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Complicated and Complex Systems: What Would Successful Reform of Medicare Look Like?

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Contents

Highlights

Introduction
    Distinction between simple, complicated and complex problems
    Health care systems are complex
    They have been treated as complicated
    Complicated solutions have not worked
    We will consider how to intervene in complex systems

Complex View of Canadian Medicare Before Reforms
    Canadian health care as infrastructural
    Canadians among most satisfied with system up to 1990s: ranked first
    Federal transfers administered by a staff of 23
    Five values of the *Canada Health Act* (CHA) broadly deeply entrenched

The Process of Deterioration
    A steady decline in public confidence
    Everyone is more unhappy: system destabilized
    Resource allocation issues remain
    Five principles of CHA threatened
    Four clusters of tensions remain despite many interventions

Why We Need a New Perspective on Health
    Complicated solutions to complex problems have failed
    Expert advice is too narrowly focussed
    Unforeseen consequences when advice was implemented
    Complex perspectives are needed

An Overview of Complex Adaptive Systems
    Theory Cluster
    Causality Cluster
    Evidence Cluster
    Planning Cluster

The French Case Study
    France's health care system ranked #1
    WHO 2000 ranking of France and Canada
    WHO characteristics of France and Canada
    OECD longitudinal changes in France and Canada
    Lesson1: France resisted massive change
    Lesson 2: Change occurred inside stable framework

Executive Summary

This paper begins by distinguishing simple, complicated and complex problems. In simple problems like cooking by following a recipe, the recipe is essential. It is often tested to assure easy replication without the need for any particular expertise. Recipes produce standardized products and the best recipes give good results every time. Complicated problems, like sending a rocket to the moon, are different. Formulae or recipes are critical and necessary to resolve them but are often not sufficient. High levels of expertise in a variety of fields are necessary for success. Sending one rocket increases assurance that the next mission will be a success. In some critical ways, rockets are similar to each other and because of this there can be a relatively high degree of certainty of outcome. Raising a child, on the other hand, is a complex problem. Here, formulae have a much more limited application. Raising one child provides experience but no assurance of success with the next. Although expertise can contribute to the process in valuable ways, it provides neither necessary nor sufficient conditions to assure success. To some extent this is because every child is unique and must be understood as an individual. As a result there is always some uncertainty of the outcome. The complexity of the process and the lack of certainty do not lead us to the conclusion that it is impossible to raise a child.

In this paper we argue that health care systems are complex, and that repairing them is a complex problem. Most attempts to intervene in Medicare (and in many other health care systems) treat them as if they were merely complicated. We demonstrate this failure of understanding by tracing the deterioration of Medicare through a series of complicated interventions to its present destabilized state. We identify the tensions that seem to represent intractable problems in the Canadian and other systems that elicit strong responses from warring ideologies and professions. We argue that many of these dilemmas can be dissolved if the system is viewed as complex.

We then present a detailed account of complex adaptive systems using health care examples to indicate the explanatory power of the approach. The first of four clusters of characteristics focuses on theory. Complex systems are non-linear and exhibit a great deal of noise, tension and fluctuation as they interact with the rest of the environment. The causality cluster identifies such characteristics as mutual causality, emergent outcomes and probabilistic, uncertain and somewhat non-predictable outcomes. The evidence cluster describes how evidence in such systems considers factors that are typically ignored in complicated systems such as outliers, historical anomalies, and the nature of actual as opposed to idealized relationships. The planning cluster identifies the notion of decision as emergent from processes rather than events. It stresses the need for deeper understanding of actual practices and argues that big changes can occur from small interventions in complex systems.

The paper continues by applying this understanding of complex systems to two case studies. The first draws lessons from the 2000 World Health Organization Report that ranked the French health care system as first in the world. The French system resisted the massive dislocation and destabilization that affected many other countries in the developed world by steadfastly maintaining its basic values and instituting only small-scale changes. Despite widely prophesied financial ruin, the French system today costs the same 9.4 percent of GDP as the Canadian one. The second case considers Brazil's successful response to the AIDS epidemic, which deals with

seemingly intractable problems of underdevelopment by dissolving the dilemmas. A distinction is made between the complicated questions asked by the World Bank and the complex question asked by Brazil.

The paper concludes with the application of a complex systems approach to some of the Canadian problems and identifies what successful reform would look like. Most critically, complicated questions would be transformed into complex ones. The complicated question "What are the structures we need to make the health care system sustainable?" becomes the complex question "How do we build on current structures and relationships to stabilize and enhance Medicare?" The question "Can we afford increasing care and treatment for an aging population?" is best understood as "How can we provide care and treatment that makes everyone feel that the system will be there should their family need it?" The question "What do we have to give up to support the most effective and advanced technology (or drugs)?" would better be asked as "How can we help health care institutions and professionals enhance the quality of services and innovation in technology and drugs?" and, finally, "How much should Canadians pay for their health care?" might become "How can Medicare contribute even more to the Canadian identity?"

We then proceed to suggest ways in which these four questions might begin to be answered. We argue that we have been trapped into a narrow way of defining and responding to current issues as if they were merely complicated. Success in answering more complex questions will begin the process of revitalizing the Canadian health care system. It will help resolve many of the tensions, which are now present in the system. The struggle to answer even the few questions we have posed can improve how health care is provided by stabilizing the system, recognizing the nature of health care knowledge and providing opportunities to improve services in a cost contained environment. These are clearly not all the questions, nor are we capable of providing all the answers. But this new perspective can help refine the questions to ask and provide indications of some of the kinds of answers we need.

We believe that there is at least as much expertise and ingenuity in Canada to generate and answer complex questions as in Brazil and France. We are confident that we can rise to the challenge to mobilize and use existing resources to revive a truly Canadian universal health care system. In answering such complex questions, Canadians may become more confident that health care will be there for them should they need it. A fresh understanding of the principles of the Canada Health Act *can then emerge. In it, the questions will closely link economic sustainability to values of social generosity, equity and security that have been central to the Canadian identity.*

Introduction

Virtually everyone agrees that there is trouble in the Canadian health care system, but there is little agreement on the nature of the trouble. Pollsters and health related surveys indicate that something is wrong, but depending on the survey orientation and the kinds of question they ask, many different sources are identified. Solutions seem to be polarized along ideological lines when left- and right-wing think tanks offer their preferred solutions. They become polarized along professional lines when doctors, nurses, and other health care providers offer their advice. Even academics have some trouble maintaining independent scholarly views in the face of what many of them see as assaults on their positions. Some argue that the problems are the polls themselves rather than the health care system. Added to this melange of confusion are periods of mass hysteria fanned by economic projections of doom: if things continue on their current path, we will be bankrupt or die impoverished or both.

Moreover, this situation is not unique to Canada. Other countries in the English-speaking world have had similar histories for the past decade. The British National Health Service (NHS) changed its orientation from right to left, from "managed competition" to "collaboration" the day after the transition from Tory to Labour. The American system rushed into vertically integrated Health Maintenance Organizations with very mixed results. New Zealand assumed the role of guinea pig for extreme experiments in entrepreneurial health care with little apparent success (Government of New Zealand 2002).

In this paper, we argue that most of these approaches to change are based on a rational planning approach, expert driven design conceptions of strategy (Mintzberg et al. 1998, p. 5). We also argue that health care and the systems within which it is delivered are best understood as complex adaptive systems (Begun 1994; Priesmeyer and Sharp 1995; and McDaniel 1997). The assumptions underlying rational planning are inconsistent with complex adaptive systems. Hence policies and strategies based on it can have significant unintended consequences when applied to complex adaptive systems (Zimmerman 1999). Although most of the experts and advisors have recognized that the health field and its problems are not simple, they do not exhibit an adequate understanding of the theoretical frames of complex systems and how to intervene in such systems.

We begin our paper by introducing a preliminary distinction between simple problems, complicated problems and complex ones. Table 1 illustrates the distinction and identifies some of the characteristics of each type of problem.

Simple problems like following a recipe may encompass some basic issues of technique and terminology, but once these are mastered, following the recipe carries with it a very high assurance of success. Complicated problems contain subsets of simple problems but are not merely reducible to them. Their complicated nature is often related not only to the scale of a problem like sending a rocket to the moon, but also to issues of coordination or specialized expertise. Complicated problems, though generalizable, are not simply an assembly of simple components. Complex problems can encompass both complicated and simple subsidiary problems, but are not reducible to either (Goodwin 1994) since they too have special requirements, including an understanding of unique local conditions (Stacey 1992),

Table 1		
Simple, Complicated and Complex Problems		
Following a Recipe	**Sending a Rocket to the Moon**	**Raising a Child**
The recipe is essential	Formulae are critical and necessary	Formulae have a limited application
Recipes are tested to assure easy replication	Sending one rocket increases assurance that the next will be OK	Raising one child provides experience but no assurance of success with the next
No particular expertise is required. But cooking expertise increases success rate	High levels of expertise in a variety of fields are necessary for success	Expertise can contribute but is neither necessary nor sufficient to assure success
Recipes produce standardized products	Rockets are similar in critical ways	Every child is unique and must be understood as an individual
The best recipes give good results every time	There is a high degree of certainty of outcome	Uncertainty of outcome remains
Optimistic approach to problem possible	Optimistic approach to problem possible	Optimistic approach to problem possible

interdependency (Holland 1995) with the added attribute of non-linearity (Lorenz 1993), and a capacity to adapt as conditions change (Kauffman 1995; Kelly 1994). Unavoidably, complex systems carry with them large elements of ambiguity and uncertainty (Wheatley 1992) that are in many ways similar to the problems associated with raising a child. Despite the uncertainty associated with complexity, all three kinds of problems can be approached with some degree of optimism: we do look forward to raising a child despite the complexity.

Our contention is that many health care experts implicitly describe complex problems as complicated ones and hence employ solutions that are wedded to rational planning approaches. These often lead to inappropriate solutions because they neglect many aspects of complexity. We are reminded of the old joke about the drunk who is stumbling around near a lamppost. He is asked what he is doing and says that he is looking for his car keys.

"Oh, where do you think you lost them?"
"Down the block near my car," he says.
"So why are you looking for them here?"
"Because the light is better."

The sophistication of our models, theories and language for complicated problems can be as seductive as the lamplight. They provide better "light" and clarity and yet can lead to investigations that are ill-equipped to address complex adaptive systems.

Last year Canadians were shocked to learn that our health care system was ranked 30th in the world by the World Health Organization (WHO). Most of us can remember when Medicare was a cornerstone of our social policy and a key aspect of our identity: "Canadians are Americans

with no guns and free health care." How have things come to change so much in Canada? We will explore this question and a few others that come to mind. "What can we learn from other ways of thinking about health care systems?" "How can we once more be proud of a viable well-functioning health care system?" "What would that system look like?" We will try to struggle with these questions closer to where the problems have arisen even if there is less light there. We will use ideas from Complex Adaptive Systems theory to provide fresh accounts of how our system deteriorated and also to describe what a repaired health care system might look like. We hope that we can also gain some insights into how we might get there. We will use two case studies as we proceed: The rise of France to the top of the WHO ranking, and the unexpected Brazilian response to the HIV/AIDS epidemic.

How the Canadian Health Care System
Came to Its Present State

In spite of many experts' stated recognition of the complexity of health care, we contend that many of the problems associated with Medicare result from the lack of a theoretical frame for understanding the complex nature and role of health care systems in our society. This has led Canada and other English-speaking countries to intervene in their health care systems in complicated ways with largely negative results. We can begin by considering changes in the Canadian system between 1990 and the year 2000 using a more complex filter.

We all know that the Canadian Medicare system has been an important part of Canadian federalism for more than 30 years. It is deeply embedded in the values and culture of Canadians. Its special role in Canada was well described by pointing out that in Canada, Medicare was part of the infrastructure of the country. The metaphor of infrastructure carries with it a complex array of values and expectations. Health care was a symbolic replacement for railroads as that which holds the country together. Medicare was an important privilege of citizenship and an indication of Canadian social generosity. To get some sense of this, it is worth contrasting it with the metaphorical place of health care in the United States or the United Kingdom. In the United States health care is increasingly seen as a commodity that can be bought and sold. Among the complex consequences of this metaphor is a much diminished desire to pay for someone else's health care, except in cases of dire need when it becomes a charitable act to provide it for the elderly and the very poor. The British metaphor for health care is as a government service. Because government services often have long waiting lists and other opportunity costs, there is not too much resentment of those who are prepared to pay to get better service by "going private." These social and cultural differences mean that interventions in each of these systems will have different impacts on how the results are interpreted.

As recently as 15 years ago, Canadians were among the most satisfied people in the world with how they received health care, but by the late 1980s this began to change. In Canada, the United States and Great Britain, there were growing fears surrounding health care inflation and the sustainability of the then existing systems. The result was an epidemic of retrenchment and massive restructuring that has lasted for more than a decade. All three countries have faired relatively badly in the WHO rankings and all continue to have serious problems with their health care systems into this new century.

Public dissatisfaction with the Canadian system has been growing steadily and progressively from the time of the first interventions. By 1994, it was becoming clear that things would not get better quickly. Michael Decter summed up the Canadian experience by declaring that we were no longer smug about Medicare (Decter 1994). Things have not improved. We remain worried about the current state and future prospects of Medicare. There are a number of widely acknowledged problems beyond current questions about the economic sustainability of the system. Public confidence has worn down to the extent that many Canadians are not sure that the system will be there should they need it. Overcrowded emergency rooms, intolerable waiting lists, crises in cancer care and even in the water supply fuel this anxiety. Canadians' generosity in accepting the financial and opportunity costs associated with universal health care has been

eroding in the face of these anxieties (Berger 2001; 2000; 1999). Health care professionals are dissatisfied with the current state (Barret 2000). They feel overworked, underpaid and seriously undervalued for the services they provide. For example, "Canada is experiencing a crisis in nursing" (Advisory Committee on Health Human Resources 2000, p. 2).

Increases in funding to the system momentarily reduced public anxiety in the late 1990s but it was widely recognized that this was only a short respite. A renewed sense that the health care system is out of control buttressed by terrifying economic projections in a period of recession has once again led to questions of economic sustainability. Renewed attempts to bring the system under control have now led governments to swing from extravagant and rather impotent generosity to tight-fisted frugality. These swings appear to be getting shorter and shorter. This reminds some of the parent who, not knowing what to do with a difficult child, swings back and forth withholding and increasing allowance but never getting to the underlying issues.

Most significantly, there are apparent threats to the guiding principals and values that lie behind the system. All five principles of the *Canada Health Act* are threatened today, in one way or another.

- As pressures reduce the scope of what is considered medically necessary, what is medically possible has expanded. This disparity creates tensions around the public's understanding and expectation of c*omprehensive* care.

- Some of the economic burden of illness has shifted from hospitals and the public system to individual citizens. Because the greatest out-of-pocket costs fall on those workers who do not have private insurance coverage, they experience exclusion from a system which for them has become less than *universal*, and find the system less *accessible* because of these indirect economic barriers.

- Each province has dealt with the pressures on the boundaries of coverage in its own fashion resulting in threats to *portability*. Health Minister Alan Rock said, "We sometimes see different criteria being applied to decide what services a client needs, different health providers for different services and various approaches in determining how much the client should pay" (Rock 1998).

- As private insurers and furnishers of health services, from physiotherapy to PET scans, begin to administer a greater proportion of health, *public administration* comes under pressure.

Public policy in the area of health care has been remarkably impoverished over the last number of years. The great successes of the past like the introduction of Medicare, the publication of the Lalonde Report, and the passage of the *Canada Health Act* have not been achieved in recent years. In fact, if health policy were to be measured by levels of public confidence, there has been a steady failure over the last decade (Berger 2001; 2000; 1999).

The outcomes of health policy interventions are not the only reason to think that health policy has been based on a weak understanding of the nature of health systems and organizations. A much better indication of this failure is the glaring fact that policymakers in

different countries have taken diametrically opposite approaches to solve similar problems. If repairing health care systems posed a problem like sending a rocket to the moon, then one should be able to ignore local history and politics and find the correct technical structures that would make any system work well. But while most Canadian provinces were regionalizing their health care systems to eliminate independent institutions with the hope of making the system more efficient, the United Kingdom was busy dismantling a regional system to create independent institutions to foster competition with the expectation this too would result in increased efficiency. Similarly, changes to funding streams indicated the same lack of understanding of the role of finance in health care systems. While the United Kingdom was separating the provider function from purchasing of health care because this would theoretically increase accountability, the United States was creating vertically integrated health systems where the insurance funders also began to own and control provider organizations. The failure of the large element of private payment for health care in the United States to contain costs hardly deters Canadian policymakers from embracing this avenue in the current Senate studies. Many of these responses came from ideological commitments either to market forces or to strong regulatory mechanisms.

Often the perceived scale of the problems determined the level of response. Hence there was widespread and massive restructuring of health care systems in the English-speaking world. The consequences of restructuring seem to have resulted in destabilization of health care systems. The press to increased efficiency of the system resulted only in economies that were passed from one sector to another – savings in hospitals shifted the burden of cost or care to other providers and consumers of health care.

Intractable Choices

These opposing views appear in many health care debates. It is characteristic of complicated problems that choices must be made between different branches of a decision tree. Policymakers, experts, health care professionals and politicians are divided about which choice to make. Left-right ideologies, differing views about economic forecasts and organizational structures, and even differences about what constitutes evidence are good examples of such opposing forces. The differing perspectives on the economic sustainability of Medicare provide an excellent example of this. One group of experts (Robson 2001) argues that if we project recent spending over the next 40 years, Medicare will bankrupt us. The opposing group, using the same data, but over a longer period of time, concludes that average expenditure has not risen significantly and projects a healthy future (Evans 2002).

As a result of these and other interwoven disagreements, many of the problems associated with Medicare have appeared to become either non-existent or intractable. We can identify a series of powerful tensions that have arisen between such issues as public and private financing, between hospital and community care, between primary and secondary care and so on. There are strong views on both sides of these tensions and there is a multitude of opposition parties on one side or the other of these tensions. Current debates seem to surround these tensions and different groups of professionals, government officials and other experts line up on opposing sides of most of them to do battle. They are often presented as "either-or" issues. Four sets of tensions are presented in Table 2.

If a resolution of real and perceived health care system problems is to emerge, it will require some clarification in how we understand these tensions in the health field, find ways of dealing with them, and reconsider how to intervene. The good news is that new ideas about the nature of organizations and systems, and planning and policy development have been emerging (Coveney and Highfield 1995; De Greene 1993; et Prigogine 1984), but are only now beginning to be understood. Mintzberg (1994) and others have suggested that rational strategic planning models need to be rethought in the light of our better understanding of rapidly changing and significantly less predictable environments.

We have spent the last five years immersed in this area as investigators and consultants, and have applied some of these ways of thinking to the health field. Our results have been applied in a number of organizations and published in several places (Glouberman 2001; Zimmerman et al. 1998) with particular emphasis on new ways of approaching the health field. In this paper, we suggest some approaches that might resolve the current failures in health care policy.

Complex problems are sometimes called "wicked" problems because many of their characteristics are not reducible to their constitutive parts. When solved, the solutions do not function as recipes, which can be applied to other, like problems. There are many good examples of such problems. Often they are problems of prediction. We have learned that there are definite limits to our capacity to predict the weather, the stock market, or indeed, the next drip of the faucet (Kauffman 1995). But they also include problems of how to intervene in complex situations (Arthur 1996). We know with some precision how to diagnose and treat certain acute diseases, but people who suffer from complex chronic conditions require much more

Table 2
Four Sets of Tensions

Knowledge Tensions

Specialized vs. General Knowledge
Raising vs. Lowering Professional Boundaries
Professional vs. Lay Knowledge
Evidence vs. Experience-based Knowledge
Instrumental vs. Hands-on Knowledge
Data-based vs. Narrative-based Knowledge
Allopathic vs. Homeopathic Medicine

Economic Tensions

Sustainable vs. Unsustainable Medicare
Public vs. Private Funding
Funding Leading Edge Individual Treatment vs. Funding Population Health
Value Quality vs. Efficiency
Smooth Running vs. Heroic Battles Against Disease

Governance Tensions

Centralization vs. Decentralization
Competition vs. Collaboration
Rational Planning vs. Self Organization
Structural Change vs. Relationship Development
Strict Accountability vs. Self Accountability (Clinical Governance)
Hierarchical vs. Flat Organizations
Federal vs. Provincial Regulation

Institutional Tensions

Institutional Focus vs. Patient Focus
Institutions vs. Community
Individual vs. Collective
Standardization vs. Customization
Primary vs. Acute Care
Risk Avoidance vs. Risk Management

individualized care. In fact, treating such a patient is far more uncertain. It may result in unexpected instability, failure of standardized approaches or surprising successes. Halstead Holman, a Stanford physician, has made a distinction between even relatively complicated illnesses and complex chronic diseases. Table 3 illustrates some of these differences.

Table 3
Complicated Acute Diseases and Complex Chronic Diseases

Complicated Acute Diseases	Complex Chronic Diseases
Abrupt onset	Gradual onset over time
Often all causes can be identified and measured	Multivariate cause, changing over time
Diagnosis and prognosis are often accurate	Diagnosis is uncertain and prognosis obscure
Specific therapy or treatment is often available	Indecisive technologies and therapies with adversities
Technological intervention is usually effective: cure is likely with return to normal health	No cure, pervasive uncertainty: management, coaching and self-care over time is needed to improve health
Profession is knowledgeable while laity is inexperienced	Profession and laity must be reciprocally knowledgeable to improve health

We have argued that problems relating to health organizations and systems, health policy and health itself are complex rather than complicated problems that occur in the context of complex adaptive systems.

Characteristics of Complicated and Complex Systems

Tables 4, 5, 6 and 7 list some of the characteristics of the two kinds of systems. We have taken them from existing literature on complex adaptive systems (Axelrod and Cohen 1999; Cohen and Stewart 1994; Coveney and Highfield 1995; De Greene 1993; Kellert 1993; Prigogine 1984; and Waldrop 1992) and clustered them for heuristic purposes. There is not enough space in the present paper to fully explicate them all. Instead, we provide examples of each cluster as illustrations.

The establishment of Medicare is often seen as the progressive linear development of evidence-based policy, but Taylor's classic text recognizes that real history is much more complex and non-linear:

> It would be comforting to believe that the governmental process follows ...[a]… neat and logical course, but, obviously, it does not. Unforeseen obstacles appear, unpredictable events (such as an election defeat) occur, and feedback from the environment warns of the need for changes in policy or strategy. …. The more one examines the roles of interest groups and national and provincial political parties in the formulation of policies, ...the less the two-tier federal system resembles the traditional "layer-cake" concept and the more it exhibits the idiosyncratic confusion of a marble cake. (Taylor 1978, xvi)

**Table 4
Theory Cluster**

Complicated Systems	Complex Systems
Linear	Non-linear (inputs and outputs not directly correlated)
Noise, tension and fluctuations suppressed	Opportunity seen in tension, noise and fluctuations
Solution as external to system	Solution as part of system
Adaptation is to a static environment	Interaction with the rest of a dynamic environment

**Table 5
Causality Cluster**

Complicated Systems	Complex Systems
Simple causality	Mutual causality
Designed and intended outcomes	Adaptive and emergent outcomes
Deterministic	Probabilistic
Certainty	Uncertainty
Assumed predictability	Recognized elements of non-predictability
Focus on boxes	Focus on arrows
Structures determine relationships	Structures and relationships are interactive

**Table 6
Evidence Cluster**

Complicated Systems	Complex Systems
Reductionism/analysis	Holism/synthesis
Averages dominate: outliers irrelevant	Outliers seen as possible key determinants
Classical economics ignores historical evidence because systems always tend towards equilibrium	History contains meaning of change and systems evolve in part based on where they have been
Measures of efficiency, fit and best practice	Functioning of actual relationships and feedback loops (+ve and –ve)

**Table 7
Planning Cluster**

Complicated Systems	Complex Systems
Convergent thinking	Divergent thinking
Reductive characteristics	Emergent characteristics
Decision procedure as an event	Decision as emergent
Environmental scan	Developing insights into own practice
Big issue needs big change	Butterfly effect – size of change does not determine size of change

An excellent example of this series of differences is in the boxes and arrows often used to describe the factors that contribute to health or illness. They give the impression that the statistical correlations that support them will provide a causal deterministic account of health with a high degree of predictability. This is not really the case. There is often little proof of the direction of the causality, uncertainties are ignored and the resulting pictures tend to distort or ignore the picture of health as complex, probabilistic, with many factors interacting not only with the individual but also with each other (Glouberman 2000*a*).

The problem of overuse of emergency rooms is most often treated as a complicated problem. The variables considered are narrowly focused. Economic measures do not consider the broader history of the problem and every iteration seems to worsen the situation. The increased pressure on emergency rooms usually results in increased resources that come to them and their hospitals. And the money comes by reducing less urgent services. If one considers this issue in the context of complex systems one can quickly recognize the cycle that results (Glouberman 2000*b*).

The Vicious Cycle in ERs
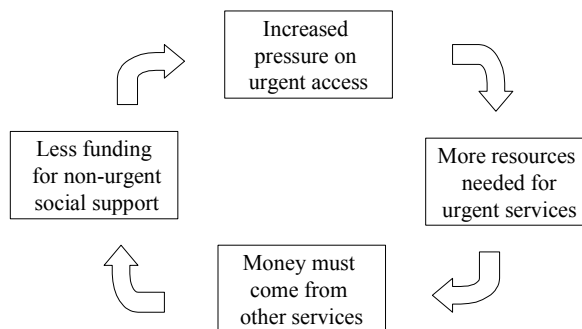
The headings for the methodology of the Health Services Restructuring Commission in Ontario are listed below (HSRC 1997). They offer an excellent example of how planning is viewed as a complicated problem. When one looks at them one can recognize some of the reasons for the recurrent difficulties with the results and the failure of the predictions of cost savings. There are clear though complicated decision procedures that take into account a limited set of replicable factors. The methodology, though complicated, must ignore significant features of health care systems such as the cultural role of hospitals. One can also see a clear linear flow from one step to the next. Each step is an event, either of data gathering or decision making. Convergence is reached and then the next step is begun. The implicit assumption is that feedback loops will be at most a minor irritation – an outlier perhaps – but if one sticks to the plan, the process will unfold as envisioned. One can quickly recognize the potential for a multiplication of error as one goes through the following steps:

Step 1: Determine Net Expenses

Step 2: Calculate Program and Related Transfers

Step 3: Calculate Clinical Efficiency Savings

Step 4: Determine Support Service Efficiencies

Step 5: Re-allocate Other Expenses

Step 6: Calculate Site Closure Savings

Step 7: Determine Administrative Efficiencies

Step 8: Add Back Selected Expenses

Step 9: Establish the Cost of the Reconfigured System

Interventions in complex adaptive systems require careful consideration and planning, but of a different kind than in mechanistic systems. It is more important to understand local conditions and to be aware of the uncertainty and feedback that accompanies any intervention. There are some good examples of successful interventions to resolve major health problems.

Case Study 1: France to the Top of the WHO Ranking

When the WHO did its ranking of world health care systems in the year 2000, France emerged at the head of the pack. There remains some degree of contentiousness about these results, but it is worth examining this case for points of comparison and difference between Canada and France. We compare the various rankings in Table 8 (WHO 2000), present a cross section of similarities and differences in Table 9 (WHO 2002) and provide a glimpse of some changes between 1990 and 1998 in the two systems in Table 10 (OECD 2002).

These comparisons can be interpreted in different ways and their significance can be questioned, but we do not wish to enter into these kinds of debates. Suffice it to say that the data is varied enough to provide material for many complicated debates. Some pieces of comparative data stand out and make us wonder about arguments to increase private funding, the threats posed by an aging population, the percentage of expenditure on drugs or the number of doctors,

Table 8
WHO 2000 Rankings of Canada and France

France	Rank Item	Canada
1	System performance	30
4	Health performance	35
3	Health level (DALE)	12
12	Health distribution	18
	Responsiveness:	
16-17	Level	7-8
3-38	Distribution	3-38
26-29	Fairness of financial contribution	17-19
6	Overall goal attainment	7

Table 9
Some Comparisons between Canada and France

France		Canada
59,000,000	Population	30,000,000
20.50 percent	Percent 60+	16.70 percent
9.40 percent	Percent GDP on health	9.40 percent
$2,074	Per capita international dollars	$2,363
76.10 percent	Percent public	70.10 percent
70.7	Healthy life expectancy	70.0
175,431	Number of doctors	50,000
347,918	Number of nurses	227,000
4.4/1,000	Infant mortality	5.5/1,000

Table 10
Canada and France 1990 and 1998 OECD Data

	1990		1998	
	Canada	**France**	**Canada**	**France**
Life expectancy at birth females	80.4	80.9	81.5	82.2
Life expectancy at birth males	73.8	72.7	76.1	74.6
Infant mortality, deaths per 1,000 live births	6.8	7.3	5.3	4.6
Total in-patient care beds, per 1,000 population	6.3	9.7	4.1	8.5
Practicing physicians, density per 1,000 population	2.1	2.6	2.1	3
Average length of stay in in-patient care, days	13	13.3	8.2	10.7
Total expenditure on health, million NCU	60,422	569,782	82,821	796,986
Total expenditure on health, percent GDP	9	8.6	9.3	9.3
Public expenditure on health, million NCU	45,071	436,594	58,082	606,348
Public expenditure, percent GDP	6.7	6.6	6.5	7.1
Percent total expenditure on in-patient care	49	46	43.1	44.8
Percent total expenditure on pharmaceuticals	11.4	20	15	22
Out-of pocket payments, per capita US$	270	207	392	209
Private insurance, percent total expenditure on health	8.9	10.9	11.2	12.6

nurses and hospital beds. France has an even higher ratio of public to private expenditure than Canada; a significantly older population; spends more on drugs and has a higher ratio of doctors and hospital beds per 1,000 population than Canada. Its outcomes do not seem to be worse despite a longer average length of stay in hospital. Its infant mortality rate, for example, has become lower than the Canadian rate. Some of the French data reinforce Canadian worries. For example, out-of-pocket expenditures in health have increased significantly in Canada while they have remained flat in France. Some of the similarities are also of some interest. For example, the percentage of GDP spent on health is the same in the two countries and healthy years of life are similar.

What is critical here is that we are not arguing that these attributes of the French system have *caused* its success. Rather, we are intrigued by the fact that the French have, at least up to the date of this survey, not followed global trends and conventional wisdom about how to have an efficient, effective and economically viable system. Our argument is that the attributes, statistics and structures of the system are less intrinsically related to success than are the more complex understanding and assumptions about how systems work. Given some of the more recent changes France is making in health care, we would argue that their resistance to change was less as a result of explicit understanding than of a series of implicit assumptions. As a result, they have become vulnerable to the power of suasion of global trends of health care reform. Our interest in looking at France is to see what insights we can gain about how France perhaps inadvertently created a more successful system than Canada by 2000.

None of these tables adequately explains how the Canadian system has deteriorated over the last decade. In fact the data suggest that the Canadian system has become far more efficient with

shorter lengths of stay and a reduced complement of beds and staff. Moreover public expenditure has gone down from 6.7 to 6.5 percent of GDP. Yet, despite this apparent increase in efficiency, the sense is that the system remains in deep trouble – in terms of financial sustainability as well as of quality, and of public confidence.

Andrew Pettigrew, a British expert on strategic planning, has pointed out that NHS managers have learned to manage (complicated) structural change, but lost the capacity to manage (complex) health care (Pettigrew et al. 1988). It appears that if we could only have the best structural features of another system then we could resolve our problems. But it is difficult to see what we should emulate in France. Should we adopt the French ratio of bed complements and professional staff? Should we reduce out-of-pocket costs? Should we spend even more on drugs? It quickly becomes clear that we cannot have the same system as the French and one learns that the situation is far more complex. The more one looks at other systems up close the more it becomes apparent that health care institutions and systems are complex because they are deeply embedded in local politics, culture and history among other factors. There is much to learn from other complex health care systems, but it is not the case that we can simply adopt their structures or processes to resolve our problems.

A good example of this in France is the array of programs and subsidies for mothers and children that provide support from pregnancy to nursery school. These programs have evolved over the last number of years. They include such things as training in parenting, nutritional support for pregnant women and developmental day care for infants and toddlers. There are also financial subsidies to encourage good personal care and proper diet. These policies have come to be known by ordinary people as "*la maternelle*," which translates literally as "nursery school." Their place in French social policy is similar in many ways to the role Medicare once had in Canada – it marks a piece of the French soul and is celebrated by most French people, from ministers to cab drivers, who declare with a swagger the extent of their social generosity. We might easily transform the joke about Canadians to say, "The French are British who drink wine and love mothers and children." Many of the programs are consistent with a French version of Fraser Mustard's vision for Canadian social policy. Although it is difficult to assign causality, the rate of infant mortality in France has gone from being higher than the Canadian rate to being lower over the last decade (OECD 2002). Perhaps we do not yet love mothers and children as the French do. And although Quebec has adopted aspects of these programs, it has not captured the hearts of Quebecers as *la maternelle* has the French. It is a critical part of the solution of our present difficulties to find and regain our own "maternelle" – one that interacts with our culture and values in relatively complex ways. Certainly we can learn more about the role of health and social policy in shaping and responding to the values and cultures of a country.

We conclude that a major difference between the Canadian system and the French one is that there was less draconian restructuring imposed on the French system. Important changes to the system, like *la maternelle*, did occur, but they were shaped in a context of relative structural stability and were largely programmatic. (Currently France is undergoing what is considered by many to be a major upheaval as the work week is shortened to 35 hours.) These apparently minor changes have had significant impacts on the effectiveness and efficiency of their system, especially in comparison with other WHO surveyed countries.

Case Study 2: HIV/AIDS in the Developing World: The Brazil Story

In this section of the paper, we explore the story of a complex health issue: HIV/AIDS in the developing world. We argue that when HIV/AIDS is considered as a complex rather than a complicated problem, radically different options emerge for intervention and policy. We show how a complicated approach to the problem determines the types of questions posed and logically leads to a conclusion that the situation is intractable. We follow this by looking at Brazil's success in beating the odds and argue that their approach embraced the underlying principles of complex adaptive systems. This dramatically changed the nature of questions asked, the solutions found and the interventions taken. *(The Brazilian HIV/AIDS case and analysis are adapted from Begun et al. in press 2002).*

Despite the fact that Brazil's annual per capita income is less than $5,000 (Downie 2001), it has managed to falsify the World Bank prediction that it did not have the resources to resist HIV infection and would have 1.2 million cases of HIV/AIDS by 2000 (World Bank 1997). Instead, it had 0.5 million (UNAIDS/WHO 2000 Update, Revised). Brazil has been far more successful than South Africa in combating AIDS. In the 1980s, Brazil had one of the worst infection rates in the world (Darlington 2000), far surpassing South Africa. Today, South Africa's HIV infection rate is 25 percent of the population whereas Brazil's is 0.6 percent (UNAIDS/WHO 2000 Update, Revised). Brazil challenged all of the prevailing complicated assumptions about how to deal with the HIV/AIDS epidemic.

HIV/AIDS in Developing Countries – The Underlying Assumptions of a Complicated View

In 1997, the World Bank reported that an estimated 30 million people had contracted the human immunodeficiency virus (HIV) and 90 percent of those were in developing countries (World Bank 1997). HIV/AIDS in developing countries is often assumed to be an intractable problem. Why? Here are the assumptions underlying the diagnosis:

Cost of drugs:

The anti-retroviral drug cocktails have transformed AIDS into a controllable, chronic disease for those who can afford the drugs in the developed world. However, their cost is out of reach for poor countries.

> Antiretroviral therapy, which has achieved dramatic improvements in the health of some individuals in high-income countries, is currently unaffordable and too demanding of clinical services to offer realistic hope in the near term for the millions of poor people infected in developing countries. (World Bank 1997)

Prevention versus treatment:

In developing countries with limited resources and high rates of HIV infection, choices need to be made as to how to spend the limited health care dollars to fight the disease. Countries frequently decide that prevention of the spread of the disease is the best they can do. Treatment is a luxury they cannot afford. So they opt to focus almost exclusively on prevention.

Uneducated, illiterate patients cannot manage their own therapies:

The drug treatment regime to control AIDS is a complicated routine. Different drugs need to be taken at specific times of the day. How can illiterate, uneducated people be expected to comply with such a sophisticated routine? In addition, sometimes a drug needs to be taken with food, which adds another challenge in poor countries where food is a scarce and unpredictable resource for the poor.

Prevention needs to focus on the fear and severity of the problem:

One of the tactics taken in prevention is to inform the public of the incredible dangers involved in unsafe sex. The fear of disease and death will change people's behaviours to limit the spread of AIDS.

Making a dent in the HIV/AIDS problem in developing countries will take a generation or two:

An almost exclusive focus on prevention, even if it is successful, will result in devastating losses in the current adult generation and perhaps the next if they were born with HIV/AIDS. The impact of today's prevention tactics will really be seen by the 2nd or 3rd generation. In the meantime, many millions will die of the disease.

Integration requires a sophisticated health care system across a country:

In developing countries, health care systems and public health infrastructures are frequently not consistent across the country. A national system of prevention and treatment requires a well-developed integrated health care system and infrastructure.

Brazil's Approach to HIV/AIDS as a Complex Problem

Brazil did not accept the analysis of the HIV/AIDS problem presented by the World Bank. It implicitly recognized that it was a complex problem that lent itself to different questions and hence led to less intractable conclusions. Tables 11 and 12 contrast the questions and answers in the two perspectives.

Table 11
Brazil Questions

Questions That Assume a Complicated Problem	Questions That Assume a Complex Problem
What will drug costs be for our infected population? Or whom can we afford to treat?	How can we reduce costs so that we can provide treatment for all who need it?
Since illiterate poor people cannot be expected to comply with a complicated regime of therapy, what resources are needed to assure compliance for those treated (i.e. assumption of need for professionals to manage patients' regime)?	What methods of communication will work to convey drug therapy routine to a patient – even a homeless, illiterate patient? If food is an issue, how can we use existing charities to provide food so that patients can get food at the right time for their drug regime?
With our limited resources, should we focus more on prevention or treatment? Or what are the resources for an effective prevention treatment?	How can we achieve our prevention goals while treating all of those currently infected?
What infrastructure do we need to implement our plans? What will this cost? What are the trade-offs? From what program/service will we take the money to afford this infrastructure?	Where are the informal and formal networks/relationships that exist that are consistent with our overall approach/values? How can we help to strengthen these connections? What skills or resources exist already in our country and how can we help make them more visible and hence useful?

Table 12
Brazil Answers

Conclusions That Assume a Complicated Problem	Conclusions That Assume a Complex Problem
Meaningful solutions require sophisticated, integrated national health care systems.	We will find ways to use the resources we have to respond to the problem.
We cannot provide treatment to all when the costs are so high. Choices must be made.	We will find a way to provide treatment to all who need it by dramatically reducing costs.
We cannot afford resources to manage treatment compliance.	We will use our informal system to train people to care for themselves.
With our limited resources, we should focus more on prevention than treatment.	Prevention will be part of treatment and treatment will allow us "access" to population for prevention strategies.

A more detailed account of how Brazil dealt with the problem is presented below.

Cost of drugs:

The government gives the drugs away for free to HIV/AIDS patients. Since 1994, Brazil has been manufacturing generic versions of the drugs in the anti-retroviral drug cocktail. Brazil uses the controversial clause of the World Trade Organization (WTO), which allows countries to violate patent laws in cases of national emergency (American Medical Association 2001). Brazil

argued that the HIV/AIDS epidemic is and could become a national emergency. Although both the WTO and the United States challenged Brazil on their use of this approach, Brazil has continued and in 2001, the United States dropped the lawsuit against Brazil.

Each year, more of the drugs were produced in Brazil in a generic form. By 2000, 8 of the 12 necessary drugs were produced in generic form, at enormous cost reductions (Darlington 2000). Estimates of the cost reduction vary, and are being further reduced as more and more of the drugs are produced in generic form. At a minimum, the costs of the drug therapy per patient per year are 65 percent lower than the $12,000 cost in the United States. Some estimate that it could be further lowered to be 90 percent less than the US cost.

Prevention versus treatment:

Brazil chose to use treatment as part of the prevention strategy. When people know they can get treatment, they are more willing to come in to hospitals, clinics or certain NGOs for tests (Rosenberg 2001). The situation is not deemed to be hopeless. While they are there for treatments or tests, they also get information and spread the prevention ideas. Today the bulk of the spending is on treatment, yet the prevention goals are being met.

Uneducated, illiterate patients:

Nurses and other health care workers teach patients how to take the drugs. They use whatever methods they can to communicate the drug routine to the patients. They will draw pictures of the sun or the moon to denote different times of day. They will draw pictures of food on the labels of the pill bottles for those that need to be consumed with food (Rosenberg 2001, p. 30). In addition, they will help the poorest patients link up with NGOs, churches and other organizations, which offer free food. In spite of the high illiteracy rate in Sao Paolo, the adherence rate for the drug regime is at the same level as in San Diego. In both cities, 70 percent achieve an 80 percent adherence rate (Rosenberg 2001, p. 30).

Prevention needs to focus on fear and the severity of the problem:

Brazilian organizations have used a variety of playful approaches to sell the concept of condom use. The approaches include celebrating life and humour. Bright coloured costumes on musicians playing music are used as an opportunity to share information and make the use of condoms acceptable among the high-risk groups. Pre-school children are taught about HIV/AIDS prevention in some parts of Brazil (Lehman 1999). Ads depict condoms as props. One ad shows three women sitting around a table, which has a condom for a tabletop. All the women are saying, "Yes." The caption is "With a condom, they'll say 'yes, yes, yes'" (Walbran 1998).

Making a dent in the HIV/AIDS problem in developing countries will take a generation or two:

Brazil's efforts really began in earnest in the early 1990s. By 1994, they were producing their first generic anti-retroviral drugs. Within five years, they had made a major impact on reducing the spread of the HIV virus. In the 1980s, they were held out as an example of one of the worst

hit countries for HIV/AIDS. Today, they are touted as a model for developing countries fighting HIV/AIDS.

Integration requires a sophisticated health care system across a country:

Brazil is not among the poorest countries in the world; it had an established infrastructure of hospitals, clinics and public health services, but it was hardly of the caliber of first world systems (Rosenberg 2001). There were huge differences in the services available across the country and to different segments of the population. Their HIV/AIDS efforts have, to quite an extent, strengthened the health infrastructure, or web of connections, to do the treatment and prevention work necessary to grapple with HIV/AIDS. They used over 600 existing NGOs and community level care organizations to reach the country's poor (Center for Disease Control 2000). The country now has 133 testing and counseling centers. Health care clinicians worked along side NGOs and other organizations to provide the full range of services needed. "It is a well-organized, well-formulated program that works because the government has managed to integrate the whole society – especially NGOs" (Rosenberg 2001).

The questions posed were of the kind "who has the current resources, skills needed to provide the treatment services or complementary needs for HIV/AIDS patients?" In other words, they looked for the hidden resources and existing informal relationships in the country, which would not show up on a Ministry of Health organization chart. They looked at what existed in reality rather than in theory. They did not assume away the messy and complex nature of the "system" but rather accepted it and embraced an emergent system and structure holding on to a very few key principles.

Changing the Nature of the Questions in Brazil

There are some key differences between a hypothetical set of questions that assume the Brazil case to pose a complicated problem and ones that assume its complexity. Both kinds of questions are based on a coherent set of assumptions about reality and change. Complicated problems are machine like and complex problems more life like. Each set of assumptions both illuminates and distorts certain aspects of reality. The machine metaphor of the complicated approach suggests external managers – or mechanics – need to fix the system or its parts. The life metaphor suggests that solutions (and new problems) have the potential to emerge from within. The external role becomes more facilitative than mechanical.

Our contention is that Canadian health care policymakers, administrators and citizens too often tried to reduce the complex problems of Medicare to complicated ones. They have ignored many of its complex characteristics. The most prominent questions posed in the Canadian context tend to assume that the problems associated with Medicare are complicated. The challenge is twofold: to articulate an approach to the complex issues and to resist reducing the analysis to one that assumes a complicated problem.

How Ideas about Complexity Can Be Applied to Canada's Health Care Reform

In the final sections of this paper, we will build on the lessons drawn from the French and Brazilian cases and other examples when examined with a complexity perspective rather than a complicated view of health care.

Building on the Brazilian analysis, we demonstrate how changing the questions posed for Canada's health care system from a complicated to complex viewpoint changes the solutions seen as viable. We show how changing the questions asked can shift the framework for intervention and lead to some clear directions, even some specific action plans, for policymakers. We conclude the paper with some optimism that Canadians have the potential to make positive changes to the health care system.

Examples of Questions for Canadians Reflecting on Health Care Reform

Many of the questions currently raised about Canada's health care system assume a complicated system and hence constrain the possible answers. Some of the specific questions to which this paper is a response are good examples of ones that assume that current problems must be viewed as complicated. Questions like "Is it true that the success of reform depends on the means put in place to see it through?" carry with them the assumption that there is a process of "seeing it through" to a definitive conclusion. It is such assumptions that are being challenged in this paper. Such questions often imply that someone else is in control of the system and can take the blame for its troubles. The provincial premiers and ministers of health often say Ottawa is to blame because they have reduced resources. Hospital executives blame the provincial governments for lack of direction. Researchers blame politicians for meddling with their solutions. The other side of blame is control. If someone or something can be blamed for a failure, then it is logical to assume they can also be responsible for success. This fits clearly within the complicated assumptions noted above. An external party is responsible for the results and outcomes. Clear causal chains of inference can be made. Someone is ultimately responsible for the success or failure of the system. "The buck stops here."

When leaders do not seem to have the solutions, other sources for the problems are exposed – again often from a complicated perspective. Money is a zero sum game. Spending more on health care means less will be available for other services, as demonstrated in our emergency room closure example. The vicious cycle is repeated as "parts" of a system are seen as both the problem and solution.

In Table 13, we have listed some questions that assume that Canadian problems about health care are complicated. Learning from Brazil's lead, we can then reframe them if we assume that the issues are complex.

Table 13 Canadian Questions	
Questions That Assume a Complicated Problem	**Questions That Recognize the Problem as Complex**
What are the structures we need to make the health care system sustainable?	How do we build on current structures and relationships to stabilize and enhance Medicare?
Can we afford increasing care and treatment for an aging population?	How can we provide care and treatment that makes everyone feel that the system will be there should their family need it?
What do we have to give up to support the most effective and advanced technology (or drugs)?	How can we help health care institutions and professionals enhance the quality of services and innovation in technology and drugs?
How much should Canadians pay for their health care?	How can Medicare contribute even more to the Canadian identity?

The first set of questions is laden with constraints of limited resources, lack of leadership, trade-offs, external control of the future and individual rights. They paint a picture of an intractable problem where compromises are necessary but not likely to satisfy many. The complex questions have a more optimistic tone as they look for existing resources.

In the last section of the paper we present some possible answers to the four complex questions raised above.

How Do We Build on Current Structures and Relationships to Stabilize and Enhance Medicare?

At first glance, it appears that France and Brazil used radically different approaches. France used incremental changes in *la maternelle* while Brazil made dramatic changes. Traditionally it was thought that incrementalism is an evolutionary rather than revolutionary approach (Lindblom 1968). However, using insights from complex adaptive systems, which are non-linear in their reactions, new conceptions of change have emerged. Small, or incremental inputs, to a system can have dramatic or revolutionary impacts (Zohar and Morgan 1995; Morgan 1998). Revolutionary change can happen within an evolutionary container.

Both Brazil and France suggest that it is important not to disrupt existing resources. A stable context can apply existing resources to useful change. Because many parts of the health care system interact, large scale complicated interventions can destabilize the entire system, with chaotic results. In Canada, the health care system has undergone constant economic and structural changes for the last 10 years. At the end of this period everyone is unhappy AND costs are less well contained. Complicated repairs have not worked and we would argue that they have destabilized the system. They have weakened relationships and Canadians – both providers and recipients of health care – are losing faith that the espoused principles or values of the *Canada Health Act* will be adhered to.

Therefore, we would conclude that the first thing to do is to introduce relatively small interventions to stabilize the system and regain some measure of confidence in it. In the current situation, it is wise to introduce only those structural changes to the system that may stabilize and improve relationships. The system contains a large number of health care relationships that by and large work and are effective. These can be strengthened and reinforced. Other relationships have been disrupted by major changes and must be given time and care to adjust if we are to create and stabilize new ways of working. We will concentrate on a few examples of the kind of interventions that might be considered. All contain elements of cost containment AND of system stabilization.

- Find the local informal relationships that already work in the system.

- Identify local providers and users of the system who can identify what makes it work.

- Legitimize what works by providing recognition and support for those who make the system work.

- Do not change structures to disrupt those relationships.

- Increase security of employment for nurses – they need to feel confident that they are not the first to be cut whenever cost containment is put on the table.

- Provide security of income for doctors – they need to feel confident that if they achieve savings, this will not threaten their livelihood either.

- Do not increase the burden of care for patients and families but work with existing care systems to enhance self-care rather than a sense of abandonment.

- Do not decrease the support for health related organizations and other professionals.

How Do We Make Everyone More Confident That the System Will Be There Should They Need It?

Many of the issues surrounding access have to do with several consequences of recent changes. A paradox of complicated solutions is that rationalized services reduce points of access to them. This often makes access worse by clogging other already overburdened parts of the system – an unintended and expensive outcome of a rational complicated planning process. The complicated process undervalued the cultural context of health as a local phenomenon. Increasing points of access is less expensive than concentrating them in emergency rooms. Advice and social support services provide more comprehensive and less expensive access than emergency rooms. This is a lesson that we are already beginning to learn. Telephone-based advice nursing services are already helping to change the shape of the population that goes to the emergency room (Lattimer et al. 2000). Similar advisory and counseling services can help turn the vicious cycle described above into a more virtuous one.

The Virtuous Cycle in ERs
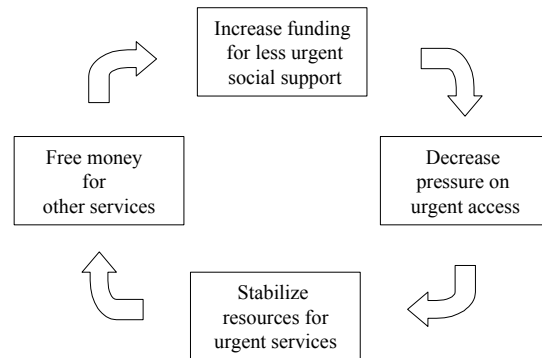
Some examples of these kinds of relatively inexpensive interventions follow:

- Provide multiple access points, e.g., tele-health and tele-ecounseling – which paradoxically allows for centralized provision of care in a highly local context for citizens.

- Increase information points to the system, e.g., local, provincial and Canada-wide bed availability services.

- Make waiting times more transparent and safer, e.g., emergency room clock for non-urgent cases, clearing house, which posts waiting time for procedures and indicates safe margins for waiting.

- Multiply less urgent services inside emergency rooms, e.g., direct support for frail elderly patients who may need help while they wait.

- Increase support for carers, e.g., more support for relatives of frail elderly.

- Increase support for self-carers, e.g., more tobacco cessation programs to complement advertising.

How Do We Recognize and Support Efforts to Improve Care?

Organizations in the health field are almost always eager to learn and apply new knowledge and techniques. Most have a long history of assimilating innovation and improvements in treatment. Much learning is typically complex and non-linear. Efforts to build complicated solutions to learning have most often ignored the more complex aspects of learning and of health care and attempted to reduce complex health care education to complicated manageable

components. Often a choice is made between introducing innovative improved care and containing costs. It is clear that solutions to Canadian problems must do both. We suggest that some interventions might begin to respond to the problem, but that the puzzle is worth pursuing.

Clarifying boundaries can be as useful as lowering them in order to reduce the destructive rivalry that pits one profession against another. The effort of the Canadian Health Services Research Foundation (CHSRF) to increase research in nursing is a good example of this. All the groups of professionals and paraprofessionals who provide health care will have more freedom (and responsibility) to do what they do best for patients: doctors to diagnose and treat illness; nurses to provide physical care and support for patients through illness, and so on. Many small points of innovations would be encouraged.

The paradox in health care is that although the acquisition of knowledge has benefited greatly from the division of labour, the integration of health care requires additional skills and attributes of connection (Glouberman and Mintzberg 2001).

- Recognize and reinforce the altruistic motives of most providers.
- Respect the different complementary professional perspectives on care.
- Reward the differentiated knowledge that emerges from various professions.
- Do not disrupt the division of labour in the acquisition of knowledge.
- Increase the cross disciplinary recognition of the value of its results.
- Ring fence funding for discipline-based research to stabilize costs.

How Can We Restore Medicare to Reinforce Canadian Identity?

We have been trapped into a narrow way of defining and responding to current issues as if they were merely complicated. Success in answering more complex questions will begin the process of revitalizing the Canadian health care system. It will help resolve many of the tensions, which are now present in the system. The struggle to answer even the three questions we have posed can improve how health care is provided by stabilizing the system, recognizing the nature of health care knowledge and providing opportunities to improve services in a cost contained environment. These are clearly not all the questions, nor are we capable of providing all the answers. But this new perspective can help refine the questions to ask and provide indications of some of the kinds of answers we need.

There is at least as much expertise and ingenuity in Canada to generate and answer complex questions as in Brazil and France. We are confident that Canadians can rise to the challenge to mobilize and use their existing resources to revive a truly Canadian universal health care system. In answering such complex questions, Canadians may become more confident that health care will be there should they need it and a fresh understanding of the principles of the *Canada Health Act* can emerge. In it the questions will closely link economic sustainability to values of social generosity, equity and security that have been central to the Canadian identity.

We need to be open to question the *Canada Health Act* principles, but with a deeper understanding of the complexity of health and health care. The fact that the principles have not been adhered to is not necessarily an indication that they are wrong. Rather, we need to look at the gems in Canada's health care system and determine what core values and principles they actually reflect. Our contention is that some of our best functioning systems do indeed embody most of these.

A healed system will contribute to health by reinforcing universality of health care coverage, which is increasingly recognized as a critical determinant of health. It will also provide improved care, because the relationships among those providing care will be improved and the flow of work will be less fragmented. The struggle to contain costs will be a virtuous cycle spread throughout the system, rather than a vicious cycle of blame from one fragmented sector to another.

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