Legionella risk shows the need for guideline innovation; An example from the Netherlands

J.E.M.H. van Bronswijk MSc PhD EurProBiol
Department of Architecture, Building and Planning
Technische Universiteit Eindhoven, the Netherlands
e-mail: j.e.m.h.v.bronswijk@tue.nl

E. Hasselaar MSc
OTB Research Institute for Housing, Urban and Mobility Studies
Technische Universiteit Delft, Delft, The Netherlands
e-mail: hasselaar@otb.tudelft.nl

L.G.H. Koren MSc PhD
Allergo-Consult BV, Beusichem, The Netherlands
e-mail: l.g.h.koren@allergo.nl

J.E.M.H. van Bronswijk, E. Hasselaar, L.G.H. Koren, Legionella risk shows the need for guideline innovation; An example from the Netherlands, Gerontechnology, 2001; 1(1): 65 - 68. Viewing current hygienic directives against *Legionella* in potable water to prevent pneumonia mortality is the aim of this study. Data were obtained from the Netherlands National Statistical Database. Current practice does not take into account increased susceptibility of the population due to its greying. A necessary innovation in future guidelines is adaptivity to susceptibility of the individuals who are actually at risk.

Key words: Veteran's disease; legislature; ageing

Pneumonia is a common cause of mortality. Average yearly death toll in the Netherlands over the period 1995-1997 includes 3,171 women and 2,318 men[1]. One of the causal organisms in pneumonia is *Legionella* (Veteran's Disease). The bacterium is counted among the top 2-3 causes of pneumonia[2, 3, 4]. Unfortunately actual percentage in the Netherlands is not known since identification of specific pneumonia causes is not common.

The *Legionella* organism lives in water, including warm and cold potable water made available in dwellings and other buildings. Both physical and chemical means are available to exterminate *Legionella* or lessen its growth[5].

We studied demographic trends (1950-2050 at 10 years intervals) and pneumonia mortality (1995-1997) in the National Statistical Database (Statline)[1]. In addition national and European directives were scrutinized to elucidate the relationship between hygienic rules and practice and actual or expected susceptibility of individuals.

Collected statistical data showed that the risk to die of pneumonia is influenced by gender. Male mortality surpasses female mortality up to a factor 2.2 or 2.3 (55-59 and 70-74 Years Age Classes, respectively). Only at 10-19 years of age, females showe a possibly higher mortality rate than males. Age has an even

larger influence than gender on pneumonia mortality. During childhood risk declines to become lowest at an age of 14-19 years. Subsequently female mortality increases from 2 to 38,000 per million living that year, while male mortality ranges from 2 to almost 50,000 / year / million living (Figure 1).

In case of *Legionella* pneumonia male subjects are diseased or killed a factor 2-3 more frequent than female subjects. All age categories may fall victim to the disease, but a sharp increase in both incidence and mortality has been found in the higher age categories[2, 3, 4]. By and large, age and gender distribution of Legionella-pneumonia (Veteran's Disease) appear to follow the same lines as the data on all pneumonia cases.

In the time period 1950-2050 pneumonia mortality of the total Netherlands population has risen and will continue to do so due to ageing of the population. Median age in the Netherlands population was located in the 25-29 years class in 1950-1970, and is expected to be in the 40-44 years class in 2010-2050. The oldest quart of the population commenced with the 45-49 years class in 1950, and may start at a 15 years higher age in the time period 2030-2050 (Figure 1). Under the (further) assumptions that (a) Mortality distribution over age and gender is constant and equal to the 1995-1997 data, and (b) Pneumonia mortality percentage attributed to Legionella mortality remains at the same level, the temporal shift in age represents an increase in risk by a factor 4 (based on Median shift) to 6 (based on the shift in 25 Percentile).

In the Netherlands Legionellosis has been recognized as a public health problem since 1986 when the Netherlands Health Council published a report on the subject[6]. 13 Years later protective legislature has been decided on, except for small domestic hot water sys-

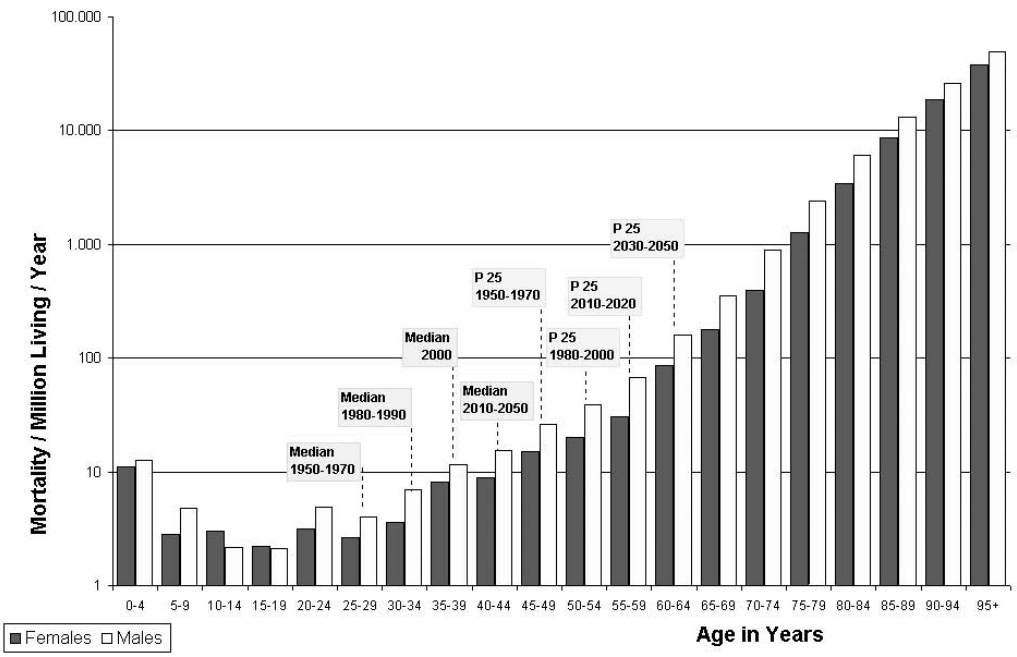

Figure 1. Mortality of woman and man due to Pneumonia. Average of the years 1995-1997 in the Netherlands. Population median age and upper 25 Percentile (P 25) are indicated for the time period 1950-2050, with 10 years intervals. Source: Statline[1]

tems[7]. A concentration of 50 Legionella cfu / l water became the legal hygienic limit for collective water systems, half the level that was proposed for highly susceptible individuals in the Netherlands[8]. However, neither industry nor local government have been able to implement this legislature yet[9], although both the European Directives on Building Products (89/106/EEC) and on Drinking Water (98/83/EC) have been calling for a maximal prevention of disease.

A number of notions contribute to the lack of utilization of available technology to prevent Veteran's Disease: (1) Demographic developments leading towards a higher susceptibility of the population are not taken into account[7], (2) Energy conservation measures ask for lower hot water temperatures[10], (3) Reduction of biocidal use is advocated on environmental grounds[11], and (4) Use of metals, such as copper for potable-water piping[12] is disapproved of in sustainable development endeavours[13]. Discrepan-cies between health and environmental measures have been reported earlier in case of indoor air quality. Here too elderly were victimized to a higher level[14].

To guarantee the best health for the greatest number of persons, we need a new way of thinking about legal guidelines to limit health risk. Not one hygienic limit should be set, but a list of different ones to be met depending on the risk situation. Homes for older people require different limits compared to schools for the youth on aspects as radon concentration, ventilation of indoor air or - in this study - *Legionella* presence in water. Susceptibility of actual (elderly) consumers (i.e. the persons at risk) should be reflected in the directives, containing actions with suitable technology (water temperature[15], local biocidal treatment[16]).

Such a gerontechnological innovation of guidelines to limit risk will diminish Legionellosis mortality and chronic disease. In addition, it might also lessen the gap between female and male longevity.

References

1. Statistics Netherlands (CBS). Statline – The Statistical Database on The Netherlands, as searched in June 2001. Available from: http://statline.cbs.nl/statweb/index_ENG.stm
2. Sopena N, Sabria-Leal M, Pedro-Botet ML, Padilla E, Dominguez J, Morera J, Tudela P. Comparative study of the clinical presentation of Legionella pneumonia and other community-acquired pneumonias. Chest 1998;113(5):1155-8
3. Peiris V, Prasad MKD, Bradley D, Zawistowicz W, Sivayoham S, Naqvi SNH, Hutchinson DN. Legionnaires' disease in elderly people: the first sign of an outbreak in the community? Age Ageing 1992;21:451-5
4. Nauciel C, Guilhin P, Matsiota-Bernard P, Ronco E. [Legionnaires' disease in the Paris area: epidemiology and mortality. Apropos of a series of 81 culture-positive cases]. Presse Med 1996;25(36):1786-8
5. Lin YE, Stout JE, Yu VL, Vidic RD. Disinfection of water distribution systems for Legionella. Semin Resp Inf 1998;13(2):147-59
6. Gezondheidsraad. Advies inzake preventie van legionellose uitgebracht door een commissie van de Gezondheidsraad, aan de Minister en de Staatssecretaris van Welzijn, Volksgezondheid en Cultuur, de Minister van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer. Report No 1986/6. 's-Gravenhage, Gezondheidsraad 1986 (June 25). 126 pp.
7. Pronk JP. Veteranenziekte. Brief van de Minister van Volkshuisvesting, Ruimtelijke ordening en Milieubeheer. Kamerstukken Tweede Kamer der Staten-Generaal 1999 (March 17);26442(2):1-10
8. Hoebe CJ, Cluitmans JJ, Wagenvoort JH, van Leeuwen WJ, Bilkert-Mooiman MA. [Cold tap water as a source of fatal nosocomial pneumonia due to Legionella pneumophila in a rehabilitation center; in Dutch]. Ned Tijdschr Geneeskd 1999;143(20):1041-5
9. [Cities: Legionella control too expensive and not effective; Legionella checking too slow; Duct testing on Legionella slow; in Dutch]. NRC Handelsblad 2001(May 2001, July 13, September 7);31
10. CEN Commission TC164 (Drinking Water). Specifications for installations inside buildings conveying water for human consumption. Part 2: Design. Pr EN806-2:1996
11. Pronk JP. Alternatieve technieken voor Legionella-preventie: kenmerken en beoordeling. Brief van de Minister van Volkshuisvesting, Ruimtelijke ordening en Milieubeheer. BWL/2000155355.

Directoraat-Generaal Milieubeheer 13-4-2001.
12. Pongratz A, Schwarzkopf A, Hahn H, Heesemann J, Karch H, Doll W. [The effect of the pipe material of the drinking water system on the frequency of Legionella in a hospital; in German]. Zentralbl Hyg Umweltmed 1994;195(5-6):483-8
13. Jansen PFC (ed). Duurzaam Bouwen. Nationaal pakket Woningbouw. Rotterdam, Stichting Bouwresearch, 1996. ISBN 90-5367-175-7
14. Snijders MCL. Indoor Air Quality and Physical Independence. An Innovative View on Healthy Dwellings for Individuals with Chronic Lung Disease (PhD Thesis). Eindhoven: Eindhoven University of Technology; September 5, 2001. ISBN 90-6814-122-8
15. Steinert M, Ockert G, Luck C, Hacker J. Regrowth of Legionella pneumophila in a heat-disinfected plumbing system. Zentralbl Bakteriol 1998;288(3):331-42
16. Kool JL, Carpenter JC, Fields BS. Effect of monochloramine disinfection of municipal drinking water on risk of nosocomial Legionnaires' disease. Lancet 1999;353(9149):272-7

European Commission support

Jan A.M. Graafmans MSc
International Society for Gerontechnology, Kempenlaan 5, 3020 Herent, Belgium
e-mail: j.a.m.graafmans@tue.nl

J.A.M Graafmans, European Commission support, Gerontechnology, 2001; 1(1): 68 - 70. The Directorates of the European Commission have a history of 20 years in programming research and technology development in so-called framework programs. Age-related programs addressed Technological Issues of relevance to the ageing population of Europe. At present the 'User-Friendly Information Society' and 'Quality of Life' are ongoing relevant programs. In the near future the 6th Framework may bring more focus on e-Accessibility.

Key words: cost, 6th framework, European Union

THE PAST

The European Union has a history of 20 years in programming research and technological development in the so-called framework programs.

Research and demonstration projects of a more applied nature were also funded through other Directorates, such as Employment, Social Affairs, and Industrial Relations, Transport, and Information Society. In the beginning Ageing and Technology did not appear on the research agenda, but could be found under Biomedical Technology and the Information and Communication Technology programs. As a consequence, the orientation was strongly focused on the medical field or on technology applications related to disabled persons. Ageing and the ageing population as separate issues emerged in the beginning of the 90s.

The action 'Ageing and Technology' (COST A5 1991-1996) started immediately after the 1st Conference on Gerontechnology in Eindhoven, under the auspices of European Cooperation in Science and Technology. The leading idea of COST A5 was that the population of Europe is rapidly ageing, but needs, preferences and capabilities of older people had not received sufficient attention[1]. This is true for resources in research and technological development, as well as for the potential for technological interventions to enhance physiological capability and health status throughout life.