Prevention: Delivering the Goods

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ABSTRACT

In this brief primer on prevention, the authors raise some of the scientific, social, behavioural, political and practical issues that must be addressed to integrate effective preventive initiatives into our health system (which includes public health practice). They begin by reviewing the contributions science has and has not made to inform our prevention efforts. The authors further examine what it is we know about changing human behaviour in health-promoting ways. The article closes with a review of the practical challenges for prevention-oriented policies and programs in the health system and in society as a whole.

The authors call for increased emphasis on strategies that encourage the creation of supportive environments. Moreover, they identify that we need to try for fewer, but better-thought-out and more sustained, multi-level health promotion and disease prevention interventions. Community-led interventions that identify, address and change local cultural norms that contribute to these health concerns are especially key. Finally, the authors identify the need for rigorous evaluation to ensure that all effects, good and bad, of preventive interventions are fully captured and addressed.

PREVENTION BETTER THAN CURE

We believe that prevention is better than cure. Our grandmothers even told us so. And now a number of reports tell us that we must get on with the job of prevention as a focus of reform and a critical strategy to sustaining our healthcare system. By implication, our efforts at prevention are universally judged inadequate. So why are we doing so poorly at prevention, as a system and society? What exactly are the roadblocks to moving ahead? And how should we go about it? We start with the science.

STEP 1: UNDERSTANDING THE SCIENCE

If we knew exactly what measures would safely and economically prevent disease, this would be a short and simple article. Unfortunately, as we recently learned the hard way from the U.S. Women's Health Initiative Trial on Hormone Replacement Therapy (Rossouw et al. 2002), even widespread preventive practices are frequently proved wrong by further research. And this is not the first time. A few years ago, the senior author, like many "evidence-based medical practitioners" told his patients at risk of heart disease and cancer to take vitamin E and beta carotene, in addition to eating a healthy, well-balanced diet. Now, based on further trials (Pearce et al. 2000) he longer gives this advice. Science, of course, evolves and must be expected to change its views. But how does one explain such wide swings in prevailing preventive policies concerning well-defined dietary supplements and drug therapies that can readily be tested for their long-term effects (good and bad) in definitive studies (albeit ones requiring very large numbers of test subjects, long follow-ups and significant resources)?

Part of the problem is our cultural predisposition toward "premature enthusiasm" about the benefits of any new technology or perceived "magic bullet" (including drugs and supplements) (McKinlay et al. 1989). The rest of the problem is largely due to inadequate clinician training, and decision support/continuing education after training, about substances to be taken by patients. First and foremost, society has not learned that most new technology that messes with our "evolutionarily tuned" bodies is likely to come at a price – there is no such thing as a free lunch in biology. When people take a chemical that is marketed (often aggressively by pharmaceutical companies) (Barer and McGrail 2000) as having sufficient potency to reduce our risk of a chronic disease over many years, we should not be surprised when there are unexpected side-effects. The body is not a simple machine with readily predictable linear causal processes within it. Indeed, the more we learn, the less we seem to know – advances in the new molecular biology are ultimately very humbling. With a naive "technical fix" mentality, our culture rushes breathlessly, even greedily, from one untested promise to another, in pursuit of longer life and better quality of life and reduced chance of illness. This despite the fact that we are already the healthiest and longest-living humans to have walked the planet.

There is a second force driving our overenthusiastic adoption of untested preventive remedies. It is the failure of medical and related professional training and continuing education (at least as currently practised) to inculcate in each generation of graduates a profound *fear* of what side-effects must be *necessarily unknown* for any new drug or supplement. These effects remain unknown until they are observed in large populations exposed to the agent over many years, via what is euphemistically termed "post-marketing surveillance." All new drugs, biologicals and supplements are only cleared for licensure on the basis of rather short-term follow-up studies of their effects, in limited study populations. From animal and laboratory studies, we can only really guess at more subtle, longer-term side-effects, especially in specific population groups who are often not well studied in pre-licensure investigations. These groups include the elderly, those with preexisting health problems and taking other medications, ethnoracial minorities and even children! Recent examples are not hard to find: the epidemic of eosinophilic myalgia from misprocessed tryptophan for insomnia, sold in health food stores; the outbreak of intussusception from a new rotavirus vaccine; and the apparent association of certain diet pills with heart valve damage (Ernst 2002; Delage 2000; Weissman 2001).

We are not saying put new preventive agents on hold or avoid their use altogether. Many are lifesaving and justified if good studies clearly demonstrate that the benefits exceed the risks. *But* everyone needs to appreciate, especially health professionals, that we "see through a glass darkly" on these matters. So, whenever possible, use tried and tested therapeutic agents *and* preventive measures as first line management, especially if it involves taking something internally for decades simply to *prevent* the chance of an illness many years down the road. *"Primum non nocere"*– first do no harm.

STEP 2: ACCEPTING – AND PLANNING FOR – THE TRUE NATURE OF HUMAN BEINGS

What if the science is right, and the prevention remedy on offer is truly efficacious, safe and cost-effective? As we all know from visits to the dental hygienist, there remains "many a slip 'twixt the cup and the lip" before preventive benefits actually accrue. To expand on this example, how well have you been doing with daily dental flossing lately?

Case in point: The senior author of this article actually ran a little "n of 1" trial involving only himself, rather inadvertently, over the last few years, following a move to the United States. After missing a number of appointments with a hygienist and suboptimal brushing and flossing habits – bingo! Pyorrhea (gum disease) outbreak – just like clockwork, with truly frightening consequences. (When did your spouse last tell you your breath smelled like a garbage can?) It took only three or so horrific hygienist visits to clean him up, get him brushing twice a day with something powerful and now he's fine. But does that mean he flosses as recommended by our erstwhile dental professional? Are you kidding? You know how that stuff feels in your teeth!

Our point is that human beings do not generally do as they are told, especially if

1. the suggested action is inherently unpleasant, or even just less pleasant than the alternative (e.g., avoiding certain comfort foods)
2. the source of the recommendation has any characteristics that suggest an excuse for not adhering to the advice ("That hygienist has clearly had such fabulous teeth from birth! She has no idea how it feels to floss all the time.")
3. the "voice of authority" has no real influence over the patient, so that noncompliance can be easily covered up on the next visit (Hygienist: "How's that flossing going?" Patient: "Oh, about the same, thanks.")

These criteria for noncompliance describe the context of most of the healthcare system's preventive advice. Such advice is based on the following traditional naive health education approach: "If patients only knew more about this" (in this case, the benefits of flossing), rather than "If we only knew more about patients and the social and environmental factors that influence human behaviour" (Lefebvre and Flora 1988).

Smoking is a classic example of how social, economic and cultural factors profoundly contextualize health-related behaviours. Everyone knows that smoking rates have been generally going down in Canada for some years (Statistics Canada 2000). But this trend varies greatly across different socio-economic groups, as well as by age, gender and culture in specific subpopulations. Generally, male rates of smoking in Canada *are* on the decline, but the smoking rate gap between rich and poor and educated versus less educated Canadians has greatly increased (Health Canada 1999). Economically privileged Canadians were the first to take up smoking en masse. This occurred in the early years (in the case of males) and middle years (in the case of females) of the 20th century. This

economic class was also the first to give up the habit or not even start as teens. However, among adolescent girls and young women, for example, there is still no steady decline in sight. There is an astonishingly regular pattern of overall smoking rates by province, with a steady decline as one moves from east to west – except for Quebec and the Territories, with anomalously higher smoking rates, due in part to cultural differences. Yet these subpopulations surely have access to similar "knowledge" about the nefarious health effects of smoking. It is just that the societal milieu around each person – particularly during teenage years when the vast majority of smokers become addicted – is not uniform, even within the same city or neighbourhood. *Local cultures* determine smoking rates, and they vary by age, gender, ethnicity, geography, socioeconomic status, etc. The moral here is that quitting – or not starting – is not equally "easy" or " hard" for everyone. The social context of smoking varies in systematic ways that produce stable, long-term patterns in who smokes and who does not.

Equally regular around the world are socioeconomic patterns of both ill health and related risk factors, for example, smoking, unhealthy eating and physical inactivity. In setting after setting, era after era, these determinants of health and 90% of related health outcomes are overwhelmingly concentrated in the socially disadvantaged (Evans et al. 1994). The reasons for this persistent and ubiquitous pattern are multiple and probably begin in childhood, when adverse material and psychosocial conditions profoundly affect the normal development of human beings, leaving them at lifelong elevated risk of most diseases. In virtually all developed countries, Type II diabetes and heart disease typically show clear increases in frequency of occurrence as you move down the rungs of the socioeconomic ladder. And even though initial epidemics of smoking and nutrition-related risk factors for chronic disease in developed countries are concentrated in the wealthy, they soon impact on the less privileged. People with more education and options in life typically take steps to control such problems in their lives, yet continue to market tobacco and high-profit/low-quality foods to those people in their society with fewer resources (Chockalingam and Balaguer-Vintro 1999).

Yet, all is not dismal – research is uncovering clear evidence that cultural and behavioural change is possible in ways that will reduce the risks of future ill health. A recent report from the U.S. Academy of Sciences summarizes what social and behavioural scientists have learned about changing human behaviour to improve health, at the level of whole communities and societies. In the report, Smedley and Syme identify the following key features of successful preventive programs and policies that aim to change human behaviour, especially at the community level.

- *Interventions need to be multiple in nature and reinforce each other.* For example, to reduce youth smoking, there has to be a combination of increased tobacco taxation, enforced legislation reducing access to purchased cigarettes, and education that focuses not just on dry medical facts (who at 15 really cares about their health status at 65?), but also

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on tangible and immediate benefits of the proposed healthy actions – not smoking – that are consistent with the *cultural* norms of the target population (e.g., smokers' kisses taste bad). The application of carefully tested behavioural and social science theories can further enhance the effectiveness and coherence of educational programs by considering, for example, an individual's stage of readiness to change. Program designs need also to take into account the influences of peers and other socioenvironmental influences in encouraging or discouraging specific behaviours. (Glanz et al. 1997).

- *Deliver interventions systematically at multiple levels and settings* (e.g., deliver prevention through schools, recreation programs, the community at large, retail establishments and in the home).
- *Interventions need to be of a sufficient dose intensity and sustained over what may take many years of cultural change before the desired behavioural changes become the norm.* For example, smoking behaviours appear to require decades of intense comprehensive muti-level interventions, since new generations keep experiencing afresh the power of this extraordinarily addictive substance. Sufficient intervention dose is needed to *denormalize* tobacco use by countering forces such as the tobacco industry's perennial ability to "recruit new young users."

It is simply naive to expect that less effort than this will pay off, at least when attempting to change what people regard as their personal prerogatives – whether this has to do with eating, physical activity, alcohol and drug use, gambling, sexual habits, dangerous driving or any other "risk-taking" behaviour. The evidence is incontrovertible that all of these behaviours *and the social milieu that largely determines them* account for a large fraction of the theoretically preventable burden of disease and injury in developed countries (WHO 2002). This not-so-new revelation should not be taken as bad news; it is simply reality. Either think through your preventive program fully and support systematic implementation and evaluation of programs, in line with these principles, or be prepared to accept a very low success rate!

STEP 3: APPRECIATING POLITICS, POLICIES AND TIME

The last bugbear of all prevention also barks at our heels in the rest of life: *time*. Simply put, doing something, anything, differently *today*, to obtain putative and rather remote health benefits far into the *future*, just isn't attractive to many of us. We may be too overwhelmed by the difficulties of daily life to contemplate behaviour change for such long-term payoffs, especially in socioeconomically disadvantaged settings. Indeed, it has been pointed out that continuing smokers may have what economists call a "high social discount rate" (also called "rate of time-preference") (Drummond et al. 1999). In other words, their personalities are inherently predisposed to downplay the value of anything – good or bad – that is far away in the future, as compared to what is happening to them now. This helps to explain the widening socioeconomic gap in smoking rates referred to earlier. The more pressing and stressful daily life is (which is clearly related to one's social position), the harder it is to take action now to avert illness decades away.

Another manifestation of the "time problem" is public policy and political process. It is virtually impossible for politicians in a democracy, serving 2-to-5 year terms before facing another election, to ask the public to forgo something they cherish *now*, to avert a problem with longer-term impacts. The best example, well explained by both Clyde Hertzman of UBC (Hertzman and Wiens 1996) and Fraser Mustard and Margaret McCain (1999), is the case for more consistently high-quality preschool care for all children, and especially for children of disadvantaged households. Study after study has shown clearly that such policies (1) best develop a society's "human capital," leading to gains in national productivity and

CEO Perspective

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Lessons to be learned from this paper are:

- Prevention can work but implementing preventive interventions requires careful assessment of social and political dimensions as well as scientific ones.
- Evaluation is important but the timeframe for achieving outcomes is long, hence it is important to look at intermediate outcomes in order to assess progress.
- To be effective, health systems must work with communities to influence the factors which create health.
- Prioritize – too often preventive interventions are scattered and too small in scope to show an effect.

wealth, with almost certainly a more egalitarian distribution of these goods and (2) likely reduce the adult burden of ill health and disability, and social welfare and criminal justice costs for society as a whole. One scholarly estimate (Barnett 1995) suggests that modest preschool programs involving parents and tots in creative play and communication training will save nine dollars for every dollar invested.

There is only one problem: the benefits of such a national program are separated in time, from the costs, by decades. The eyes of politicians and senior mandarins glaze over at the thought of convincing the electorate, not to mention treasury board, to invest with such a remote payoff. And so only the most altruistic societies with a longer-term vision of health have acted on this compelling evidence by investing in universal quality preschool programming. Quebec alone among the Canadian provinces has taken this step. Presumably, this has something to do with Quebeckers' increasing social concern at the vanishing future of "la Francophonie" in North America. Perhaps their ever-less-numerous children consequently appear more precious to them than those in the rest of Canada, at least in terms of social and educational investments by the public sector.

STEP 4: RECOGNIZING WHEN *CULTURAL* EXPERIMENTATION AND CHANGE ARE KEY

How *can* we move ahead on prevention, given all of these barriers and caveats? We suggest opening up the conversation. Prevention, like many other key challenges, may be just "too important to leave only to the professionals." It requires citizen engagement, increased debate and popular demand for "healthier choices and supportive social environments." Every member of the lay public already makes hundreds of personal preventive decisions every year but is often unaware of the full range of choices, and the resulting consequences. The Internet and consumer-led initiatives help to increase access to scientific knowledge to inform many of these decisions. Health service providers need to actively support this shift in the "locus of control" for health decision-making, in both curative and preventive care settings, as well as in public health programming, for *people and communities,* while creating supportive environments and safeguards against "blaming the victim" (Lalonde 1974; WHO 1986).

A good example is North America's epidemic of obese and overweight children and youth (Tremblay and Willms 2000). The statistics are terrifying: the absolute percentage-point increase in these conditions in the last 15 years is greater than the increase seen in our society, for *any* disease or risk factor, over the last century. These conditions now affect 1 in 3 boys and 1 in 4 girls, as well as 1 in 2 adults (Tremblay and Willms 2000; Tremblay et al. 2002). We know that the reasons for this change are complex, but (again) they must be *culturally driven* at the societal level: increased and easy access to fast and low-quality food and "super-size" portions; decreased opportunities for engaging in regular physical activity, no doubt aided and abetted by the rise in Internet and home computer use, access to multi-channel TV, feeling unsafe exercising outdoors in certain communities and the reduction in high-quality physical education and activity programs during and after school.

Yet there is good news, because this condition is, especially in young people, entirely reversible – unlike, for example, the HIV/AIDS epidemic. We even know, from a recent Finnish randomized control trial – albeit in overweight, middle-aged adults with mild glucose intolerance – that weight loss, regular physical activity and improved diet can reduce the subsequent occurrence of full-blown diabetes in such people, from 23% over three years to just 11% (Tuomilehto 2001). This preventive course of action is one of the most efficient we know of (i.e., the number needed to treat, per beneficiary, is just over eight).

Of course, many *middle-aged,* overweight people readily follow an onerous, professionally supervised dietary and physical activity regimen, *because* they are rightly scared to death that diabetes is about to pounce on them. Young obese people are much harder to convince, since the associated health risks seem so remote. Indeed, based on our experience, we know that few overweight teens will even agree to go to a doctor for their "problem," and most are in complete denial. Some seasoned clinicians are also reluctant to aggressively diagnose and treat such kids, unless their weight problem is extreme. This is for fear of the social and psychological consequences of medically labelling them as unwell and "different," especially given the modest success record of one-on-one counselling by physicians in achieving weight loss.

All of these arguments were clearly explained by the eminent British epidemiologist, Sir Geoffrey Rose, in his book *The Strategy of Preventive Medicine* (1992). He showed how such a "high-risk" approach to individuals with obesity, hypertension, hyperlipidemia or other chronic disease risk factors fails to target the *upstream causal factors* that have shifted the whole population distribution for risk factors in a society. The fact that we see

shifts in the entire bell curves of the frequency of overweight, hypertension and abnormal blood cholesterol levels signals that the root causes are not found in a subgroup of susceptible individuals alone – they are widespread in our culture, driving the whole curve to abnormal levels.

Clearly, the answer to this new epidemic is definitely *not* to run "school weigh-ins" to identify all the heavy set kids, round them up and send them to doctors – that will do more harm than good. Rather, the answer is to *find creative ways to change the negative influences in our culture,* including the social environment's impact on young people. To do this, we need to enlist the active support of communities, for two reasons. First, additional resources are needed to help us know exactly what sorts of community intervention programs are effective in changing a local population's rate of obesity/overweight. An expertly conducted "review of reviews," for example, from the literature on school-based interventions to prevent obesity (Miccuci et al. 2002) found seven methodologically strong reviews, five moderately well-done and eleven weak ones. However, all these reviews showed that most of the primary studies to date were so poorly designed and/or conducted that they provide only very general guidance on precisely what communities should do. While these findings can also point to the need for better quasi-experimental designs to evaluate community-based interventions, we also know that the most successful interventions tend to be multi-pronged, delivered in changing environments as varied as school cafeterias, physical education classes, relevant class curriculum and included lunch, recess and after-school programs. The successful programs were (echoing the Smedley and Syme report cited earlier) longer in duration and intensity, included frequent "booster" (i.e., reinforcing) activities and were based on realistic, scientifically informed assessments of what influences human behaviour.

As is so often the case, more and better intervention research is needed, especially in the Canadian context. Perhaps it is also time to stop always applying "clinical epidemiologic standards" of measuring success to community-level interventions, especially given the available time and resources we have to dedicate to them (Sorensen et al. 1998). We know that small changes in smoking cessation rates at a population level can significantly drive this secular trend in the right direction.

This brings us to the second reason we need to recruit communities to work on the problem: only they can design the *creative* strategies to change local cultural norms and social environments so as to make it both easy and fun for young people to engage in more physical activities and healthy eating, *together*. In some parts of Canada, deteriorating labour relations and reduced resources in the school system have, in recent years, led to the steady decline of after-school activity programs, especially for disadvantaged children, which are critical to achieving this public health goal. Quality daily physical education isn't mandatory in high schools, for instance, nor is consistent delivery of a comprehensive health studies curriculum in many parts of the country. Some school teams and after-school clubs go uncoached or lack faculty mentors. Our best hope now is carefully planned and novel initiatives led by communities. To help them, there should be community-level advisory committees and evaluation teams, composed of local public

CEO Perspective

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In my opinion, there is great wisdom in the key messages in this paper.

- Premature enthusiasm for the technical fix, magic bullet or quick fix often leaves us without achieving progress.
- Falling into the trap that more is better fails to distinguish that more is more and better is better.
- In our zeal to do good we may in fact do harm and it is, therefore, important to evaluate and confirm that our good intent equals good results.
- Leadership requires community support and community action to be sustained and successful.

In the summer of 2003, Cape Breton Island will become a smoke-free zone in all public places. For an area with one of the highest smoking rates in Canada to adopt such a strategy shows leadership. This would not have been possible without the lessons learned in this paper. Not only have our community leaders responded to the requests from Community Health Boards but our health community spoke with a single voice no matter what their profession, place of occupation or focus.

The most important message from this paper may be just that, that its time for a new and improved focus on "that old time health."

health, nutrition and physical-activity professionals. But to truly get this nationwide effort off the ground, it will take long-term *grants* to local agencies and their community partners, from higher levels of government with broader tax bases, to ensure that even the least well-off communities – which tend to have the worst rates of overweight people – have access to the necessary resources to create healthy and supportive communities to keep their children healthy. And for that to happen in Canada, the federal and some provincial/territorial governments must stop pretending that public health is properly left entirely to local jurisdictions, which are already overwhelmed by "downloading" of other responsibilities by higher-level authorities (Schabas 2002; Hoey 2002).

This leads us to one last point on the policy and program front. Above and beyond the looming epidemic of obesity and its resulting complications, we need to try *fewer but better-thought-out and more sustained* population-level health promotion and disease prevention programs and policies, not only at the neighbourhood/community level, but at the provincial/territorial and national levels. These programs and policies must be based on the principles of intersectoral collaboration to avoid the "magic thinking" of one-off, short-term attempts to change societal behaviours. Policy-makers working in the many sectors influencing the health of Canadians need to also be encouraged to develop healthy public policies that lead to the kind of supportive environments required for behaviour change. We must insist on clear, publicly debated goals and methods for a *few* such initiatives that tackle our worst threats to public health. We must also insist on rigorous evaluation to ensure that all effects, good and bad, of preventive interventions are fully captured and assessed. To do less is both uneconomical and unethical – surely a happy convergence of considerations.

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