

Cannabis flos by vaporization

This paper discusses the topic of administering cannabis flos¹ by vaporization and inhalation into the lungs. It explores several aspects of vaporization, highlighting the importance of using medical grade administration devices in combination with standardised, pharmaceutical quality cannabis flos. It then describes the health benefits of vaporization, and potential policy implications.

Not all vaporizers are the same

Many of us have heard of vaporizers, and instantly we think of ‘e-cigarettes’ or ‘vape-pens’. However, these are not the only types of vaporizer available. Vaporizers (as medical devices) for the administration of cannabis flos¹ are in fact quite different from ‘vape-pens’ or ‘e-cigarettes’. The vapour does not contain nicotine, or carries agents such as liquid propylene glycol, glycerol, or synthetic flavours.^{i ii} The large, socially intrusive vapour clouds of ‘e-cigarettes’ do not apply for the medicinal use of cannabis flos by vaporization.

Vaporizer medical devices offer patients an effective, safe, and easy to use delivery system for cannabis flos.^{iii iv} The inhaled vapour contains THC, CBD, and terpenes²

in consistent, measurable quantities. This is something not otherwise possible via oral administration. Importantly, the use of a vaporizer medical-device avoids the respiratory disadvantages of smoking, by virtually eliminating exposure to toxic compounds linked with cannabis smoke.^v



Fully standardised, pharmaceutical-quality cannabis flos provides an optimal medicinal product for vaporization and inhalation into the lungs.



The vapour of cannabis flos contains therapeutic levels of cannabinoids and terpenes. Harmful compounds are virtually absent, making it suitable for use by immune-compromised patients.



The vapour content is rapidly absorbed by the lungs, improving the ability to adjust dose and therefore minimize side effects. There are no pyrolytic compounds that constitute a risk for second-hand exposure.

Pharmaceutical quality cannabis flos

For vaporization to be truly effective, the cannabis product used with it must be of pharmaceutical quality. Fully standardised cannabis flos assures dosage composition, repeatability and the ability for patient and prescriber to effectively adjust dose by titration. A critical factor for Australia to build the evidence-base of medicinal cannabis, it is essential to be able to compare findings from different clinical trials and studies across time. That means the exact quality and dose of the cannabis, used for different conditions, should be known.

¹ Pharmaceutical-quality cannabis flos is the whole, dried flowers of the cannabis plant which is genetically and chemically standardised according to pharmaceutical standards with a defined cannabinoid and terpene composition. Also, it is free of contaminants such as microbial contaminants (molds, fungi, and bacteria) pesticides (residues), aflatoxins, impurities and heavy metals.

² Terpenes are a major component of Cannabis sativa. Responsible for the plant's aroma, terpenes may also act synergistically with the cannabinoids.^x

Finally, pharmaceutical quality cannabis flos is required from a public and patient safety perspective. Cannabis flos must be free of contaminants such as microbes, pesticides and heavy metals, qualities that make the vapour safe for inhalation into the lungs.

An efficient administration route

The most efficient administration route of medicinal cannabis is by inhalation. Indeed, administration by inhalation is a rapid way to induce measurable serum levels of cannabinoids.^{vi}

A vaporizing medical device, compared to smoking, dramatically lowers concentrations of toxic compounds such as carbon monoxide, ammonia and polyaromatic carbohydrates (PACs). Compared to smoking, higher therapeutic levels of THC and consistent, reproducible THC extraction and delivery is possible.^{vii viii}

The vapour is quickly absorbed by the lungs, permitting patients to effectively titrate to optimise their dose based upon symptom severity, tolerability and avoidance of side-effects. The rapid onset of effects of inhaled cannabinoid use allows easier titration of dose, while standardised cannabis products enable patients to administer an exact dose.^{vi}

In practice, with prescriber guidance, patients initially focus on finding a dose range that works for their specific condition. On average, patients in the Dutch medicinal cannabis program use only 0.7 grams of cannabis flos per day, divided over multiple doses.^{ix}

Smoking cannabis in the form of cigarettes (joints) is still the most common way of consumption today, for medical as well as recreational users internationally. The advantage of vaporizing over smoking is obvious with regard to irritation and respiratory complication resulting from smoking. The presence of non-THC constituents, including anti-inflammatory terpenes that protect the lungs from irritation, are present in the cannabis flos vapour.^x This makes vaporizing the obvious and healthier choice for administration of the full range of therapeutic compounds present in the cannabis plant.

“The most efficient administration route of cannabis is inhalation ...the use of a vaporizer medical device avoids the respiratory disadvantages of smoking.”

Patient perspectives and providing options

The importance of vaporization is underlined in patient use surveys. The majority of survey respondents report higher satisfaction (approval) scores with the inhalation route. In general, whole plant, herbal cannabis-based medicines received higher scores than other products containing isolated cannabinoids.^{xi xii}

While smoking may be a popular administration method internationally, it is evident patients are looking for alternatives to smoking. Patients seek a reliable, affordable and portable vaporizer for administering cannabis flos. Presently there is research dedicated to advancing administration technology. Some examples of major developments in vaporizer medical devices, using standardised cannabis flos, include the Volcano® Medic vaporizer ([Storz & Bickel](#))^{xiii xiv xv}, the Syqe® Inhaler ([Syqe Medical](#)),^{xvi} and the Bedrovape® vaporizer. All devices have relied on Bedrocan standardised cannabis flos for their quality testing and clinical trials.

Vaporizer medical devices, delivering standardised doses, underline quality assurance, safety, and efficacy. With these administration technical advancements, smoking of cannabis flos can soon be a

thing of the past. Backed by proper scientific studies, medicinal cannabis flos will become an acceptable therapeutic among patients, prescribers, and regulatory authorities.

Future research and recommendations

Medical Education

Medicinal cannabis is a new type of herbal medicine containing several active components. Prescribers, pharmacy and patients need sufficient support in introducing cannabis to its proper place in modern medicine practice. There is a need for prescribing guidance and education, good pharmacy dispensing practices, and effective, patient friendly and affordable modes of administration (such as vaporizers).



The infographic is titled "Vaporization" and features a central icon of a vaporizer. Below the title, there are five key points, each with an icon and a text box:

- Administration**: Absorption via the lungs may reduce total daily intake. (Icon: Lungs)
- Dose type**: Cannabis flos is used in granulated (ground up) form. A vapour of therapeutic cannabinoids and terpenes is inhaled. (Icon: Jar with plant)
- Onset**: First effects can be noticed within minutes. (Icon: Clock)
- Duration**: Typically between 2 - 4 hours. (Icon: Clock with arrow)
- Safety**: Harmful compounds are virtually absent. (Icon: Checkmark)

Second hand exposure

The content of exhaled cannabis vapour contains no pyrolytic compounds for second-hand exposure. However, it is not exactly known how exhaled vapour is dispersed in the air, and whether there may be significant levels of cannabinoids present in the exhaled vapour. No vapour cloud dispersion studies have yet been conducted. As a result, it is undetermined if passive intake of cannabinoids would present an occupational hazard to health professionals and other carers. While the levels are not likely critical to health and safety, this is an important future research to be undertaken.

Policy and legislation

With regard to administration, policy must be clear and obvious. For example, in the Netherlands and Germany, smoking cannabis flos is actively discouraged and forbidden, respectively. The clinical guidelines state cannabis flos for inhalation should be administered by vaporization.

Furthermore, as for any controlled drug, suitable policy and guidance needs to support minimising diversion and misuse.

The availability and use of 'e-cigarettes' and 'vape-pens' has significantly increased over recent years. Australian laws controlling these products vary between jurisdictions. Broadly, it is illegal to sell 'e-cigarettes' that contain nicotine, and to use them without prescription. ^{xvii xviii xix} It is important to consider if future adaptations this legislation might impact on the legitimate use of vaporizers for administering medicinal cannabis. In Queensland for example, currently, a personal vaporiser is defined as a smoking product. The implications for therapeutic option and the health and wellbeing of patients are potentially intertwined with these considerations. While there are similarities between the administration methods,

similarly restricting vaporizer medical devices would impact on their use in hospitals and hospices, rest-homes, and general social areas including in the home. It should be considered that currently none of the ‘e-cigarettes’ or ‘vape-pens’ for inhalation of cannabinoids have been subjected to any scientific or clinical testing.

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References

- ⁱ Douglas, H., Hall, W., Gartner, C. (2015). E-cigarettes and the law in Australia. *Australian Family Physician*. 44 (6): 415-418. See: <http://bit.ly/2cFqbYi>
- ⁱⁱ Jensen, P., Luo, W., Pankow, J., Strongin, R., Peyton, D. Hidden formaldehyde in e-cigarette aerosols. *New England Journal of Medicine*. 372 (4): 392-393.
- ⁱⁱⁱ Eisenberg, E., Ogintz, M., Almog, S. (2014). The pharmacokinetics, efficacy, safety, and ease of use of a novel portable metered-dose cannabis inhaler in patients with chronic neuropathic pain: A Phase 1a study. *Journal of Pain & Palliative Care Pharmacotherapy*. 28:216–225.
- ^{iv} Hazekamp, A., Ruhaak, R., Zuurman, L., van Gerven, J., Verpoorte, R. (2006). Evaluation of a vaporizing device (Volcano) for the pulmonary administration of tetrahydrocannabinol. *Journal of Pharmaceutical Sciences*. 95(6):1308-17. Available from: <http://bit.ly/1W48YuC>
- ^v Pomaahcova, B., Van der Kooy, F., Verpoorte, R. (2009). Cannabis smoke condensate III: the cannabinoid content of vaporised *Cannabis sativa*. *Inhalation Toxicology*. 21(13): 1108-12. See: <http://bit.ly/1SW03be>
- ^{vi} Grotenhermen, F. (2003). Pharmacokinetics and pharmacodynamics of cannabinoids. *Clinical Pharmacokinetics*. 42: 327-360. Also, Grotenhermen, F. (2004). Clinical pharmacodynamics of cannabinoids. *Journal of Cannabis Therapeutics*. 4(1): 29-78. See: <http://bit.ly/2eJKXYJ>.
- ^{vii} Abrams, D., Vizoso, H., Shade, S., et al. (2007) Vaporization as a smokeless cannabis delivery system: a pilot study. *Clinical Pharmacology and Therapeutics*. 82 (5): 572 - 8.
- ^{viii} Gieringer, D., Laurent, J., Goodrich. (2004). Cannabis Vaporizer Combines Efficient Delivery of THC with Effective Suppression of Pyrolytic Compounds. *Journal of Cannabis Therapeutics*. 4(1)
- ^{ix} Hazekamp and Heerdink (2013). The prevalence and incidence of medicinal cannabis on prescription in The Netherlands. *The European Journal of Clinical Pharmacology*. See: <http://bit.ly/1TulxeC>
- ^x Russo, E. (2011). Taming THC: potential cannabis synergy and phytocannabinoid-terpenoid entourage effects. *British Journal of Pharmacology*. 163: 1344–1364.
- ^{xi} Hazekamp, A., Ware, M., Muller-Vahl, K., Abrams, D., Grotenhermen, F. (2013). The medicinal use of cannabis and cannabinoids: An international cross-sectional survey on administration forms. *Journal of Psychoactive Drugs*. 45 (3), 199–210. See: <http://bit.ly/1rZnYhz>
- ^{xii} de Hoop, B., Hazekamp, A., Kopsky, D., Wijnkoop, L. (2016). Experiences and motives of medicinal cannabis patients: A cross-sectional questionnaire. Radboud Universiteit Nijmegen, the Netherlands. (Unpublished work)
- ^{xiii} The Volcano® Medic vaporizer medical device is listed on the [Medical Devices Active Licences Listing](#) (Health Canada), licence No.: 82405.
- ^{xiv} Hazekamp, A., Ruhaak, R., Zuurman, L., van Gerven, J., Verpoorte, R. (2006). Evaluation of a vaporizing device (Volcano) for the pulmonary administration of tetrahydrocannabinol. *Journal of Pharmaceutical Sciences*. 95(6):1308-17. Available from: <http://bit.ly/1W48YuC>
- ^{xv} Pomahacova, B., Van der Kooy, F., Verpoorte, R. (2009). Cannabis smoke condensate III: the cannabinoid content of vaporised *Cannabis sativa*. *Inhalation Toxicology*. 21(13):1108-12. See: <http://bit.ly/1SW03be>
- ^{xvi} Eisenberg, E., Ogintz, M., Almog, S. (2014). The pharmacokinetics, efficacy, safety, and ease of use of a novel portable metered-dose cannabis inhaler in patients with chronic neuropathic pain: A Phase 1a study. *Journal of Pain & Palliative Care Pharmacotherapy*. 28:216–225.
- ^{xvii} TGA (30 March 2015). Electronic cigarettes. See: <http://bit.ly/29IR7cS>
- ^{xviii} Quit Victoria (June 2016). Legal status of electronic cigarettes in Australia: Information sheet. See: <http://bit.ly/1Rnk7jM>
- ^{xix} Douglas, H., Hall, W., Gartner, C. (2015). E-cigarettes and the law in Australia. *Australian Family Physician*. 44 (6): 415-418. See: <http://bit.ly/2cFqbYi>