

# Diabetes mellitus- shared care model and ict

[Health & Medicine](#), [Diabetes](#)



The world is fast changing: the pace of events is massive. The apparently big world is shrinking into a global village as democracy spreads, western civilizations encroach on other civilizations and globalization becomes a household concept. Technological advancements and improvements in the information and communication technology have perverted all spheres of human endeavor. While this is happening on one hand, healthcare delivery has not improved significantly. Many patients and clients complain of the lack of coordination in the health sector: they are not happy about the reduced utility derived from health care facility they patronize.

There is a growing reduction in number of competent staff as well as insufficient fund for the health sector. These factors have made it necessary to evaluate the impact of information and communication technology on health care service. This need has become more important for chronic disease where collaboration between health care service providers is important. And with increasing incidence of chronic diseases and their attendant complications, this need cannot be overemphasized. Besides, the cost of managing some of the chronic diseases, for example diabetes, epilepsy and seizure disorders, with the traditional method is reasonably high.

The prospect ICT brings is improved quality of care due to collaboration between health care workers through a comprehensive shared care system adequately powered by ICT solutions and reduced overall cost for the management of chronic diseases like diabetes. In this paper, diabetes is the focus chronic disease. I will attempt to evaluate the requirements for an Irish ICT system to supply the model of shared care. However, a brief review of

diabetes mellitus and shared care will be undertaken to unravel areas of focus for ICT intervention.

**Diabetes mellitus: Review** Diabetes mellitus is a syndrome of chronic hyperglycemia due to relative or absolute insulin deficiency, resistance or both. It affects over 100million people worldwide. Diabetes is usually irreversible, and patients can have a reasonably normal lifestyle; however its later complications which include macrovascular disease lead to increased risk of develop coronary artery disease, peripheral vascular resistance; and microvascular complications such as diabetic nephropathy, retinopathy and neuropathy.

In a normal person, the blood glucose concentration is narrowly controlled in order to prevent the devastating complications that may follow reduced or increased blood glucose concentration. This normal glucose level is 80-90mg/100ml or 3.5-5.0mmol/l. This concentration usually increased to 120-140mg/100ml during the first hour after a glucose meal. The feedback mechanism of the body is alerted to reduce this level to tolerable levels by the body by the conversion of glucose to glycogen for storage under hormonal influence particularly insulin.

However, in the fasting state, glucose is produced from glycogen and other substrates and released into the blood to maintain the blood glucose concentration. The various mechanisms for achieving this level of glucose control are as a result of hormonal influence, the activities of organs such as liver, skeletal muscle and the particular glucose concentration. The liver is a major metabolic organ that is important in the blood glucose buffer system:

this is done by the storage of glycogen formed from glucose under the influence of insulin, a hormone produced by the pancreas, in the liver.

It also releases glucose into the blood in the fasting state. Insulin and glucagon function as important feedback control systems for maintaining a normal blood glucose concentration. When the glucose concentration rises too high, insulin is secreted from the Islet cells of Langerhans, the endocrine portion of the pancreas; the insulin in turn causes the blood glucose concentration to decrease toward normal. Conversely a decrease in blood glucose concentration stimulates glucagon secretion; the glucagon then functions in the opposite direction to increase the glucose concentration toward normal.

Under most normal conditions, the insulin feedback mechanism is much more important than the glucagon mechanism, but in instances of starvation or excessive utilization of glucose during exercise and other stressful situations, the glucagon mechanism also becomes valuable. Diabetes mellitus is a syndrome of impaired carbohydrate, fat and protein metabolism caused by either lack of insulin secretion or decreased sensitivity of the tissues to insulin.

It could be primary or secondary; primary diabetes is inherent while secondary diabetes can be due to Cushing syndrome, pheochromocytoma, cystic fibrosis, chronic pancreatitis, malnutrition-related pancreatic disease, pancreatectomy, and hereditary hemochromatosis, carcinoma of the pancreas, thiazide diuretic use, corticosteroid therapy, atypical antipsychotics, congenital lipodystrophy and acromegaly. There are two general types of diabetes mellitus: Type I diabetes also called insulin-  
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dependent diabetes mellitus [IDDM]; this is caused by lack of insulin secretion.

Type II diabetes, also called non-insulin dependent diabetes mellitus [NIDDM] is caused by decreased sensitivity of target tissues to the metabolic effect of insulin. This reduced sensitivity to insulin is often referred to as insulin-resistance. The basic effect of insulin lack or insulin resistance on glucose metabolism is to prevent the efficient uptake and utilization of glucose by most cells of the body, except those of the brain. As a result, blood glucose concentration increases, cell utilization of glucose falls increasingly lower and utilization of fats and proteins increases.

Injury to the beta cells of the pancreas or diseases that impair insulin production can lead to type I diabetes. IDDM is immune-mediated and has been associated with other autoimmune conditions like pernicious anaemia, alopecia areata and Hashimoto disease. Viral infections or autoimmune disorders may be involved in the destruction of beta cells in many patients with type I diabetes, although heredity also plays a major role in determining the susceptibility of the beta cells to destruction by these insults. HLA-DR3 or DR4 is found in more than 90% of patients.

In some instances, there may be a hereditary tendency for beta cell degeneration even without viral infections or autoimmune disorders. The usual onset of type I diabetes occurs is less than 30 years; this is why it is called juvenile-onset diabetes mellitus. Type II diabetes mellitus is caused by diminished sensitivity of target tissues to the metabolic effects of insulin, a condition referred to as insulin resistance. This syndrome, like Type I diabetes mellitus is associated with multiple metabolic abnormalities

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although high levels of keto-acids are usually not present in type II diabetes mellitus.

Type II diabetes mellitus is far more common than type I, accounting for 80-90% of all cases of diabetes mellitus. In most of these cases, the onset of type II diabetes mellitus occurs after age 40. There is usually no immune disturbance. Therefore, this syndrome is often referred to as adult-onset diabetes mellitus. Patients with diabetes present with acute manifestations which include polyuria, polydipsia, weight loss and ketonuria; they also present with subacute symptoms like lethargy, reduced exercise tolerance, vulvar pruritus, and visual disturbance.

They also could also present with some of the complications of the disease such as staphylococcal disease, retinopathy, polyneuropathy, erectile dysfunction and peripheral neuropathy. Investigations that are necessary in the diagnosis of diabetes mellitus include fasting plasma glucose  $> 7.0$  mmol/l, random plasma glucose  $> 11.1$  mmol/l; routine investigations include urinalysis for protein and acetone, full blood count, urea and electrolytes, liver biochemistry and random lipids. Management of diabetes mellitus: avenue for shared care The management of diabetes required community participation and patient education.

The importance of glycemic control in the management of diabetic patient cannot be overemphasized: patient should adequately understand the favorable outcome associated with good glycemic control, the implication and concomitant complications that may result from poor plasma control. This is the core of self management of diabetes. Patient should also know the dietary requirement and comply with/adhere to drug use. Besides this self-

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care, community care is very essential as this constitutes family and general practitioner care. There is monitoring of patient's compliance to medications and dietary advice.

Essentially, the management of diabetes is multidisciplinary: dieticians, cardiologist, ophthalmologists, neurologists, internal medicine physicians, endocrine experts. There is growing need to integrate this range of practitioners. Metabolic control of diabetes can be tested by urine tests, home blood glucose testing and glycosylated hemoglobin. Urine tests are carried using dipsticks these methods are simple and give a good feedback on the blood glucose control. Patients can also be taught finger-prick and use blood glucose monitoring device to measure blood glucose.

They can then interact with specialist through appropriate communication facility for automated scheduling and medication. Epidemiologically, there are 200, 000 persons in Ireland with diabetes; this figure represents 3-5% of western populations. It is estimated to double by 2010. It consumes 10% of total health budgets. About €350 million annual cost is spent in Ireland where 59% of which is spent treating complications: 50 countries endorsed measures to reduce diabetes complications by one-third Shared Care What is shared care?

Shared care is a concept where all the professionals involved in the management of a case collaborate by exchanging information on the patients' care. In this way, patient also has input into the care because his/her self-management better informed from the avalanche of information provided by the care network. Shared care is an approach to care where professionals share joint responsibility with respect to an individual's care using <https://assignbuster.com/diabetes-mellitus-shared-care-model-and-ict/>

their skills and knowledge. It also talks about adequate monitoring and exchange of patient data within the limits of confidentiality and privacy.

Shared care is both systemic and local: it collaborates the systems involved while there is local interaction between clinicians. Shared care impacts on the iron triangle of health. This triangle includes quality, access and cost. Shared care improves quality of patient care for patients with complex chronic disease like diabetes. There is increased access to patient information by health care professionals, and the patient can also easily access the professionals' especially when the shared system is backed up by information and communication technology. Patient is also satisfied with the service rendered.

This model has been suggested to be better than the conventional method of treatment afforded to patients. The treatment is appropriate because the health care givers agree on best available method based on evidence-practice. Competence is also guaranteed and services are effective and efficient. On the hand, there is improved provider satisfaction: because there is reduced contact with the utilization of tertiary level of health care service. Definitions of terms Self-management: this is about goal-setting. It is the core of self management about medication and body care.

Diabetic patients need to understand the implication of self care to monitor the progress of symptoms and emergence of complications. Home care monitoring is also very useful because it helps patients to monitor their response to treatment and glycemic control. Prevention: primary prevention is important to reduce the possibility of a worsening condition especially for patients with multiple complex co-morbidities. Community of practice: this

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refers to the people involved in the share care. They include providers and organisations, citizens and patients with families and support groups.

Models of shared care: shared care is found in Primary Care which is the emphasis of The European Forum for Primary Care (EFPC), Secondary Care, Community Based Care and mental health. The focus of shared care includes inter-professional relations and patient management. Inter-professional relations include collaborative provision of clinical services, communication and information exchange, use of treatment and referral guidelines, shared responsibility for patient care, regular face-to-face contact, and joint professional education. Patient Management is based on individual patientgoals.

It includes patient and family in the decision making protocol of management and patient-centered focus. There is no rigid working modality; with shared care, increased patient access to care reduced fragmentation of care and increased integration and continuity of care. There is a strong link at all levels of health sector-improved working relationships between providers and improved satisfaction among patients and providers. Diabetes-shared care-ICT solutions There is no doubt that information and communication technology is inevitable in the management of chronic diseases like diabetes.

In order to set-up an Irish ICT unit for diabetes, the requirements will be considered within the limit of the community of practice which includes providers and organization, citizens and patients. The concept of ICT solutions is branded as eHealth. It is a promising field that will incorporate all the professionals who are directly and indirectly involved in the management

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of a case to properly integrate their knowledge and skills for the appropriate care of a diabetic patient while making the emphasis: glycemic control convenient for providers and patients.

It is imperative to elucidate the aspect of health care that are relevant to ICT input: the idea of ICT use is to integration of information to improve access. This implies that patients' information are made available at a common centre and accessible to the patient, their health care providers and researchers. The components include Clinical database: this contains the information of patient. There is a central repository of health care information of the patient. It includes the electronic patient record which is but a segment of the repository.

For diabetics, the information about their presentations, clinical features, investigations, treatment plans and modalities are combined, classified and ordered in accessible manner at the clinical database centre. This database centre is secured as the confidentiality and privacy of the patient's data has to be maintained. It is also prevented from use by third parties unless there is due consent by the patient. This central unit is fed by local diabetes databases from local hospitals. The data is made accessible to general practitioners, community health care providers and patients.

Decision support tool: this is second important part of ICT solutions in shared care for diseases including diabetes. It contains specialized information guide for experts and simple algorithms of decisions for patients. Specific Requirements Providers and organization The tools that are required to have an effective shared care plan for diabetes includes: Internet: the internet has become the most influential means of connecting people, and exchanging <https://assignbuster.com/diabetes-mellitus-shared-care-model-and-ict/>

information in this age. It is therefore unequivocal that it is useful in health information systems to achieve a collaborative network of professionals who care for diabetic patients.

A large bandwidth is required for the volume of information that is processed, exchanged and implemented in shared care practice for diabetic patients. Interprofessional Communication systems: Diabetic care requires effective interdisciplinary communication so that management decision is both cost-effective and evidenced based. A huge communication network is therefore required. Mobile and wireless Infrastructure: these also form ICT tools which are used in database processing, exchange and monitoring, they are required in order to facilitate the integration of the patient, and more importantly improves providers access to information

Data storage: since clinical database is an integral part of ICT solutions for shared care plan for diabetics. Data must be stored in a way that is accessible to providers. This implies that strict measures and guidelines must be in place to ensure the database is well-structured. Intelligence systems: Websites must be secured. Database must be protected from intrusion by third party parties. Patient's data must be confidential and kept private and guideline of medical ethics with respect to this must be maintained. Therefore a sophisticated intelligence network is imperative to accomplish this gargantuan task.

E-learning for medical education: there is need to provide facility for providers for training and retraining. They need to update their knowledge base so that they can offer quality service to clients. This can be achieved by making such up-to-date information available through an accessible means,

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for instance, the internet. Medicolegal/Ethic Issues: ICT input into health care must be maintained within the limits of ethical guidelines and medicolegal regulations for data management, exchange and implementation. It addresses problems of public interest, patient autonomy, third party involvement and international regulation against threats.

Citizens and Patients The requirements for the patients include E-learning device for the patient: this will teach patient the modus operandi of the collaborative health information system, their role and why it is important they adopt it. It will also give useful information about diabetes. Decision support tools: this should contain factual information that can guide the patient to make informed choice with respect to their management. Patient home management: this includes clinical signs monitoring, automated scheduling and medication.

It also comprises access to health educators and professionals. Areas of ICT use have been well documented in the literature: they are basically Teleconsultation: this is a kind of telemonitoring between patient and caregiver via phone, email, automated messaging tools and the internet Videoconferencing: this is face-to-face contact via such equipments as television, digital camera, videophone to connect between caregivers and patients. Both have proven useful in diabetic care. And this is widely reported in many papers from across the world. Issues and challenges