

# Pictograms in medicine information and counselling

Pharmaceutical pictograms illustrate medicine information and can help patients to recall and comprehend medicine instructions, thereby contributing to the correct use of medicines. Pharmacists should have knowledge about pictogram applications, and the subsequent patient-centred outcomes and benefits. The aim of this paper is to educate pharmacists on pharmaceutical pictograms, by presenting updated scientific evidence on the use of pictograms in medicine counselling.

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## KEY MESSAGES

Pictograms can facilitate communication between patients and pharmacists.

Pictograms are patient-, culture-, and context-sensitive.

Pictograms can enhance understanding, comprehension and recall of medicine instructions, and increase medication adherence.

The evidence on pharmaceutical pictograms used in pharmacies in Norway is scarce.

Before the systematic use of pictograms in Norwegian pharmacy practice, pictograms should be adapted, tested and validated.

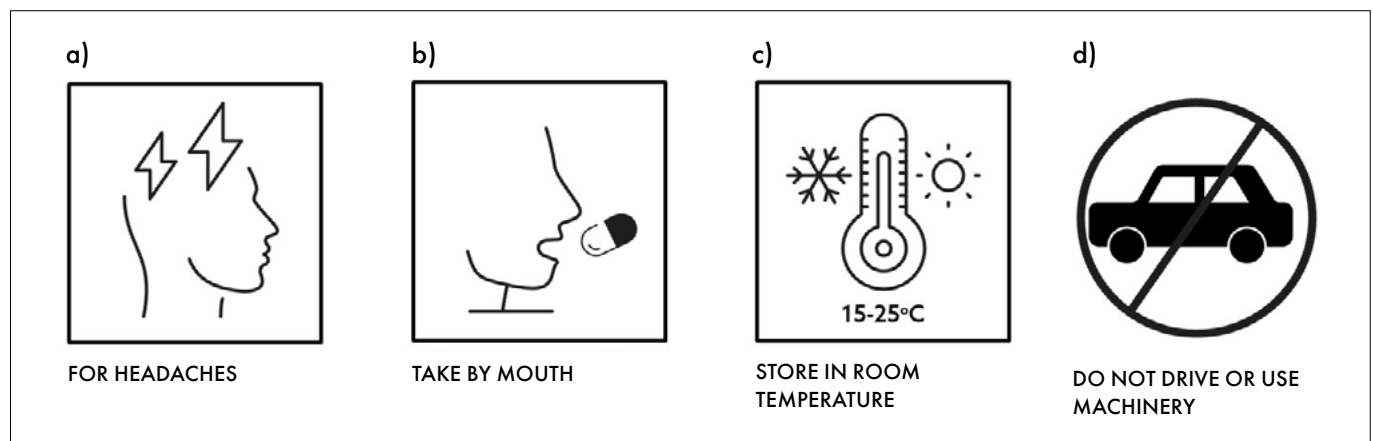
## BACKGROUND AND AIM

Pharmacy personnel must provide sufficient medicine information to patients, to contribute to the correct use of medicines. However, medicine counselling can be challenging, in particular if patients have reduced language comprehension, communication barriers, and/or poor reading and writing skills. The report to The Storting (Norwegian Parliament) *White Paper on Medicinal Products: Correct use – better health*, stated that patient-centred information about medicines, such as the patient information leaflet (PIL) provided by the medicine manufacturer, to a small extent is adapted to the users and can be difficult to understand (1).

A pictogram illustrates a word, a concept, phrase, or a situation, and consists of simple and intuitively understandable icons, stylized images and/or symbols. Pictograms are suitable for informing or alerting and can potentially help patients

understand medicines information. Pharmaceutical pictograms illustrate medicine information; instructions for proper use, precautions, warnings, indications, side effects and storage conditions, and are used by healthcare professionals in communication about medicines (2–4). Figure 1 shows examples of pharmaceutical pictograms.

It is uncertain to what extent Norwegian pharmacists are familiar with and use pictograms in their practice. In the Norwegian Pharmaceutical Journal chronicle from 2021, Breivik describes an online software based on pictograms in combination with explanatory texts in different languages (Depicto), that so far has not been implemented in Norwegian pharmacies (5). A few years ago, the Norwegian Medicines Agency (NoMA) piloted the use of written medicine advice sheets on penicillin and acetylsalicylic acid to be used in supplementing patient information leaflets



**Figure 1.** Pharmaceutical pictograms with supplementary brief text, illustrating and providing information on the correct use of medicines; a) indication, b) instructions for proper use, c) storage conditions and d) precautions. The pictograms are made with inspiration from <https://www.fipfoundation.org/pictograms-support/pictogram-software/>.

(PILs), that contained structured and concise medicine information including pictograms (6). However, the advice sheets were never systematically applied in medicine counselling in pharmacies after the pilot period ended. In 2018, The Directorate of eHealth developed a standard for concise, patient-centred medicines information, that allows using supplementary pictograms (7), but we are not aware that the standard has been implemented.

The research on pharmaceutical pictograms used in Norway is scarce, however, there are some Master and Bachelor theses on the subject (mostly unpublished), and an applied research project with Depicto™ (8, 9). Research on pharmaceutical pictograms is international, and the amount of scientific literature has increased steadily over the past 30 years. In the last decade, several systematic reviews on the use of pharmaceutical pictograms have been published (2, 4, 10–18). The aim of this paper is to educate pharmacists on pharmaceutical pictograms, by presenting updated and published scientific evidence on the use of pictograms in medicines information and counselling. The evidence base is the authors' own experiences from research, e.g., (9, 12, 13, 17, 19), as well as selected scientific peer-reviewed literature, mainly systematic reviews, published in the last decade (2, 4, 10, 14, 16–18, 20). Reports, studies and publications that have not been published by publishers or in a scientific journal are excluded.

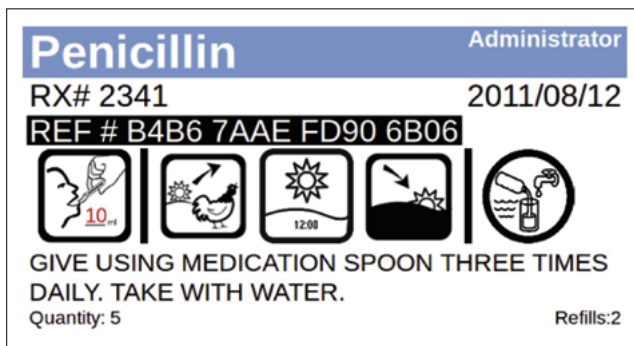


Figure 2. Pharmaceutical pictograms used in a medicine label. Source: <https://www.fipfoundation.org/pictograms-support/pictogram-software/>

### PHARMACEUTICAL PICTOGRAMS – APPLICATIONS AND EXAMPLES

The body of literature refers to various applications for pharmaceutical pictograms, including medicine labels (Figure 2), medicine information sheets (Figure 3), PILs, dosing instructions (for example in explaining the dosing of liquid medicines to children), medicine lists, educational materials on the proper use of medicines (for example in books and videos on the proper use of anti-asthmatic agents), as support in verbal communication about medicines, and in general in medicine information materials intended for patients or healthcare professionals (2, 10, 14, 17).

### PHARMACEUTICAL PICTOGRAM AVAILABILITY AND LIBRARIES

As of today, there is no openly available pictogram library that has been tested and validated for use in Norwegian pharmacies. There are many different national and/or local variants of pharmaceutical pictograms, designed for a specific purpose or intervention, context, or population. An example from Norway is the pictograms used in the NoMA medicines advice sheets (6), and medicine information notes designed by Breivik (21) (Figure 3). Internationally, the following pictogram libraries are available:

- The United States Pharmacopeia (USP) Pictograms is an internationally recognized

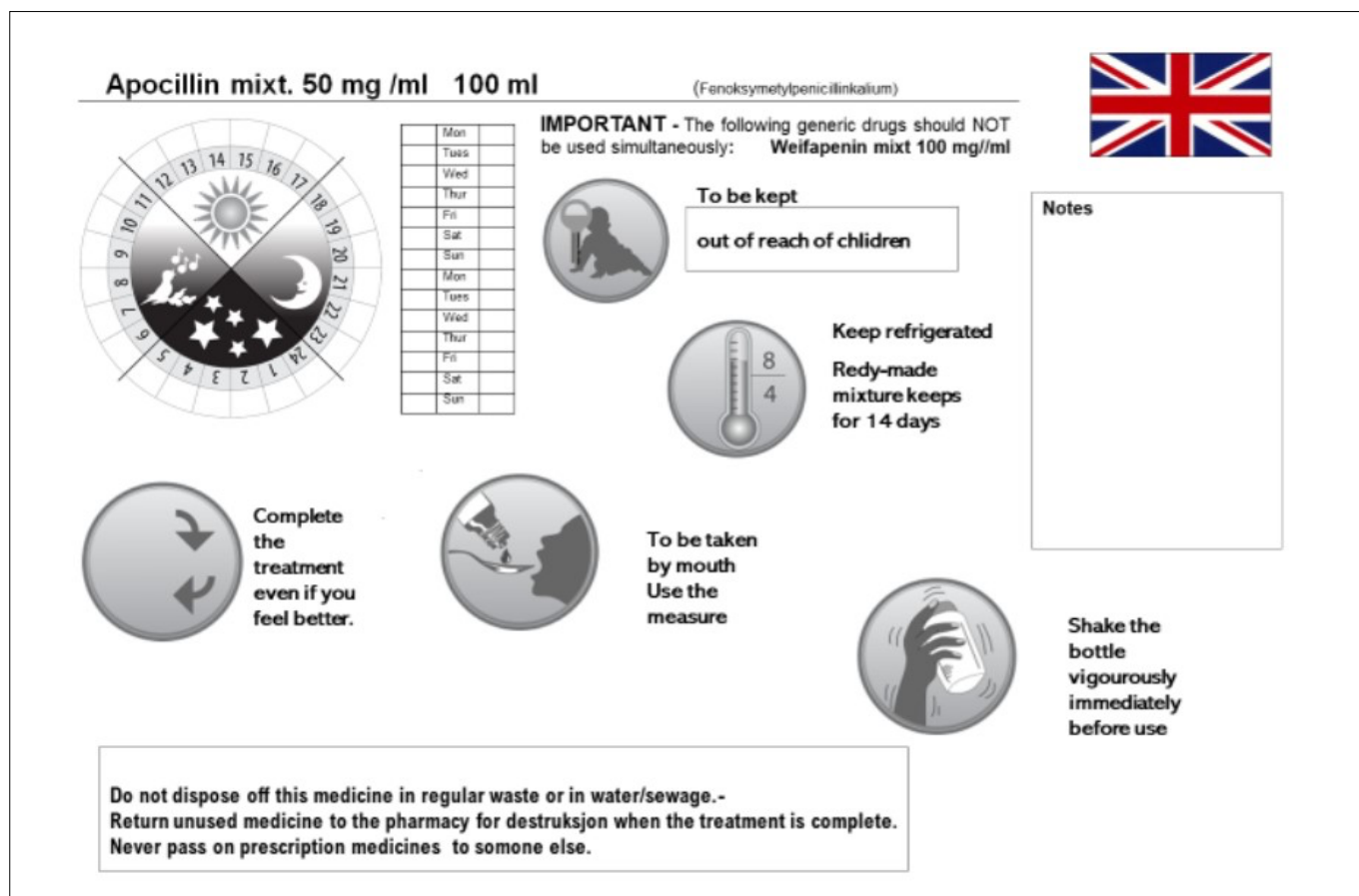
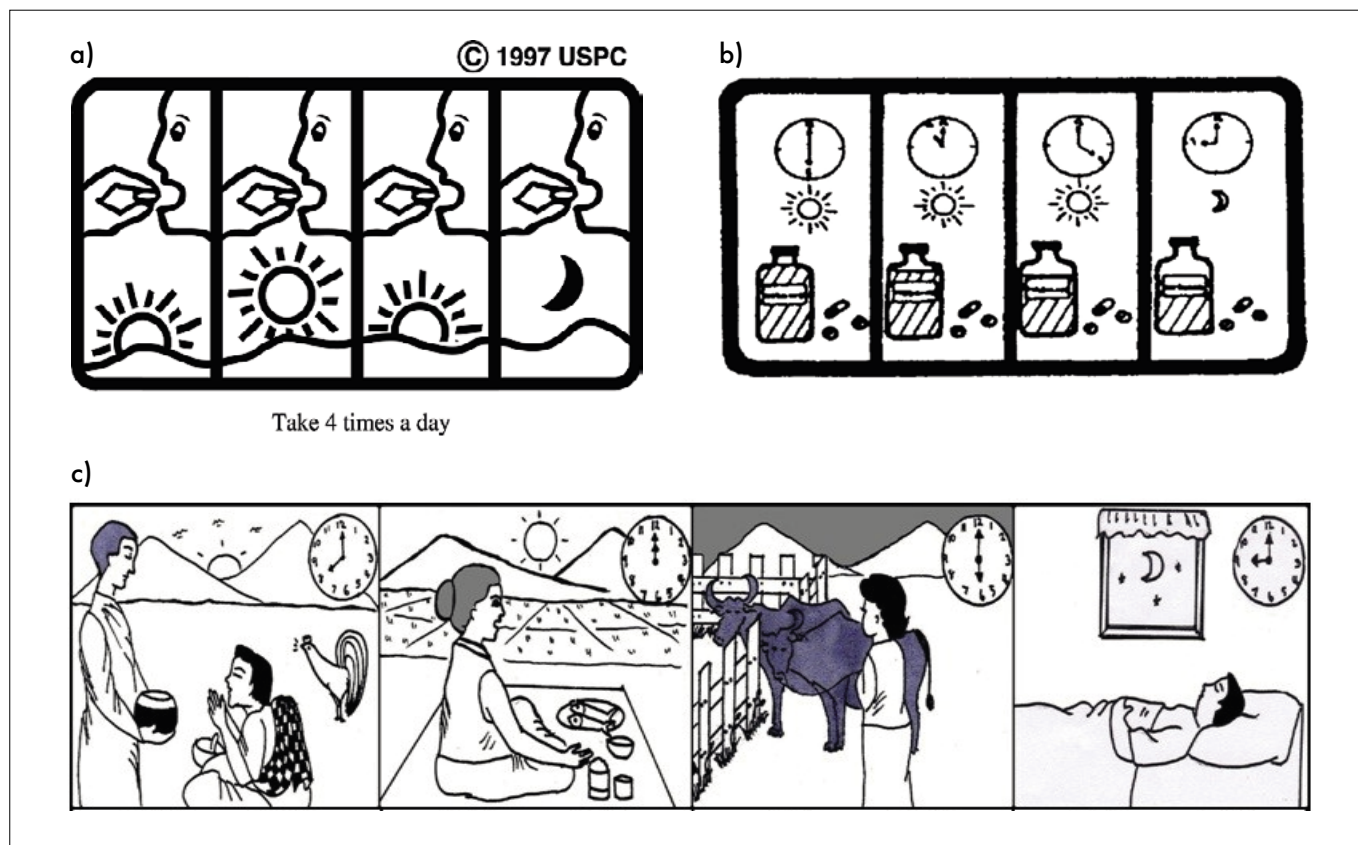


Figure 3. Pharmaceutical pictograms used in a medicine information note. Source: (21)



**Figure 4.** Pictogram examples of the dosing instruction «Take 4 times a day», designed for medicine users in various parts of the world; a) USA (USP), b) South Africa (22) and c) Thailand (20).

library. As of June 2022, it consists of 81 different pictograms that have been tested in several countries (e.g., South Africa, Iran, Portugal and UK), but not in Norway. The library is free of charge and USP will grant a licence after acceptance of terms for use. The library can be downloaded from <https://www.usp.org/download-pictograms>.

- The International Pharmaceutical Federation (FIP) has a pictogram software called *PictoRX*, that can be downloaded from <https://www.fipfoundation.org/pictograms-support/pictogram-software/>.
- Rhodes University (RU) pictograms is a South African collection of around 100 pictograms designed and tested with low health literacy end-users. This collection can be accessed at <http://rupictogramsdowse.co.za/>

### PICTOGRAM ADAPTATION TO CULTURE AND CONTEXT

There are good reasons to design locally adapted pictograms, as pictograms are not universal. Pictograms are understood and perceived differently, and one should be careful about uncritical use of, for example, USP pictograms in a Norwegian practice. Figure 4 shows examples of pictograms with various designs for the dosing instruction «Take 4 times a day», and illustrates that pharmaceutical pictograms are culture and context sensitive. That is, pictograms require adaptation to

the patient population, as this affects the needs, preferences, and perceptions of pictograms. Adaptations should consider for example, the population's culture, language, visual and linguistic skills, cognition, and health literacy (2, 10, 12, 13, 16, 17). Pharmaceutical pictograms should also be adapted to the context or the situation in which they are to be used, and examples are pharmacies, hospital wards, outpatient clinics, municipal or local healthcare units, humanitarian health work, and public information campaigns (2, 10, 16, 17).

Since pictograms are non-universal and have various detail levels, the literature unambiguously recommends using pharmaceutical pictograms in combination with verbal information and/or supplementary, short, concise text (exemplified in Figure 4a), regardless of area of use, culture or context (2, 10, 16, 17).

### WHO BENEFITS FROM PHARMACEUTICAL PICTOGRAMS?

In general, the literature describes those patients in risk of low medication adherence benefit from pharmaceutical pictograms (2, 10, 15–17).

#### Foreign-language medicine users

Foreign-language medicine users, patients with poor reading and writing skills, and/or low degree of health literacy are described as target users of pictograms (2, 16, 17). However, understanding the pictograms may also be challenging for

these patients, that may necessitate additional intervention components beyond pictograms to help comprehension of medicine information (16). Examples of complementary components are education or counselling sessions, and teach-back method (17). We know that medicine information is not well adapted to these patients (1, 16), and that the use of picture-based health education materials significantly improves comprehension of medicine information, as opposed to text-based health information alone (Tabel 1). Foreign-language pharmacy customers in Norway emphasize that communication barriers may contribute to incorrect use of medicines, and perceive pictograms as useful tools in supporting medicine counselling (19).

#### Chronically ill patients

We know that patients suffering from chronic diseases have challenges with medication adherence, and a recently published systematic review describes the role of pictograms in medicine counselling of for example asthma, diabetes mellitus, Acquired Immuno Deficiency Syndrome (AIDS), and chronic kidney disease. Merks and co-authors conclude that chronically ill patients can benefit from pictogram interventions, due to complex daily multi-drug regimens that requires high levels of literacy and self-efficacy to achieve medication adherence. (15)

**Table 1.** Overview and information about the effects of pharmaceutical pictograms, summarized from literature reviews.

Reference	Title	Results that describe the effects of pharmaceutical pictograms
Barros et al., 2014 (2)	The use of pictograms in the health care: a literature review.	Health professionals can use pictograms to enhance or improve the oral and written instructions about the medicines dispensed to the patient: <ul style="list-style-type: none"> <li>• increasing knowledge levels</li> <li>• promoting adherence to treatment</li> </ul>
Chan et al., 2015 (10)	Using pictograms to assist caregivers in liquid medication administration: a systematic review.	Pictogram interventions: <ul style="list-style-type: none"> <li>• reduced dosing errors of liquid medicines</li> <li>• enhanced comprehension and recall of medicine instructions</li> <li>• improved adherence of caregivers</li> </ul>
Lühnen et al., 2018 (14)	Pictures in health information and their pitfalls: Focus group study and systematic review.	Pictogram effects were: <ul style="list-style-type: none"> <li>• ambiguous results on the cognitive outcome</li> <li>• knowledge was assessed in four studies, three of them showed no differences between the intervention and the control groups, and one study showed an increased level of knowledge in the intervention group.</li> </ul>
Park og Zuniga, 2016 (16)	Effectiveness of using picture-based health education for people with low health literacy: An integrative review.	Pictogram-effects in 10 of 11 (91%) studies with low health-literacy populations showed a <ul style="list-style-type: none"> <li>• positive effect on health learning-abilities</li> <li>• increased comprehension or recall of health information</li> </ul>
Sletvold et al., 2020 (17)	Impact of pictograms on medication adherence: A systematic literature review.	10 of 17 studies (58.8%) reported a statistically significant effect on <ul style="list-style-type: none"> <li>• medication adherence</li> </ul>

### Children and the elderly

Others who may benefit from pharmaceutical pictograms are elderly patients, to minimize the risk associated with cognitive impairment (2). Children, their parents, and caregivers have also been shown to benefit from using pictograms. A systematic review examined the effect of pictograms to assist caregivers in liquid medicines administration and included five studies (Table 1). Despite the limited evidence, the researchers concluded that pictograms may be useful in such pictogram interventions, since the use of pictograms in medicine instructions reduced dosing errors and enhanced comprehension and recall of the instructions (10).

### EFFECTS OF USING PICTOGRAMS IN MEDICINE INFORMATION AND COUNSELLING

Intervention studies that test the effects of pictograms typically use different outcome measures, that causes challenges in comparing the studies to each other, perform a meta-analysis, and estimate the size of effect estimates. Consequently, literature reviews and systematic reviews commonly present effect results narratively, and we want to provide an overview of these (Table 1).

#### Knowledge, comprehension and recall

Pictograms can contribute to increased knowledge of medicines, and enhanced comprehension of medicines information (2, 10, 14, 16). For example, patients will increase their knowledge of a medicine's storage condition and better

understand what storage of the medicine entails. Pictograms will increase the patients' recall of health information (10, 16), in that they will better remember how a medicine is to be stored if this information is explained through pictograms compared to not using pictograms.

#### Medication management and adherence

Pictograms can contribute to correct medication management, for example by correct dosing of liquid medicines, where pictograms have shown to reduce dosing errors, defined as a «deviation of a measured dose greater than 20% from the prescribed dose» (10).

It is reported that pictograms can increase medication adherence, particularly for patients with elevated risk for non-adherence, for example chronically ill patients, and patients with low health literacy (2, 10, 17).

#### CONSIDERATIONS OF RANDOMIZED CONTROLLED TRIALS (RCT) WITH PICTOGRAM INTERVENTIONS

The majority of pictogram effect studies are RCTs that uses complex interventions, combining pictogram(s) with verbal and/or written information, health education and/or counselling (10, 15–17). However, there are studies testing plain pictogram interventions that has positive effects. For example, medicine labels or PILs including pictograms increase medication adherence, compared to controls with medicine labels or PILs using text only (adherence measured by pill-count

and self-reported questionnaires) (17).

The evidence on RCTs designed to evaluate pictogram effects in medicine counselling is sizeable. However, there are substantial heterogeneity in design and conduct of the RCTs, for example regarding patient populations, pictogram interventions and outcome measurements. Furthermore, systematic reviews report on generally poor quality in studies, due to for example high risk of bias (13, 14, 16–18), that entails low confidence in effect estimates. As far as we know, there are no reports or study results on negative effects or disadvantages of using pharmaceutical pictograms. However, we would like to point out that incorrect interpretation of pictograms might cause negative health outcomes. The evidence base lacks assessment and reporting of resource use and costs of interventions.

There is currently no research that assesses clinical outcomes of pictogram-interventions, for example health-related quality of life, adverse drug events, or hospitalization. Suggestions for further research includes using high-quality study design adhering to best practices of RCTs, and including patient-centred, clinical outcome measures.

#### SUMMARY, PRACTICAL ADVICE AND FUTURE PERSPECTIVES

Pharmacists need knowledge of pharmaceutical pictograms and their applications in medicine counselling. Furthermore, pharmacists should have knowledge of when pictograms can be useful for patients, and the benefits of using them (box 1). ►



**Box 1. Practical advice to pharmacists on using pharmaceutical pictograms.**

WHAT is illustrated in pictograms?	HOW are pictograms used?	WHO benefits from pictograms?	WHAT are the effects of pictograms?	WHERE can you find pictograms?
Indications Adverse drug reactions Administration Dosing Storage conditions Precautions Warnings	Medicine labels Medicine information sheets Patient information leaflets (PIL) Dosing instructions Medicine lists Educational materials Support in verbal communication	Patients with poor medication adherence Foreign-language medicine users Patients with poor health literacy Chronically ill patients Children and their caregivers Elderly patients Healthcare personnel	Safe medication management Medicine knowledge Comprehension of medicine information Recall of medicine instructions and information Medication adherence	Pictograms are not systematically adapted, tested or validated in Norwegian pharmacies  Available international pictogram libraries are: <ul style="list-style-type: none"> <li>• The USP Pictograms: <a href="https://www.usp.org/download-pictograms">https://www.usp.org/download-pictograms</a></li> <li>• PictoRX: <a href="https://www.fipfoundation.org/pictograms-support/pictogram-software/">https://www.fipfoundation.org/pictograms-support/pictogram-software/</a></li> <li>• RU pictograms: <a href="http://rupictogramsdowse.co.za/">http://rupictogramsdowse.co.za/</a></li> </ul>

A pictogram illustrates a word, a concept, phrase, or a situation, and in medicine counselling they should be combined with a short, explanatory text (preferably in the patient's own language), and/or supported by verbal explanation or counselling. When used in medicines information, the patients' benefits outweigh the harm or risk. In medicine counselling, pictograms can contribute to patients taking their medicine correctly as prescribed, and to correct medication management, thereby positively contributing to patient safety. Furthermore, pharmaceutical pictograms can have a positive impact on knowledge, comprehension and recall of medicine information. Generally, the evidence base has low quality.

The systematic use of pharmaceutical pictograms in Norwegian pharmacies can be considered as a measure for effective communication about medicines, by making the information accessible, visible, and understandable. In particular, this applies to foreign-language medicine users, chronically ill patients, children and the elderly. The recommendation is in line with *White Paper on Medicinal Products: Correct use – better health*, that in 2015 stated «Communication with patients and information about medicinal products must be adapted to the patient group. For instance, language barriers or poor reading skills may present a challenge among some minority groups» (1).

To be able to systematically use pharmaceutical pictograms in Norway, pictograms should be adapted, tested, and validated to Norwegian pharmacies and their customers. In the future use of pictograms in Norway, we believe that the necessary adaptation, testing and validation should be performed in pharmacy contexts in close collaboration with patients or patient organisations, and research environments. The responsibility for implementation can lie with the pharmaceutical authorities, to ensure up to date content and effective dissemination.

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