

ONLY CONNECT **Nicholas A Christakis**

Health care in a web

The care we give one person can also have positive—or negative—consequences for the health of others around them

Consider an example: a factory making widgets pollutes the environment. This cost is borne by people who are downstream or downwind. The cost is not borne by the faraway consumers who purchase the widgets; nor is it reflected in the factory's balance sheet. In social science parlance these costs are "externalities"—they are consequences that affect parties other than those engaged in a transaction.

Another example is this: you make an investment to improve your garden, and your neighbour not only enjoys a better view but also benefits because the value of his home rises. Strictly speaking, according to economic theory, you should tax your neighbour to recover some of the value created.

This idea of externalities can be extended to health and health care. The care we give to one patient can have adverse health consequences (negative externalities) but may also have beneficial health implications (positive externalities) for others to whom a patient is connected and to whom they are in turn connected.

People are embedded in a vast and complex social network of ties to their friends, family, coworkers, and neighbours and, through those individuals, in turn, to their friends, family, coworkers, and neighbours, and thence on outwards, endlessly, into a vast fabric of humanity. This kind of structural perspective is crucial for a better understanding of medicine and public health.

Treating women for postpartum depression may mean that they are likelier to vaccinate their children or treat their asthma, thus saving some children's lives. Replacing an elderly man's hip or fixing his cataract may reduce not only his disability but also his wife's. Preventing a woman's stroke may benefit not only her but also her friends. Providing better care at the end of life may reduce the risk of the surviving spouse dying during

bereavement. Getting one person to quit smoking, lose weight, or become less depressed may improve the lives of numerous others connected to that person.

Patients care about such externalities too, of course, and have always acted accordingly. Think of patients who choose one form of chemotherapy over another because it imposes less hardship on their spouse, even if it means slightly more hardship or even a slightly smaller chance of survival for themselves.

These are very basic ideas, but they can have profound and complicated implications. Taking seriously the embeddedness of our patients in social networks has numerous consequences for clinical care and health policy.

Firstly, it means that clinical and policy interventions may be more cost effective than we have previously supposed and that some interventions may gain more than others in the accounting. Interventions that have greater positive externalities may rise in our estimation. If it costs, say, \$25 000 to replace a man's hip, and he gains four quality adjusted life years (QALYs) from this intervention, and if his spouse also gains one QALY as a result of having a more active partner, then the cost effectiveness of the surgery has just gone up by 25%. But if a knee replacement does not benefit a spouse, then its cost effectiveness does not rise. If we spend \$500 to get a woman to quit smoking, and if her quitting in turn results in one in 10 of her social contacts quitting, and if that leads to one of that person's social contacts quitting as well, we can see that three people have quit for the price of one, tripling the cost effectiveness of the intervention.

These kinds of effects are rarely taken into account by policy makers or even by entities with a collective perspective, such as insurers and health trusts. Yet they should be.



PAUL SCHMITTACHER

“
Replacing an elderly man's hip or fixing his cataract may reduce not only his disability but also his wife's
 ”

Another implication of social networks is that group level interventions may be more successful than interventions aimed at the individual. We've always known this, and programmes like those of Alcoholics Anonymous and weight loss groups are explicitly designed to create social network ties. But a social network perspective also vindicates other kinds of health care, such as family medicine, family or group psychotherapy, and health interventions at the level of community, school, or workplace.

For example, if a firm implements a wellness programme, it is likely to see health benefits that accrue beyond the individuals using the programme, magnifying the benefits within the workplace. In fact, the benefits can extend outside the workplace. One study of a health behaviour intervention administered to firefighters in the United States found that not only they but also their wives improved their lifestyles.

Finally, a social network perspective suggests that it may be possible to exploit variation in people's social network position to target interventions where they might be most effective in generating benefits for the group. For example, if funds are limited, it may be best to target those people who are most likely to influence others. Teaching the key people in a village to use treated bed nets against malaria, teaching highly sexually active people to use condoms, or teaching popular children in schools to wear seat belts are all examples that might work. But all this would require that we measure networks in ways we don't at present.

People are interconnected, and so their health is interconnected.

Nicholas A Christakis is professor of medical sociology, Harvard Medical School, and attending physician, Mt Auburn Hospital, Cambridge, Massachusetts
 christak@hcp.med.harvard.edu