

Addendum 3: Tables for chapter 2

Table 2-1 Air levels of mercury in relation to different technologies/locations in dentistry.

Author, year	Type of technology, flooring, suction, location, etc.	Mercury vapour, (mg/m <sup>3</sup> ), median-values	Occupation (No. of measurements)
(Ritchie and others 2004), Scotland 2001	Around the base of the chair;	0.0163 (0-0.236) <sup>b</sup>	(180)
	Below the area where the Hg is stored;	0.0212 (0-0.484) <sup>b</sup>	(180)
	Beside the mixing device;	0.0210 (0-0.289) <sup>b</sup>	(110)
	Capsule storage and preparation;	0.0103 (0-0.122) <sup>b</sup>	(43)
	Waste amalgam storage;	0.0083 (0-0.047) <sup>b</sup>	(163)
	Above the autoclave;	0.0087 (0-0.056) <sup>b</sup>	(66)
	Preparation area;	0.0080 (0-0.089) <sup>b</sup>	(179)
	Dosimeter worn close to the breathing zone;	0.0150 (0-0.452) <sup>b</sup>	(153)
Air	0.0057 (0.001-0.024) <sup>b</sup>	(112)	
(Pohl and Bergman 1995), Sweden	Cutting + filling, high-volume evacuator (HVE) + mirror-evacuator (ME) + saliva extractor (SE)	0.0015 <sup>a,b</sup>	Dentist's breathing zone (20)
	Cutting + filling, HVE + SE	0.0017 <sup>a,b</sup>	(20)
	Cutting + filling, SE	0.0066 <sup>a,b</sup>	(10)
	Polishing, HVE + ME + SE	0.001 <sup>a,b</sup>	(20)
	Polishing, HVE + SE	0.0011 <sup>a,b</sup>	(20)
	Polishing, ME + SE	0.0009 <sup>a,b</sup>	(20)
	Polishing, SE	0.0011 <sup>a,b</sup>	(20)
	Cutting, SE	0.168 (0.056-0.442) <sup>a,b</sup>	(11)
Condensing, SE	0.0022 (0.0004-0.0096) <sup>a,b</sup>	(15)	

(Powell and others 1994), USA	Dispersed-phase amalgam; insertion (15 min.) removal (15 min.) Spherical amalgam; insertion (15 min.) removal (15 min.) Dispersed-phase amalgam with indium; insertion (15 min.) removal (15 min.)	0.014 0.009 0.013 0.010 0.013 0.013	Dentist's breathing zone (5) (5) (5) (5) (5) (5)
(Chopp and Kaufman 1983), 1979-1981, USA	592 dental offices surveyed, handling mercury different. Capsules of premeasured amalgam; Bulk mercury; Mercury in bulk with open amalgamators; Closed system amalgamators; Open system amalgamators; Squeezed excess mercury from the amalgam; Did not squeeze excess mercury from the amalgam;	Concentrations of mercury vapour greater than the TLV (0.05 mg/m <sup>3</sup> ); 0.6% (1) 9% (39) 11% (40) 0% (0) 8% (42) 16% (26) 3.5% (15)	Breathing level in the operatory room (157) (435) (366) (69) (523) (165) (427)

(Lundgaard 1981), Denmark	Cleared working table: Windows closed Windows open Working table with remnants of amalgam: Windows closed Windows open By the Dentomat, not in use: Windows closed Windows open By the Dentomat, in use: Windows closed Windows open By the Dentomat, in use, but with loose cover: Windows closed Windows open	0.015-0.030 0.002-0.010  0.045->0.1 0.015->0.1  0.008-0.030 0.002-0.065  0.022-0.035 0.01-0.021  0.031-0.058 0.035->0.1	Dental assistants (4) (5)  (4) (5)  (4) (6)  (4) (4)  (4) (4)
(Norseth 1977), Norway 1973	Floor, working table, sink, dentist's breathing zone;	0.043 (0-0.400) <sup>a</sup>	Dental clinics (96)
(Buchwald 1972), USA 1968	Rubberdam; Rubberdam + suction; No rubberdam (air coolant); No rubberdam (water coolant);  Breathing zone of dentist before drilling; Breathing zone of dentist during removal of old amalgam; Near assistant, when old amalgam is being removed; At dentist position, 2-5 minutes after removal of old amalgam; Near assistant, 2-5 minutes after removal of old amalgam; Reception area; Operatory 1; Operatory 2; Storage room; Near triturator; During removal of old amalgam fillings; During condensation of new fillings;	2.67 (0.07-12.0) <sup>a,c</sup> 0.19 (0-0.68) <sup>a,c</sup> 1.5 (0-10.5) <sup>a,c</sup> 0.15 (0-1.10) <sup>a,c</sup>  0 0.65 <sup>a,d</sup> 0.08 <sup>a,d</sup> 0.02 <sup>a,d</sup> 0.03 <sup>a,d</sup> 0.020 (N.D.-0.036) 0.023 (N.D.-0.170) 0.029 (N.D.-0.090) 0.025 (0.005-0.080) 0.028 (0.005-0.053)  N.D.-0.400 (N.D.-2500) 0.032 (0.008-0.050)	Dentists (5) (4) (9) (4)  (1) (1) (1) (1) (1) (9) (23) (20) (11) (17)  (13) (12)

Frykholm 1969 (Frykholm 1969)	Preparation and insertion of fillings. Direct reading meter over 25 min. Normal amalgam, well ventilated room  Normal amalgam, surplus of mercury  Copper amalgam, small room	Patient 0.01-0.09 mg/m <sup>3</sup> Dentist 0.00 – 0.01 mg/m <sup>3</sup> Nurse 0.01 – 0.08 mg/m <sup>3</sup> Patient 0.01-0.11 mg/m <sup>3</sup> Dentist 0.00 – 0.03 mg/m <sup>3</sup> Nurse 0.01 – 0.09 mg/m <sup>3</sup> Patient 0.09-0.62 mg/m <sup>3</sup> Dentist 0.05 – 0.17 mg/m <sup>3</sup> Nurse 0.05 – 0.39 mg/m <sup>3</sup>	
(Frykholm 1970), Sweden	Treatment room;  Sterilization room; Laboratory;	0.01-0.02 (0.01-0.04) <sup>a</sup>  0.015 (0.01-0.03) <sup>a</sup> 0.02-0.14 (0.01-0.49) <sup>a</sup>	Dental clinic, no. of samples (14)  (6) (24)
(Joselow and others 1968c), USA	Operating rooms; Waiting rooms; Operating rooms;	0.020 (0.002-0.160) <sup>a,e</sup> 0.018 (0.002-0.100) <sup>a,e</sup> 0.045 (0.004-0.410) <sup>a,d</sup>	(50) (50) (50)

<sup>a</sup>mean-value

<sup>b</sup>μg/m<sup>3</sup> converted into mg/m<sup>3</sup>

<sup>c</sup>airborne particulate mercury

<sup>d</sup>total mercury (vapour and particulate)

<sup>e</sup>mercury vapour

N.D. None detected

Table 2-3 Urinary mercury levels in relation to different technologies in dentistry.

Author, year	Type of technology, flooring, suction etc.	U-Hg, median-values (nmol/L)	Occupation (No. of measurements)
(Jokstad 1990), Norway	Carpet;		
	Reception room	45 <sup>a</sup>	Dental personnel (182)
	Sterilizing room	42 <sup>a</sup>	(21)
	Operator room	43 <sup>a</sup>	(27)
	Tile;		
	Reception room	43 <sup>a</sup>	(30)
	Sterilizing room	42 <sup>a</sup>	(34)
	Operator room	42 <sup>a</sup>	(38)
	Linoleum;		
	Reception room	47 <sup>a</sup>	(598)
	Sterilizing room	49 <sup>a</sup>	(766)
	Operator room	49 <sup>a</sup>	(807)
	Wood;		
	Reception room	55 <sup>a</sup>	(11)
Sterilizing room	68 <sup>a</sup>	(13)	
Operator room	78 <sup>a</sup>	(13)	
Separator	58 <sup>a</sup>	(86)	
No separator	42 <sup>a</sup>	(805)	
(Herber and others 1988), The Netherlands	Hg-U as a function of condensation method;		
	Hand	35.11 <sup>a,c</sup>	Dentists (107)
	Vibrator	13.69 <sup>a,c</sup>	(7)
	Pneumatic	41.06 <sup>a,c</sup>	(27)
	Cavitron	33.92 <sup>a,c</sup>	(4)
	Electro-mallet	36.30 <sup>a,c</sup>	(14)
	Hg-U as a function of number of amalgam fillings per year;		
	100-999	27.37 <sup>a,c</sup>	Dentists (15)
	1000-2499	36.30 <sup>a,c</sup>	(44)
	2500-3999	39.27 <sup>a,c</sup>	(22)
4000-9000	48.20 <sup>a,c</sup>	(22)	

(Battistone and others 1973), USA

Clinic A;  
A large room with 3.5-foot high dividers that separate each of 12 dental units. The busiest clinic and smallest clinic.  
Clinic B;  
A large room with 14 dental units and 1.5 times more cubic feet per dental unit than Clinic A. The only clinic not used more than 50%.  
Clinic C;  
Rows of adjoining operatories, a central corridor, and rooms opposite the operatories for supply, administration, etc.  
Clinic D;  
Like Clinic C, but larger in cubic feet per dental unit.  
Clinic E;  
Openings between pairs of operatories, so that each pair could be considered one room. Less cubic feet per dental unit than in Clinic C.  
Clinic F;  
3 separated locations with max. 3 dental units in separate rooms at each location. Has the most cubic feet of space per dental unit.

280<sup>a,b</sup>

180<sup>a,b</sup>

110<sup>a,b</sup>

105<sup>a,b</sup>

130<sup>a,b</sup>

65<sup>a,b</sup>

Dental personnel  
(20)

(10)

(10)

(10)

(11)

(9)

<sup>a</sup>mean-value

<sup>b</sup>μg/L converted into nmol/L

<sup>c</sup>μg/g creatinine converted into nmol/L

Table 2-4 Urinary mercury levels in relation to occupation in dentistry.

Author, year	No. of measurements	U-Hg, median-values (nmol/L)	Occupation
(Karahalil and others 2005), Turkey 2004	(14) (6)	23.5 (8.25-44.05) <sup>b</sup> 35.7 (26-80.5) <sup>b</sup>	Dentists< 10 yr. of work experience Dentists> 10 yr. of work experience
(Ritchie and others 2004), Scotland 2001	(162)	17.85 (0.21-219.45) <sup>d</sup>	Dentists
(Martin and others 1995), USA 1991	(1208) (1115) (93) (unknown) (unknown)	24.7 (SD33.05) <sup>a,b</sup> 25.45 (SD34.1) <sup>a,b</sup> 15.8 (SD11) <sup>a,b</sup> 24.15 (SD32.8) <sup>a,b</sup> 39.7 (SD70.2) <sup>a,b</sup>	Dentists, all General dentists Specialists Dentists, < 5 years of practice Dentists, > 40 years of practice
(Steinberg and others 1995), Israel	(25)	14.22 <sup>+/-</sup> 1.90SD <sup>a,c</sup>	Dental personnel
(Akesson and others 1991), Sweden	(244) (83) (153) (8)	18.9 (4.2-135.45) <sup>a,c</sup> 15.75 <sup>a,c</sup> 22.05 <sup>a,c</sup> 17.85 <sup>a,c</sup>	Dental personnel Dentists Nurses Dental hygienists
(Jokstad 1990), Norway 1986-1990	(672) (273) (6) (29) (34) (864) (18)	39 <sup>a</sup> (SD=29) 43 <sup>a</sup> (SD=36) 10 <sup>a</sup> 22 <sup>a</sup> 34 <sup>a</sup> 44 <sup>a</sup> 69 <sup>a</sup>	Mostly dentists Mostly dentists Students Specialists Dental hygienists Dentists Dental assistants

Author, year	No. of measurements	U-Hg, median-values (nmol/L)	Occupation
(Skare and others 1990), Sweden	(154) (90) (64) (160) (86) (74)	16 (1.5-80) <sup>a,b</sup> 19 (3-80) <sup>a,b</sup> 11.5 (1.5-30) <sup>a,b</sup> 18 (1.5-75) <sup>a,b</sup> 20.5 (1.5-75) <sup>a,b</sup> 15 (3.5-60) <sup>a,b</sup>	Dentists, all Dentists, private practice Dentists, public clinic Nurses, all Nurses, private practice Nurses, public clinic
(Nilsson and others 1990), Sweden	(127) (53) (149) (92)	15.8 (<2.1-64.2) <sup>d</sup> 16.8 (<2.1-48.4) <sup>d</sup> 20.0 (<2.1-212.6) <sup>d</sup> 30.5 (<2.1-170.5) <sup>d</sup>	Dentists, male Dentists, female Dental nurses, public dental care Dental nurses, private dental care
(Herber and others 1988), The Netherlands	(152) (160)	62 (35.5-111.5) <sup>b,f</sup> 52 (25.5-106.5) <sup>b,f</sup>	Dentists Dental assistants
(Kelman 1978), UK	(28) (34)  (21) (28)	76.9 (25-115) <sup>a</sup> 97.5 (25-455) <sup>a</sup>  110.7 (25-500) <sup>a</sup> 191.3 (25-940) <sup>a</sup>	Dentists, Area Health Authority Dental surgery assistants, Area Health Authority Dentists, National Health Service Dental surgery assistants, National Health Service
(Norseth 1977), Norway 1973	(22) (33)	80 <sup>a,b</sup> 140 <sup>a,b</sup>	Dentists Dental assistants
(Brooks and Allingham 1974), New Zealand	(26) (26)	87.5 (20.0-316) <sup>b</sup> 130 (0-1090) <sup>b</sup>	Dentists Chairside assistants



Author, year	No. of measurements	U-Hg, median-values (nmol/L)	Occupation
(Schneider 1974), USA	(75)	123.5 (10-550) <sup>a,b</sup>	Dentists handling mercury
	(25)	96.5 (10-300) <sup>a,b</sup>	Dentists not handling mercury
	(74)	188 (10-1500) <sup>a,b</sup>	Dental assistants handling mercury
	(33)	84 (10-460) <sup>a,b</sup>	Dental assistants not handling mercury
	(95)	91.5 (10-1120) <sup>a,b</sup>	Nonoperatory personnel
(Battistone and others 1973), USA	(38)	164 <sup>a,b</sup>	Dentists
	(32)	164.5 <sup>a,b</sup>	Dental assistants
(Frykholm 1970), Sweden	(10)	25 <sup>a,g</sup>	Dentists
	(10)	45 <sup>a,g</sup>	Dental nurses
	(10)	75 <sup>a,g</sup>	Dental technicians
(Joselow and others 1968b), USA	(50)	200 (0-775) <sup>a,b</sup>	Dentists

<sup>a</sup>mean-value

<sup>b</sup>μg Hg/L converted into nmol Hg/L

<sup>c</sup>μmol/mol creatinine converted into nmol Hg/L

<sup>d</sup>nmol Hg/mmol creatinine converted into nmol Hg/L

<sup>e</sup>μg Hg/g creatinine converted into nmol Hg/L

<sup>f</sup>Geometric means

<sup>g</sup>mg Hg/L converted into nmol Hg/L

Table 2-5 Blood mercury levels in relation to different technologies in dentistry

Author, year	Type of technology, flooring, suction etc.	B-Hg, median-values (nmol/L)	Occupation (No. of measurements)
(Moller-Madsen and others 1988), Denmark	Amalgam restorations/week:		
	< 30	18.5 (6-58) <sup>a</sup>	Dentists (130)
	> 30	21 (6-96) <sup>a</sup>	(130)
	Days since last filling:		
	< 3	20 (6-96) <sup>a</sup>	(130)
	> 3	18.5 (6-31) <sup>a</sup>	(130)
	Method of trituration:		
	Dentomat	19.5 (6-62) <sup>a</sup>	
	Capsule system	24 (8-96) <sup>a</sup>	

<sup>a</sup>µg/L converted into nmol/L

Author, year	No. of measurements	B-Hg, median-values (nmol/L)	Occupation
(Atesagaoglu and others 2006), Turkey	(10)	178.5 <sup>+/-</sup> 47.5SD <sup>a,c</sup>	Dentists
(Akesson and others 1991), Sweden	(244)	16.9 (5.8-69.0) <sup>a</sup>	Dental personnel
	(83)	17.4 <sup>a</sup>	Dentists
	(153)	16.9 <sup>a</sup>	Nurses
	(8)	18.0 <sup>a</sup>	Dental hygienists
(Moller-Madsen and others 1988), Denmark 1986	(130)	20.0 (7.5-96) <sup>b</sup>	Dentists
	(101)	20.5 (6-62) <sup>b</sup>	Dentists, private practice
	(20)	15 (6-96) <sup>b</sup>	Dentists, school dentist
(Chang and others 1987), USA 1985	(205)	30.5 <sup>+/-</sup> 1.5SEM <sup>a,e</sup>	Total Hg in Dentists
	(205)	10.5 <sup>+/-</sup> 0.5SEM <sup>a,e</sup>	Inorganic Hg in Dentists
(Norseth 1977), Norway 1973	(48)	35 (5-105) <sup>a,d</sup>	Dental personnel

<sup>a</sup>mean-value

<sup>b</sup>μg/L converted into nmol/L

<sup>c</sup>μg/dl converted into nmol/L

<sup>d</sup>ng/g converted into nmol/L

<sup>e</sup>ng/ml converted into nmol/L

Table 2-6 Mercury levels in blood in relation to occupation in dentistry.

Author, year	No. of measurements	B-Hg, median-values (nmol/L)	Occupation
(Atesagaoglu and others 2006), Turkey	(10)	178.5 <sup>+/-</sup> 47.5SD <sup>a,c</sup>	Dentists
(Akesson and others 1991), Sweden	(244)	16.9 (5.8-69.0) <sup>a</sup>	Dental personnel
	(83)	17.4 <sup>a</sup>	Dentists
	(153)	16.9 <sup>a</sup>	Nurses
	(8)	18.0 <sup>a</sup>	Dental hygienists
(Moller-Madsen and others 1988), Denmark 1986	(130)	20.0 (7.5-96) <sup>b</sup>	Dentists
	(101)	20.5 (6-62) <sup>b</sup>	Dentists, private practice
	(20)	15 (6-96) <sup>b</sup>	Dentists, school dentist
(Chang and others 1987), USA 1985	(205)	30.5 <sup>+/-</sup> 21. <sup>a,e</sup>	Total Hg in Dentists
	(205)	10.5 <sup>+/-</sup> 7.2 <sup>e</sup>	Inorganic Hg in Dentists
(Norseth 1977), Norway 1973	(48)	35 (5-105) <sup>a,d</sup>	Dental personnel

<sup>a</sup>mean-value

<sup>b</sup>μg/L converted into nmol/L

<sup>c</sup>μg/dl converted into nmol/L

<sup>d</sup>ng/g converted into nmol/L

<sup>e</sup>ng/ml converted into nmol/L

**Kommentar [jeb1]:** Sikorski skal med her.

Table 2-7 Mercury levels in head/pubic hair in relation to occupation, different technologies, etc. in dentistry.

Author, year	Occupation, type of technology, flooring, suction, etc.	Head/pubic hair, median-values (µg/g)	No. of measurements
(Zolfaghari and others 2007), Iran	Dentists	2.84 (0.09-25.43) <sup>a,c</sup> (head)	(100)
	Dental nurses	0.92 (0.12-4.56) <sup>a,c</sup>	(25)
	Dentists <45 years of age	2.25 (0.09-25.43) <sup>a,c</sup>	(64)
	Dentists >45 years of age	3.89 (0.20-16.63) <sup>a,c</sup>	(36)
	Dentists, <8 patients/day	1.46 (0.14-16.63) <sup>a,c</sup>	(42)
	Dentists, >8 patients/day	3.84 (0.09-25.43) <sup>a,c</sup>	(58)
	Dentists, always use of masks	2.24 (0.09-25.43) <sup>a,c</sup>	(72)
	Dentists, sometimes use of masks	4.38 (0.20-16.63) <sup>a,c</sup>	(28)
	Dentists, always use of gloves	2.34 (0.09-25.43) <sup>a,c</sup>	(68)
	Dentists, sometimes use of gloves	3.90 (0.15-16.63) <sup>a,c</sup>	(32)
	Dentists	0.80 (0.10-5.67) (head)	(161)
(Ritchie and others 2004), Scotland 2001		0.69 (0.09-11.71) (pubic)	(167)
(Harakeh and others 2003), Lebanon	Dentists, total population	4.11 (3.61SD) <sup>a</sup> (head)	(99)
	Dentists 0-10 yr. of practice	3.5 (2.3SD) (0-10.3) <sup>a</sup>	(27)
	Dentists 10-20 yr. of practice	4.0 (3.3SD) (0.39-19.4) <sup>a</sup>	(50)
	Dentists >20 yr. of practice	5.3 (5.3SD) (0.85-24.2) <sup>a</sup>	(21)
(Herber and others 1988), The Netherlands	Dentists	1.88 (0.59-5.94) <sup>b</sup> (head)	(143)
	Dental assistants	1.27 (0.47-3.42) <sup>b</sup> (head)	(133)
	Dentists;		(143)
	No ventilation	3.6 (hair)	
	Window	1.2	
	Window fan	0.69	
	Air conditioning	0.64	
	Dental assistants;		(133)
	No ventilation	0.90 (hair)	
	Window	0.86	
	Window fan	0.61	
	Air conditioning	0.87	
(Brooks and Allingham 1974), New Zealand	Dentists	2.6 (0.5-16.6) (head)	(24)
	Chairside assistants	4.5 (1.0-11.6)	(27)

<sup>a</sup>mean-value

<sup>b</sup>Geometric means

<sup>c</sup>mg/kg converted into µg/g

Table 2-8 Mercury levels in fingernails/toenails in relation to occupation, type of technology, etc. in dentistry.

Author, year	Occupation, type of technology, flooring, suction, etc.	Fingernail/toenail, median-values (µg/g)	No. of measurements
(Zolfaghari and others 2007), Iran	Dentists;	3.56 (0.10-27.27) <sup>a,b</sup> (finger)	(100)
	Dental nurses;	1.77 (0.01-8.68) <sup>a,b</sup>	(25)
	Dentists <45 years of age;	2.58 (0.10-23.42) <sup>a,b</sup>	(64)
	Dentists >45 years of age;	5.30 (0.14-27.27) <sup>a,b</sup>	(36)
	Dentists, <8 patients/day;	3.63 (0.10-27.27) <sup>a,b</sup>	(42)
	Dentists, >8 patients/day;	3.71 (0.10-16.32) <sup>a,b</sup>	(58)
	Dentists, always use of masks;	2.90 (0.10-23.42) <sup>a,b</sup>	(72)
	Dentists, sometimes use of masks;	5.26 (0.14-27.27) <sup>a,b</sup>	(28)
	Dentists, always use of gloves;	2.98 (0.10-23.42) <sup>a,b</sup>	(68)
Dentists, sometimes use of gloves;	4.78 (0.14-27.27) <sup>a,b</sup>	(32)	
(Ritchie and others 2004), Scotland 2001 (Joshi and others 2003), USA 1991	Dentists	1.05 (0.12-239.6) (finger)	(164)
	Dentists	0.38 (0.02-14.74) (toe)	(163)
	General dentists	0.62 (0.22 , 1.93) <sup>c</sup> (toe)	(169)
	Dental specialists	0.37 (0.09 , 1.32) <sup>c</sup> (toe)	(45)
	Amalgam preparation method;		
	Premixed disposable capsules in amalgamators	0.67 <sup>d</sup> (toe)	(63)
	Reusable capsules or cylinders in amalgamators	0.61 <sup>d</sup>	(94)
	Hand-mixed with mortar and pestle	0.36 <sup>d</sup>	(4)
	Other	0.11 <sup>d</sup>	(5)
	Number of amalgams placed per week;		
	0-4	0.76 <sup>d</sup>	(7)
	5-24	0.73 <sup>d</sup>	(33)
	25-49	0.52 <sup>d</sup>	(60)
	50-74	0.67 <sup>d</sup>	(33)
	75-100	0.61 <sup>d</sup>	(16)
	100+	1.64 <sup>d</sup>	(7)
	Number of amalgams removed per week;		
	0		
	1-4	0.35 <sup>d</sup>	(5)
5-9	0.73 <sup>d</sup>	(27)	
10-19	0.70 <sup>d</sup>	(36)	
20-29	0.81 <sup>d</sup>	(44)	
30 or more	0.48 <sup>d</sup>	(27)	
	0.44 <sup>d</sup>	(16)	

<sup>a</sup>mean-value

<sup>b</sup>mg/kg converted into µg/g

<sup>c</sup>(10th, 90th Percentile)