and what you normally eat. It may be that if you are a little bit overweight we may need to reduce the number of calories you take each day, but there are some general principles which apply really
to diabetics and non-diabetics alike and which could be called rules for healthy living.

So what should we all be eating? I said earlier that calories are derived from three main nutrients - proteins, fats and carbohydrates. Some foods contain a mixture of these nutrients eg. margarine contains fat, eggs contain protein and fat, milk contains a mixture of fat, protein and carbohydrate.

You should try to keep the fat content to a minimum. Eat lean meat, fish or poultry, grill food where appropriate and remove visible fat. Use skimmed milk and a low fat spread. Eat small amounts of cheese and eggs, do not choose cheese as a snack food. Some of these foods are also protein foods and they are essential in a balanced diet, so don't remove them from your diet.
(3) You will remember that the amount of glucose in blood is affected by the amount of carbohydrate in your diet. There are two types of carbohydrate.

Refined carbohydrates such as jam, honey, sweets, chocolate and manufactured foods such as cakes and sweet biscuits, are quickly digested and absorbed into the bloodstream. They cause a rapid rise in blood glucose levels.

Whatever your weight you should try to avoid all sweet foods. Read nutritional information on labels to see if products are suitable. In this way you can add variety to your diet. If used to sugar in drinks, any of the low-calorie sweeteners can be used in their place.

Unrefined carbohydrates are
UNREFINED CARBOHYDRATES
HIGH IN FIBRE

found in starchy foods such as potatoes, root vegetables, whole grain cereals and wholemeal bread. Pulses, beans and peas are higher in fibre; they are much more slowly digested and absorbed and produce much steadier blood sugar. While some adjustments may be needed compared to your previous intake, these foods should be eaten regularly.

HELP YOUR DIABETES WITH A HEALTHY DIET

(3) Changing your style of eating is never easy, but by following the guidelines laid down for you in the clinic, we hope you will not only manage your diabetes, but give yourself a healthier lifestyle as well.

J.P. Clinical Nurse Specialist

(4) How will you know that what you are doing is what you should be doing? It is not always possible to judge how well controlled your diabetes is by how you feel. Many
people feel quite well despite having a high blood glucose level, but this can produce undesirable effects over a period of time. We advise you to test your urine and I would like to go over the technique with you.

First you need to collect a specimen of urine in a clean container.

(4) Remove the test strip from the box - we are using here Diabur 5000 testing strips - and briefly dip it into the urine container. Withdraw it and wipe the edge along the edge of the container. Wait for two minutes and then compare the test strip with the colour chart on the box. If the lower pad remains cream you should just match the upper green area, but if the lower pad should change to blue, ignore the green area and just match the lower blue pad. Record the result in your record
The aim should be no glucose in your urine.

(4) Although initially the readings may be high, as your treatment begins to work so the level in the urine will fall. If the glucose remains high seek advice from the clinic or your own doctor. Don't forget to take your record book with you. We may ask you to test before meals and before you go to bed in the early stages, but as your diabetes settles you can reduce testing to two days a week. Urine testing is for you to be able to check on your diabetes.

Blood glucose is normally maintained at a constant level in the body and ranges around 5-7 mmol; at the level of about 10-12 mmol you will be able to detect it in the urine using the test strip.

Occasionally in some older people the urine will appear to
be quite satisfactory, but the level in the blood may be too high. We would then ask you to use an alternative test, but testing the urine is usually quite sufficient.

Again, watching your weight - either losing some if you're overweight or maintaining your ideal weight will be a good indication that you are keeping well.

J.W. (1) You may have heard that there are sometimes complications associated with having diabetes; problems which may arise when diabetes has been present for ten to twenty years. There are certain things that we are particularly concerned about in younger and older patients when looking further ahead. The first of these concerns is that diabetes can affect the circulation in the distant parts
of the body, especially the feet and other changes can also result from damage to the small nerves in those parts.

(1) But there is increasingly convincing evidence that good control of diabetes will help prevent the development of complications such as neuropathy i.e. damage to the nerves, which is the principle cause of damage to the feet.

One of the things we recommend is that you should make sure that your feet are looked at regularly by a chiropodist.

It is important to observe normal hygienic practices, to keep your feet warm and dry and to wear properly-fitting shoes and socks. Cut your toenails carefully. Do not attempt to remove hard skin yourself and seek advice if you have a problem. The chiropodist is in the clinic to help you.
J.W. (1) From time to time we will be measuring your blood pressure. There isn’t time to do a full examination at every clinic visit but roughly on a yearly basis we will have a close look at your eyes, at the circulation in your feet and at your urine to ensure that your kidneys are functioning well. We will also enquire about smoking habits, because smoking, like diabetes, has bad effects on the circulation; so we do encourage people not to smoke.

M.J.S. (5) I think now you will have realised that with care and with moderate dieting, your life can be reasonably normal. With your help your diabetes can be kept well under control and complications which might occur can be delayed or prevented altogether.
Evaluation

A self-selected sample of the NIDDM clinic population, ie those possessing a video player and willing to watch the video at home, was obtained (n=17: 10 who had taken part in the original study and 7 others). All respondents described the content as clearly understood, approved of the length (15 minutes) and agreed that the presence on the video of those who advised on care in the clinic was helpful. From this small sample no generalisable statement was made, but the positive response suggests that the language and content was at an appropriate level for this sample. The hypothesis that the presence of the clinic team would be an effective teaching tool was qualitatively evaluated - through analysis of the comment offered by the subjects. To reduce the bias which may have been present if the video were returned to the clinic, it was returned directly to the researcher (MW).

Responses (actual statements) included:-

The following sample outside the study

1. Because the faces were known, I was able to absorb more of what they were saying.

2. It confirmed procedures laid down by the clinic, preventing unnecessary distress.

3. I learned a lot about diabetes that I didn’t know before (subject diagnosed more than 5 years!).

Sample within the study (numbers in parentheses relate to the same subject throughout the study)

4. It makes it seem more personal, I am sure it will be of help to new diabetics (6).
5. Seeing several known faces made it seem the video was made for me only and they were instructing me. I have made a copy and I think that playing it over every so often will keep me disciplined (11).

6. I found that the more I watched, the more I remembered, one time was not enough (32).

7. Having several people talking, one never gets bored, so you tend to concentrate the whole time. I took it to the day centre and people have been coming and watching it all the week (27).

8. Simply able to relate to them (4).

9. It was easy to understand and will help with my day-to-day control of diabetes (5).

10. When I was watching, my son came in and said "I didn't realise you needed to know all that" (17).

These responses, strongly suggest that there was a willingness to give time and attention to a source of information which was considered relevant and interesting. The presence of familiar members of the care team created satisfaction and appeared to give credibility to the content. Some responses suggested that subjects were testing their ability to retain the information by more than one viewing, and a sense of taking the initiative is apparent, supporting the concept of self-direction advanced by adult-learning theorists (Knowles, 1973).

It has been argued that aspects of the environment in which consultations take place are not ideal. Additional support for this contention and for the positive effect of viewing in the home is provided by the accounts of watching with family members present, eg. (32) involved a daughter, also diabetic; (17) the son who had shown no previous curiosity about his mother's
condition. Although a spouse may intend to accompany the diabetic to a clinical consultation, mundane events, eg difficulty in finding a suitable parking space near the clinic, may prevent the partner's participation. There may also be a perception, even in intimate relationships, that clinical consultations are private events between two individuals, the patient and the doctor. The home setting provides an opportunity, in this instance, for the demystification of medical matters and the direct assimilation of information by a spouse.

A gratifying response was the desire to disseminate information about diabetes (27). Further conversation with this subject revealed that the video was a focus of interest and discussion among elderly non-diabetic day centre attenders; it seemed to develop its own momentum. The emphasis on healthy eating and weight control was perceived as relevant to elderly people generally. The different ways in which the video was used suggest an important social effect. This method may be a means of strengthening the weak (negative to neutral) social support attribute identified through the dynamic concept analysis (Model 1.6).

This additional sampling provided an opportunity for further exploration of the attributes ascribed to subjects in the dynamic concept analysis (Chapter 5). Each subject completed a questionnaire based on statements designed to reflect the positive, neutral and negative attributes of the concepts entered into the information structure, ie compliance, weight status,
social support, vulnerability and attitude (Figure 35). Data from this source was used to construct further models for comparison with initial models, derived from interview data (Fig. 36).
Statement 1 - Compliance

You may have been asked to change your eating habits and resist certain foods. This item refers to how closely you feel able to follow advice -

(i) You always try & are mostly successful...COMPLIANT
(ii) You do not give much attention to advice...NEUTRAL
(iii) You do not think it worth doing when weighed against the effort needed...NON-COMPLIANT

Statement 2 - Weight

(i) You need to lose weight
(ii) You need to maintain an ideal weight
(iii) You need to gain weight

Statement 3 - Social Support

It is difficult to keep to a healthy eating pattern because it means others changing their eating habits to fit in with your diabetes.

(i) You have been able to adapt.........................YES
(ii) Not too difficult but not always easy ..NEUTRAL (N)
(iii) This describes your situation......................NO

Statement 4 - Vulnerability

Some people feel vulnerable (at risk) to the complications which are sometimes associated with diabetes.

(i) Do you feel moderately vulnerable..............N - MODERATE
(ii) Do you feel not vulnerable......................+ve - LOW
(iii) Do you feel very vulnerable......................-ve - HIGH

Statement 5 - Attitude

You can live a relatively normal life with diabetes if you follow a few healthy eating rules.

(i) Do you agree with this statement..................+ve
(ii) Not totally convinced........................................N
(iii) Do not agree..................................................-ve
Figure 36 - Comparison of Models (n=10)

Models were constructed for each respondent (b) and compared with the earlier model for these subjects (a).

<table>
<thead>
<tr>
<th></th>
<th>Interview (a)</th>
<th>Self-assessment (b)</th>
<th>Interview (a)</th>
<th>Self-assessment (b)</th>
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<td>4n ← 5a</td>
<td>1a ← 5a</td>
<td>4n ← 5a</td>
</tr>
</tbody>
</table>

* Figures in bold type are the case numbers by which the subjects are referred to throughout the study.

27 and 34 - the ideal model
When testing an earlier proposition that a predictive model for compliance could be constructed from the initial interview data, models were compared with the experimental data. It was proposed that Model 1.3 fulfilled this predictive role (p 124); subjects 6, 27, 34 and 17 were identified as matching the model.

The following observations are made -

Weight

The comparative data demonstrates a change in the model for subjects 27 and 34 - 2a (maintain weight) replaced 2n (lose weight); all other attributes are unchanged and remain positive. Subjects 6 and 17 have not achieved the target ideal body weight after one year, but all other attributes remain positive.

Vulnerability

In the initial analysis of subject 25's data, a negative vulnerability attribute was ascribed (4b, high vulnerability); this model now demonstrates 4a (does not feel vulnerable - a neutral but not desirable attribute according to the study criteria). Subject 4 also demonstrates a shift from 4n (moderate vulnerability - the positive attribute) towards 4a (does not feel vulnerable). Subject 32, originally 4n (moderate vulnerability) now demonstrates 4b (high vulnerability); this subject had viewed the video many times. Subject 5 shows a shift from high vulnerability to moderate vulnerability on self-assessment.

\(^1\)According to the number assigned at entry to the study and carried throughout.
Social Support

Two subjects, 6 and 5, show a change in respect of the ascribed positive social support to the neutral self-assessed attribute. Subjects 32 and 4 remain neutral as ascribed. The self-assessed attribute for 20 has changed from neutral to positive, while subject 11 has moved from negative to neutral. Subject 4, from whose original model it was proposed that a change in this one attribute to positive would predict compliance, remains unchanged on this attribute although both subjects' vulnerability has changed in a negative direction.

Attitude

For all subjects with the exception of 11 and 20, the positive attribute remains unchanged. Subject 11, whose attitude was interpreted as negative from interview data, assessed his own attitude as positive (see also Positive Comments, re video evaluation). Subject 20 demonstrates a less pronounced change from neutral to a positive self-assessment, ie he/she believes a relatively normal life is possible with diabetes if a few simple rules are followed.

Compliance

The two subjects, 11 and 20 (see Social Support above), were originally assessed as non-compliant according to study criteria, but their own response to the compliance statement suggests a (positive to compliance). All other subjects in this sample demonstrate no difference between the interview interpretations and self-assessment.
Discussion

The change in weight status from the need to lose weight to maintenance of ideal body weight, suggests that the ideal model proposed for predictive behaviour has been changed to an equally ideal model, but one which will now be suggested is the ideal monitoring model. These subjects have achieved the weight objective and the predicted behaviour; the strong relationships depicted in the original model between attributes may represent a visual manifestation of this achievement. For subject 17, included in the ideal predictive model, all attributes remained constant although a year had elapsed since the original data was obtained. Given the experimental evidence for a stubborn resistance to weight-reducing efforts, this apparent predictive failure may only be a function of time ie more time is needed to change this attribute, or indeed this model may be a clinical indicator of the need for chemical intervention, before weight reduction is achieved. Diet modification alone may not be sufficient.

A cause for concern is the apparent shift in the perception of vulnerability to the complications of NIDDM. The initial assessment of high vulnerability (4b), which was an interpretation made from one subject's (25) strong expression of anxiety concerning the hereditary nature of Type II diabetes mellitus and his personal knowledge of complications, through a family connection, has been transformed on self-assessment to no feeling of vulnerability to complications. It is argued that
this is not an ideal state; it suggests an element of denial of the disease, which should be explored in a clinical consultation. On the other hand, it may be a perception by the respondent that target weight has been achieved and the condition is now controlled.

Another subject (4) demonstrates similar false confidence regarding vulnerability to complications. Both subjects had been diagnosed as diabetic for less than two years. On the other hand, the high vulnerability response of subject 32 may be a result of her inability to reach a target weight (Group 2 subject, see Experimental Data) combined with the knowledge recently gained from the video about the relationship between obesity and diabetic complications. This subject highlights the need for continuity of counselling and support services.

The final models to be discussed are subjects 11 and 20, both of whom have recalcitrant weight problems (Group 2 subjects). Initial interviews did suggest a weak commitment to therapeutic advice, 1b with 5b (subject 11) and 1b with 5n (subject 20). The reliability of the self-assessment is in doubt. However, both responded enthusiastically to the video; follow-up data, especially changes in the body weight variable, could test the consistency of these self-constructed models. In conclusion, the relationships between the attributes of the "monitoring model" may need to be reconsidered; further discussion of this model is included in Chapter 8.
Validity and Reliability

Does the original conceptual model measure what it was designed to measure?

Kontiainen (1989) suggests that a valid information structure can be derived from a variety of sources e.g. the literature on the subject, research findings and expert knowledge.

This structure is derived from all these sources and validity may reasonably be claimed for the content; however it is possible that an element of selectivity is present in the literature - there may be a tendency to use evidence which supports the argument and thus reduces objectivity. Construct validity of this method of analysis is dependent on the values given to the attributes, i.e. positive, neutral or negative. The degree of congruence observed between the initial models and the self-assessed models, mediated through the questionnaire statements, suggests that construct validity has been achieved.

Nisbet and Watts (1978), in an exploration of case study methodology, suggest that this approach, if pursued systematically, is not merely illustrative but can be interesting relevant and real. The interviews obtained in this study are cameo case-studies, or profiles, depicting real people in real situations. The dynamic nature of their circumstances is the basis for the analysis. However the intra-personal (internal) consistency of the models supports the notion of reliability. To achieve greater reliability the structure would need to be
tested across different randomised populations and generalised to other clinical conditions.

Cross-checking sets of data derived from different sources may increase the reliability of a research tool. Fielding and Fielding (1988) describe the system of linking data from qualitatively and/or quantitatively different sources, to both verify information and to assess internal consistency. They suggest that in research, if diverse kinds of data support the same conclusion, confidence in it is increased (p24). The subjects who are the focus of this study have been the source of data of both types. Systematic cross-linking or triangulation of that data has provided (Figure 36) consistent intra-subject findings in a limited number of subjects and some support for the theoretical perspectives, the objective of data collection. The "ideal" model concept, for example, was developed from analysis of the interview data, cross-checked with the weight variable and assessment of vulnerability through obesity in the experimental study and responses to the health belief statements.

Fielding and Fielding state that this multi-strategy approach is no guarantee of internal or external validity, but it does serve a quality control function for the researcher. The consistencies observed in this study do suggest that this function may have been partially addressed.
Figure 37 - Cross-linking data

- Preliminary survey
  - Interview data
  - Evaluation health beliefs
  - Weight loss/gain
  - Experimental study

- Concepts
- Information structure
- Attributes
CHAPTER EIGHT

CONCLUSIONS

Diabetes mellitus is an incurable condition with associated complications. Type II NIDDM is potentially as serious as Type I IDDM, although there is evidence that Type II diabetics are not always aware of this (Gill, 1986). Type II NIDDM requires minimal clinical care but careful, consistent, monitoring. The range of physical, psychological and social needs of individuals who must achieve effective levels of self-management, are inadequately assessed and rarely completely met. The extent to which this longitudinal study, which was addressed from both qualitative and quantitative perspectives, supports this contention, will now be discussed.

Implicit in Joslin’s 1969 dictum that education is the treatment for diabetes is the assumption of shared responsibility for a process of teaching and learning about the condition. This shift in responsibility reflects the socio-political and professional changes identified in Chapter 1.

The broad aim of the study has been to explore the opportunities to promote compliance through understanding and to identify contributory health beliefs within this teaching-learning process.

Failure to follow therapeutic advice is a major clinical concern (Chapter 2), but there is little evidence that
individuals deliberately reject or ignore advice. A complex interaction exists for Type II NIDDs, between the general advice to be followed, modification of activities of daily living and the uncertainty associated with the condition. Systematic analysis of a sample of a diabetic clinic population illuminated some of these complexities.

Knowledge about diabetes - the essential knowledge necessary for effective self management was identified (p 28); dietary knowledge is the cornerstone of diabetes care. The study population demonstrated low levels of essential knowledge. How clinically significant was this finding? The relationship between knowledge and understanding is not directly causal; individuals may be taught, for instance, that obesity prevents the effective utilisation of an already inadequate production of insulin (p 17) and/or that circulatory problems may develop as a result of persistent hyperglycaemia (p 14), but the relationship between this knowledge (as measured, e.g. by questionnaire response) and the understanding which may motivate compliant behaviour, is not clear. There was no observable knowledge-behaviour effect in this study, but a slight trend towards the experimental variable - an ideal body weight.

Expert consensus that there is knowledge about diabetes which is considered essential, implies that there is an acceptable level of knowledge for effective self-management. There is, therefore, a responsibility placed upon health care professionals for its provision, even if a negative effect can
be demonstrated. Beggan and Drury (1985) found a relationship between increased knowledge and decreased regularity of attendance at clinics. Decreased attendance is not, of itself, a negative finding, if it indicates that individuals feel more self-confident and less anxious, and therefore more competent to judge the necessity for clinic attendance.

A lack of congruence between the individual's perception of his goal and how it is conveyed by the health care professional, may contribute to the apparent knowledge deficit and become a barrier to commitment to the main objective - an ideal body weight. Extension of the scope of the educative process beyond that of the person immediately involved, to include a spouse or other who provides social support, may reduce misinterpretation and increase understanding.

Individuals rarely become obese in isolation; the acquisition of knowledge which promotes effective weight reduction activities, is only one important component in an interactive process in which individuals must integrate new demands into their daily routines.

Teaching and learning - two major theoretical considerations were identified in the design of this study (p 31); the first to be considered is the educational process. Chapter 4 described the construction of a patient-education course which drew on general educational principles of curriculum design and development and a teaching-learning process pursued through a
modified, but diabetes-specific, objectives approach.

The development of a patient-education course through an analysis of each stage of the process, was based on the contention that patient-education must be a purposive activity, not incidental in the sense that there is not a single human being who has not taught something to someone (Passmore, 1982).

If individuals are expected to manage their condition effectively, as in Type II NIDDM, they must be informed and knowledgeable. Learning will be determined by factors other than mere information offering or receiving. Mazzuca (1982) found that it was not information regarding general rules which is significant, but whether specific help is offered to the individual to cope with unique self-management problems.

The design of a course, therefore, should be both comprehensive and generalisable but with a capacity for flexibility, which encompasses needs specific to individuals. Patients "switch on" if information is specific to them (Herxheimer & Davies, 1982 p.94). That a large proportion of subjects left the experimental study could indicate that this observation applied or, alternatively, that one intervention satisfied the immediate practical need for ways in which to act (Johnson, 1982) and of the demands imposed by the diagnosis. The slight trend towards a positive weight outcome, supports this hypothesis.

A process is not defined by its duration and, in practice,
individuals must feel able to move in and out of a teaching programme freely. The adult learner (here the Type II NIDD) is able to determine his own needs once he is fully informed of his condition. Informing, teaching and counselling skills were considered central to the process. A model was developed which acknowledged that these core skills were mutually inclusive. Counselling is not a separate entity in the clinical interaction, but a skilled approach, complementary to the undifferentiated, but equally important information-giving function encompassed in the teaching-learning process.

Different approaches are appropriate at different stages of adaptation, especially when more supportive, longer-term strategies may be needed.

Careful clinical assessment of the individual's ability to cope with immediate physiological adjustments is invariably undertaken, but the social and psychological domains are not afforded equal attention or analysis. Characteristics of the consultation were described in Chapter 3; physicians and others are constrained by limited time and hostile environments not conducive to establishing an early rapport, despite best intentions. If the system cannot be changed, techniques must be developed which make optimum use of the time and expert skills available and mitigate negative factors.

The second theoretical consideration in this study proposed such a development and sought to illuminate health belief variables through a process of dynamic concept analysis (Chap.5).
Non-compliance with therapeutic advice is a major clinical and research problem; evidence suggests no specific attributes which are predictive of non-compliant behaviour (Chapter 2), but indicates some psycho-social influences which may motivate desirable behaviours. The study explored the dynamic nature of the interaction between the individual (in this study Type II diabetics), the implications of living with the condition and expected behaviours, through the application of a conceptual method of analysis.

Three key concepts - perception of vulnerability to the complications associated with diabetes mellitus, the nature of social support available and beliefs concerning the efficacy of treatment (here depicted as attitude), were entered into an information structure. Relationships were hypothesised between concepts and a computer model constructed for each subject, from derived data (n=38). A predictive "ideal (ie optimum compliance) model was constructed from "ideal" data. Study findings suggested some support for this ideal model, when comparisons were made between the model and the study variable, ideal body weight, for each subject. Larger samples and different populations would test the potential generalisability of this analytical method.

The usefulness of a theory is defined by its ability to provide guidelines for further research and practice (Dracup
and Meleis, 1981). The findings concerning perception of vulnerability, for instance, were inconclusive but merit further exploration through a possible sub-set of related concepts, to establish the validity of this approach to the non-compliance problem.

The study investigated clinical practice and a central theme has been greater involvement of individuals in decision-making concerning their lives. The transition from a post-industrial society to one in which information technology predominates, will facilitate this philosophy of health care in the future. Modern society is one which views rather than reads, visual display is replacing the spoken word. Computer-assisted learning is a feature of modern schooling and some therapeutic settings. Computerised audit systems developed to ensure provision and monitoring of effective health services, are mainly concerned with a conventional demographic data base, physiological measurement and treatments; psycho-social variables are not the subject of audit.

A diabetic clinic-specific analytical model could be constructed from a consensus of research and expert experience. The patient (the diabetic) would be able to identify his personal attributes in clinical consultation and construct his personal model. The change observed in the model as the patient moves from a negative attribute of a concept to the "ideal" monitoring model would provide motivation for continuing compliance with therapeutic advice and an effective audit tool.
Additional data obtained from a small sample provided a negative example of this process in the context of vulnerability, supporting the contention that this analytical method has the capacity to depict the individual in a dynamic set of circumstances.

The ideal model may also change as data is systematically analysed and concepts become redundant or superseded by others which reflect advances in knowledge about the condition.

The study addressed the problem of obesity and its clinical classification. Figures (pp 153-155) were constructed which demonstrated the very small positive trend from obesity Grade III to Grade I (Garrow and Webster, 1985), although the majority of Type II NIDDM subjects (Group 2, diagnosed more than 1 year) were within the overall classification at the beginning and end of the intervention. Observation and report suggested that the slow rate of weight reduction was a most frustrating and dispiriting situation for those subjects.

Obesity has socially negative and embarrassing connotations for the majority of individuals and, where it is of clinical concern, requires a sensitive approach. Metric weight may have little meaning for the older age group; observation of the study population suggested bemusement and added confusion when metric body weight was converted to its imperial equivalent. The weight objective could be pursued more creatively using the obesity classification system explored in the study (p 152). An enlarged and colourful personal chart, similar to the urine testing scale,
which would demonstrate even minimal but positive movement towards the desired goal - acceptable body weight - may stimulate a sense of achievement and may lead ultimately to compliance. Cultivation of an ethos of involvement and personal responsibility, as an alternative to professional direction, will contribute to this goal.

This latter contention will be explored in the final part of this discussion, which concerns the appropriate setting for supportive care and the choice of method for its effective achievement.

It is a characteristic of a longitudinal, qualitative, study, that the setting may not be comparable with that of an experimental laboratory; all variables cannot be controlled. Prior to the General Practice reforms, which have focused on financially rewarding health education initiatives, small clinics (mini-clinics) were beginning to replace large diabetes-specific out-patient clinics in District General hospitals. But confirmation of diagnosis and the management of patients with clinical problems were, and continue to be, the responsibility of specialist health care professionals, namely diabetologists, dieticians and clinical nurse specialists. Type II NIDDs are rarely admitted into hospitals, where formerly they would have been introduced to the essential knowledge about the condition; the continuing care setting is now the home.

It is argued that well-established advances in technology can support patient-education needs in the home; even the
elderly are accepting of television, video-recorders and computer games. The chosen medium should be the means for conveying the message in the most effective way. Audio-visual tapes can be controlled by the viewer; they can be interrupted at any point to clarify information and confirm understanding, when viewed collaboratively; they may also be repeated ad infinitum. Evaluation of video viewing in the home by a study sample and an additional random sample of the clinic population (p 196) suggested that this medium may be a powerful force, although it was contended by Knight and Kesson (1986) that elderly viewers may not react favourably to this method. Subjects in this study appeared to take control of the material and to be motivated to disseminate knowledge about the condition, by increasing the audience for the video in a variety of ways, including extending viewing to immediate family members, acquaintances (diabetic and non-diabetic) and in one instance in a day centre for the elderly. The potential for this method of delivery would appear to be considerable.

A key reason for the apparent success of the method was the "actors", who were the diabetics care team responsible for the management of this study population. Interactive video describes a method in which the viewer physically and cognitively interacts with the material in a modified, programmed-learning approach. This method was dependent upon experts for its presentation. The material devised was interactive in the sense that it was conveyed by expert, familiar professionals, who were able to reinforce information conveyed at the initial
consultation and in surroundings which were assumed to be psychologically secure and accepting, and conducive to learning - the subject's own home. The health care team were symbolically accepted into it. Responsibility for subsequent action rested with the individual.

A single initiative will not ensure compliance with a subsequent action. A series of video recordings is proposed, in which specific information, based on experience and research findings, is structured to coincide with the individual's diabetic life. Study findings indicated a poor functional knowledge base for all groups, defined by duration of the disease, and a lower level for those subjects with a disease duration of 5-10 years. Research supports relationships between duration of disease and development of complications (Chapter 2), but offers no evidence for a relationship between levels of knowledge and development of complications.

Reinforcing knowledge at points along the diabetic years may, however, contribute to a delay in possible onset of associated complications. Other factors, such as gender differences and the normal ageing process may determine target groups and content selection. Long-term, seemingly intractable, problems such as non-compliance, require long-term solutions and creative application of the knowledge and skills of experienced practitioners.

A more complex strategy with, perhaps, only limited
clinical feasibility because of its apparent complexity would be the construction of videos based on the evolved conceptual models, focusing on specific concepts which demonstrated negative attributes. A planned process, which integrated the predictive/monitoring model, the appropriate video recording tailored for the stage of the condition and the complementary obesity target chart, would increase the potential for a new therapeutic relationship and generate data which may contribute to further understanding of the non-compliance problem.
APPENDIX A

Teaching Profile
<table>
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<tr>
<th>NAME</th>
<th>HEIGHT</th>
<th>AGE</th>
<th>WEIGHT</th>
<th>VISIT</th>
<th>DOCTOR</th>
<th>DNL</th>
<th>DIETICIAN</th>
</tr>
</thead>
</table>

**ADVICE GIVEN**

- **WEIGHT**
  - IDEAL TARGET

- **DIET**
  - SPECIFIC

- **MONITORING**
  - BLOOD, URINE

- **FEET**

- **EYES**

- **BP**

- **SMOKING**

- **OTHERS**
  - EXERCISE
  - ETC.

**NEXT APPOINTMENT:**

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APPENDIX B

Construction of the Models
Construction of the Models

\[ c_{3b} \rightarrow c_{1b} \text{ compliance} : \text{Negative} \]
\[ c_{4n}, c_{5n} \rightarrow c_{2a} \text{ Weight} : \text{loss} \]
\[ c_{1b}, c_{5n} \rightarrow c_{3b} \text{ social aid} : \text{negative} \]
\[ c_{2a} \rightarrow c_{4n} \text{ vulnerable} : \text{moderate} \]

\[ !c_{1b}!c_{2a}!c_{3b}!c_{4n}!c_{5n}! \]
\[ !c_{1b}! \text{ compliance} \]
\[ !c_{2a}! \text{ Weight} \]
\[ !c_{3b}! \text{ social aid} \]
\[ !c_{4n}! \text{ vulnerable} \]
\[ !c_{5n}! \text{ attitude} \]

\[ c_{2a}, c_{3n}, c_{4n}, c_{5a} \rightarrow c_{1a} \text{ compliance} : \text{Positive} \]
\[ c_{1a}, c_{3n}, c_{4n}, c_{5a} \rightarrow c_{2a} \text{ Weight} : \text{loss} \]
\[ c_{2a} \rightarrow c_{3n} \text{ social aid} : \text{NEUTRAL} \]
\[ c_{1a}, c_{2a} \rightarrow c_{4n} \text{ vulnerable} : \text{moderate} \]
\[ c_{1a}, c_{2a} \rightarrow c_{5a} \text{ attitude} : \text{positive} \]
DATE: ______________________ AGE: ______  SEX: ____________ (M or F)

HOW LONG HAVE YOU HAD DIABETES? (Please tick):

LESS THAN 1 YEAR: ___  1-5 YEARS: ___  5-10 YEARS: ___  MORE THAN 10 YEARS: ___

HOW IS IT TREATED? (Tick one) DIET  DIET & TABLETS  DIET & INSULIN

INSTRUCTIONS: This is a short quiz to find out how much you know about diabetes. There are 15 questions and each one has several possible answers. For questions 1 to 12 only one answer is correct. If you know the right answer, circle the letter in front of it. If you don't know the answer, circle the last space "I don't know". Notice that questions 13, 14 and 15 have more than one correct answer, so you should circle all the answers you think are right.

1. When a diabetic on insulin undertakes unusually heavy exercise, he or she should have:
   A. More insulin before the exercise
   B. Extra carbohydrate beforehand.
   C. Less food just beforehand.
   D. I don't know.

2. People with diabetes should:
   A. Have their food cooked separately from that of the family
   B. Eat the same foods at the same time each day.
   C. Vary their diet by substituting different foods correctly from the diet exchange list.
   D. I don't know.

3. The NORMAL range for blood glucose is:
   A. 4 - 8 mmol/l.
   B. 7 - 15 mmol/l.
   C. 2 - 10 mmol/l.
   D. I don't know.

4. Rice is mainly:
   A. Protein
   B. Carbohydrate
   C. Fat
   D. Mineral and vitamin.
   E. I don't know.

5. Insulin causes blood sugar to:
   A. Decrease.
   B. Increase
   C. Neither (A) nor (B).
   D. I don't know.

6. Which of the following is rich in carbohydrate?
   A. Meat.
   B. Eggs.
   C. Butter.
   D. Wheat
   E. I don't know.

7. Which one of the following symptoms is usually NOT associated with a hypo?
   A. Weakness.
   B. Hunger.
   C. Chest pain.
   D. I don't know.

8. If ketones are present in the urine of a diabetic on insulin he/she probably needs:
   A. More insulin.
   B. Less insulin.
   C. No insulin.
   D. I don't know.
9. When a diabetic on insulin becomes ill and unable to eat the prescribed diet:
   A. He should immediately stop taking his insulin.
   B. He must continue to take the insulin.
   C. He should use diabetic tablets instead of insulin.
   D. I don't know.

10. You can eat as much as you like of which one of the following foods?
   A. Fruit.
   B. Lettuce.
   C. Steak.
   D. Honey.
   E. I don't know.

11. You must avoid becoming overweight if you have diabetes because:
   A. Insulin can be harmful to overweight people.
   B. Being overweight makes diabetes worse.
   C. Hypo attacks occur more frequently in overweight people.
   D. I don't know.

12. A hypo is caused by:
   A. Too much insulin.
   B. Too little insulin.
   C. Too little exercise.
   D. I don't know.

In these last three (3) questions, there will be MORE THAN ONE correct answer. Please circle the letters in front of all the answers you think are correct.

13. Which of the following so-called "DIABETIC" food items are approved by the Diabetic Clinic?
   A. Diabetic Jam
   B. Diabetic jellies.
   C. Sorbitol-sweetened, sugar free canned fruit.
   D. "Low Calorie" soft drinks.
   E. I don't know.

14. If a diabetic becomes sick and has vomiting and diarrhoea he should:
   A. Stop all food and drink.
   B. Take his usual insulin/tablets.
   C. Take sugar sweetened drinks every two hours.
   D. Call the doctor if vomiting persists.
   E. I don't know.

15. Special "DIABETIC" foods are:
   A. Forbidden on a diabetic diet.
   B. Essential in a diabetic diet.
   C. Acceptable if used selectively and correctly.
   D. Usually more expensive than the non-diabetic equivalent.
   E. I don't know.

Thank you for completing this questionnaire.

1984 Diabetes Centre, R.P.A.H.
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