



University of HUDDERSFIELD

University of Huddersfield Repository

Dunn, Lynda and Brown, Steven

Diathermy smoke: a risk to perioperative practitioners?

Original Citation

Dunn, Lynda and Brown, Steven (2014) Diathermy smoke: a risk to perioperative practitioners? *Journal of Operating Department Practitioners*, 2 (7). pp. 320-322. ISSN 1746-7357

This version is available at <http://eprints.hud.ac.uk/id/eprint/22874/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>

Diathermy smoke: risk to perioperative practitioners?

Lynda Dunn Lecturer Practitioner, ODP, University of Huddersfield

Steven Brown Course Leader ODP University of Huddersfield

The use of diathermy as a cautery device is common practice in perioperative environment, however issues relating to the Health and Safety of the smoke produced through the vaporisation of tissue may still not be recognised by practitioners. This is despite the use of diathermy dating back to the late 19th century (Pollack et al 2000).

Concerns have been expressed about the components of diathermy smoke HSE (2012), which contains 95% water and 5% cellular debris (Ulmer 2008), including a magnitude of different chemicals, some of which may have mutagenic and carcinogenic potential similar to that of cigarette smoke (Ortolano et al 2009).

Brown and Dunn (2013) identified 45 different compounds being present in diathermy smoke. All of these compounds were cross referenced against the COSHH list of approved workplace exposure limits as defined by the HSE (2007) of which 9 were identified as being hazardous to health, four of which are carcinogens, none of the compounds found exceeded the PEL's outlined by the HSE (2007).

Andreasson et al (2009) found that the size of particles found in diathermy smoke was small enough to reach alveoli in the lungs and move into the cardiovascular system, and can cause inflammatory changes in the respiratory tract, nausea, carcinoma, dermatitis and cardiovascular dysfunction. He also discovered that surgical facemasks do not adequately filter particles and as such are not a suitable barrier and advise the use of an extractor. The HSE (2012) found that the quality of air was improved when using an extractor device.

Pillinger et al (2003) identify two different methods for extracting diathermy plume. The first method involves simply holding a suction device near to the diathermy pencil tip, which is reliant on the experience of the assistant and uses up one of their hands. The preferred method was the use of an integrated diathermy pencil and smoke extraction system, which operates the same as a normal diathermy pencil

and would require little change to operating technique. Spearman et al (2007) found negative attitudes towards such devices amongst surgeons who said that they were too expensive and cumbersome to use.

The regulatory agencies that govern Health and Safety policy such as the OSHA in the United States and COSHH in the United Kingdom are unable produce policy on the evacuation of diathermy smoke until a study is undertaken that can conclusively determine the realistic long and short term health risks.

Al Sahaf et al (2007) advised that staff exposed to surgical smoke should be made aware of the risks. Various nursing organisations provide guidance on the evacuation of diathermy smoke, The International Federation of Perioperative Nurses (IFPN) and the AORN both provide guidelines on the evacuation of diathermy smoke (IFPN 2011), in addition the AORN have devised a smoke evacuation tool kit as guidance for creating hospital policy (AORN 2011). This being the case NICE, who provide national guidance to the NHS when formulating policy, have not as yet provided any guidelines regarding diathermy smoke.

There is no doubt that diathermy smoke contains compounds that are hazardous to health but it is difficult to conclude to what extent individuals are affected by these compounds. However Al Sahaf et al (2007) state that the only ethically acceptable solution would be to inform those who are exposed to diathermy smoke on a daily basis of this potential hazard and to make them aware of the alternatives.

References

Al Sahaf O S, Vega-Carrascal I, Cunningham F O, McGrath J P and Bloomfield F J (2007) ***Chemical composition of smoke produced by high-frequency electrosurgery*** Irish Journal of Medical Science volume 176 pages 229-232

Andreasson S N, Anundi H, Sahlberg B, Ericsson C-G, Walinder R, Enlund G, Pahlman L and Mahteme H (2009) ***Peritonectomy with high voltage electrocautery generates higher levels of ultrafine smoke particles*** European Journal of Surgical Oncology Volume 35 pages 780-784

AORN (2011) Smoke evacuation tool kit

<http://www.aorn.org/PracticeResources/ToolKits/SurgicalSmokeEvacuationToolKit/>

accessed on 2nd May 2011

Brown S, Dunn L (2013) Diathermy Smoke: hazardous to health? Journal of Operating Department Practitioners. 1. 2. Pages 60-64

Health and Safety Executive (2007) List of approved workplace exposure limits <http://www.hse.gov.uk/coshh/table1.pdf> accessed on 19th April 2011

Health and Safety executive (2012) List of symbols, abbreviations, risk and safety phrases <http://www.hse.gov.uk/chip/phrases.htm> accessed 19th April 2011

International Federation of Perioperative Nurses (2011) Guideline for smoke plume http://ifpn.org.uk/guidelines/1012_Smoke_Plume.phtml accessed 2nd May 2011

Pillinger S H, Delbridge L and Lewis D R (2003) **Randomised clinical trial of suction versus standard clearance of the diathermy plume** British Journal of Surgery volume 90 pages 1068-1071.

Ortolano G A, Cervia J S, Canonica F P (2009) **“Surgical Smoke, a concern for infection control practitioners”** managing infection control pages 48-54

Pollack S V, Carruthers A and Grekin R C (2000) **The History of Electrosurgery** Dermatological surgery volume 26, issue 10, pages 904 - 908

Spearman J, Tsavellas G and Nichols P (2007) **Current Attitudes and Practices towards diathermy smoke.** Annals of the Royal College of Surgeons of England volume 89, issue 2, pages 162-165

Propene				✓			✓	
propylbenzene				✓				
propylene	✓							
Styrene						✓	✓	
Tetradecane				✓				
Tetradecene				✓				
Toluene		✓				✓	✓	
Tridecane				✓				
Undecane				✓				
Undecene				✓				
Xylene				✓		✓	✓	

Chemical compound	PEL mg.m3	PEL ppm	Chung et al (2010)	Lin et al (2010)	Al Sahaf et al (2007)	Hassan et al (2006)	Weston et al (2009)	Moot et al (2007)	Surgery type
			mg.m3	mg.m3	mg.m3	mg.m3	mg.m3	ppm	
Acrylonitrile	4.4	2	0.03				ND		TURP
Benzene	3.25	1				0.39	0.012	0.02	abdominal, TUR
1-3 Butadiene	22	10	8.65					0.339	TURP and abdominal
Cyclohexanone	41	10			0.02				abdominal, verruca pilonidal sinus
Ethyl benzene	441	100			0.003	0.1	ND		abdominal, verruca pilonidal sinus
Formaldehyde	2.5	2					ND	ND	
Hydrogen cyanide	8	5						16.3	abdominal
Toluene	430	100		4.6		ND	0.015		breast, abdominal and TURP
Styrene	191	50				0.61	0.005		abdominal and TURP

