PART I

Designing a garden for asthmatic children
A quest for an appropriate garden as a part of an asthma centre

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1. Introduction

In garden design and especially within the concept of healing gardens, greenery is mentioned as one of most important elements to improve the state of mind of the visitor. A well designed garden will reduce stress and can even contribute to one’s health. However, in order to design an appropriate healing garden for children, which they really can enjoy, more is needed than just an healthy green environment. For children with asthma, this design quest gets even more complicated, as most of them also suffer from hay fever and cannot endure a lot of plant species. Therefore the question rises, how to design a well-functioning and safe garden for asthmatic children, that can contribute to their wellbeing. On the basis of basic knowledge on both asthma and hay fever and information on general garden design for children, this question will be explored.

2. Asthma and its characteristics

Asthma is one of the most common chronic diseases among children in western society and this problem is expected to continue to grow over the next years. This disease is caused by an inflammation of the lining of the respiratory tract. Due to this inflammation the respiratory tract and bronchi become constricted and the exhalation, in particular, becomes complicated. This will result in symptoms as coughing, wheezing and shortness of breath.

A lot of triggers could be appointed, that will lead to these asthmatic symptoms and could possibly lead to an attack. Infection of the respiratory tract, caused by a virus or caused by certain medication as aspirin, are examples of such a trigger. Emotional factors like stress or excitement or even exercise could lead to asthmatic symptoms. In addition, even outdoor influences like weather conditions or air pollution could instigate a possible attack. However, by research is proven that indoor influences like smoke, allergens or indoor air pollution still provide more complaints than the outdoor triggers. For the majority of asthmatic patients, allergies form the greatest source of triggers. Some patients are not allergic and in these cases it is much more difficult to find out the triggers for the inflammation of the lungs. One of the few known instigators for asthma in this case are flu viruses. The reason for the allergic type of asthma lies in the cells that take care of the immune response in the lungs. These cells attack more than they should and this causes the allergic reaction. Faeces of dust mites, pollen and dander of animals are some examples of what these cells will attack, besides the viruses or bacteria that they should attack. This will cause the inflammation of the respiratory tract and will destroy the cilia on the inside of the lungs. These cilia have a protective function and by the loss of these, it will become easier for irritating substances to enter

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1 Levy, Hilton & Barnes 1994: 15-35
the respiratory tract and to cause another inflammation. Irreparable damage to the lungs can be caused by prolonged continuity of this allergic process. This can only be prevented by avoiding these substances as much as possible.\(^2\) Asthma, in particular the allergic kind, is strongly related to certain other disorders such as eczema, hay fever and allergies in general. These disorders often coexist, because the patient is born with atopic predisposition. This means that the patient is predisposed to develop allergic diseases and can suffer from multiple of these diseases. This could be one after another or at the same time. Important to know is, that people can be atopic and will never get asthma, as well as, not every asthma patient has atopic predisposition.\(^3\)

3. Designing a garden for children

To be able to discover the possibilities of a garden for a child with asthma, it is essential to know the general interest of green for children. Extensive research has shown that access to nature, through window views as well as a direct connection with nature, has a positive influence on behavioral, psychological and cognitive functions in children. Therefore, gardens and plants should be implied in childcare functions. In order to create a garden that is low in allergy triggers and can possibly fulfill a therapeutic role inside a childcare facility, much can be learned from general outdoor spaces that are designed for children in particular. Claire Cooper Marcus divides this general knowledge into a few basics elements that contributed to the health of a child.

- First of all, there should be a possibility for a child to play outside. A normal child should play outside after school, go on adventures and build treehouses. Unfortunately this is not as self-evident as it used to be. More and more children nowadays choose the television or I-pad above playing outdoors. This while nature is indispensable for the development of a child, physically and mentally.\(^4\)

- Besides that, the quality of the environment is of great importance. This is not meant in terms of air quality or such, but the extent to which the design will challenge the child. Fixed equipment on a playground is not suitable, because there are no variables in which the child can participate and express his or her creativity. This is similar to the preference by visitors for interactive objects in a museum.\(^5\)

- As a last important element, the space should offer ways to play with nature itself. By gardening, children will feel connected to the environment and at the same time they will get educated in a fun way. For example, by learning about nutrition through growing their own vegetables, children are more likely to eat healthy. Participation in gardening results also in a better learning attitude and stronger ability in social matters.\(^6\)

Examples of healing/therapeutic gardens, designed for children, are the two gardens at the Rady’s children’s hospital in San Diego. Both gardens are designed by Aesthetics, inc in association with different landscape designers and artists and both show a different approach to this task. The first garden, Carley’s magical garden, is designed as refuge for children fighting cancer as well as their parents, who have to spend long periods of time inside the hospital. The garden design is inspired on the life of a little girl, Carley, who was diagnosed with leukemia. She adored the garden outside her hospital room and the little animal creatures it contained. In the story as told by the garden, she rescues them and at the end of the story, the little creatures will come to her rescue when she needs help. Elements of this story are portrayed in the garden design by large statues and interactive play.

\(^2\) Brink 1995: 26-27
\(^3\) Levy, Hilton & Barnes 1994: 42-43
\(^4\) Berg 2007: 13; Cooper Marcus & Barns 1999: 324-326
\(^5\) Nicholson 1972: 5-9
\(^6\) Yost, Chawla & Escalante 2013: 1-2
Carley’s magical garden, San Diego (www.aesthetics.net)
Leichtag family healing garden, San Diego
(www.aesthetics.net)
areas. Each child in the hospital also receives a colouring book based on this story. So when they are well enough to enter the garden, they can experience and explore this colourful dream world for themselves. Every patient room has a direct connection to this garden, so even when the child is not able to visit it, he or she can still see it.

The other garden, the Leichtag family healing garden, is designed for terminally ill children and their families. This garden is a good example of the use of regional shapes inside a garden. The design is based on a beach theme, because San Diego is located on the coast. This theme is represented by the blue and green coloured concrete, the pavement material that is shaped like waves and the implementation of umbrellas in the furniture. Further, the garden consists of various elements to appeal to the wild imagination of children, such as statues of animals and the large colourful windmill.7 Interesting about this garden is that it has been evaluated after it was build. Although the garden proved to increase the satisfaction of the user, this evaluation showed that it was not functioning optimally. The garden was not used as often and that when it was used, it was used as any outdoor space by staff and family and not as the intended relaxing healing space. The most common complaint was the lack of actual green. The garden only contains small islands with palm trees and plants. While green, in most researches on healing gardens, is designated as truly beneficial for a therapeutic garden. Another common complaint was the lack of activities for children to participate in. This complaint was largely related to the relatively more healthy children, who were in need for exploration like all children. Cooper Marcus calls this a missed opportunity, especially in relationship to the used theme. A beach could easily be portrayed by the use of a sand box, that at the same time offers activity inside the garden.8

4. Limitations in garden design regarding asthma & hay fever

As mentioned before, a majority of the children with asthma also suffer from other allergies. By designing a garden for this kind of children, it’s important to not only take asthma into account, but also one of the most common allergies, hay fever or pollen allergy. Hay fever is caused by pollen of certain plants or grasses and will result in symptoms as sneezing, dripping nose, watery eyes and a possible elevation of the temperature. Those with hay fever also suffer from a dry mouth and difficulty breathing. The discomfort of an asthmatic patient will strongly increase if he or she is experiencing hay fever in combination with asthmatic symptoms at the same time, as one can imagine. Pollen can be transferred by insects as well as by wind, but only the latter will cause an allergic reaction. Examples of green that distribute these kind of pollen are very common, like grasses and weeds. These pollen and some other plants like red cedar sawdust could not only form triggers for hay fever, but also for asthma. To avoid the risk of an allergic reaction, most of the time children with asthma or hay fever are advised to stay inside or stay away from parks during periods in which most plants distribute their pollen. Though, there are other simple ways to avoid these triggers to some degree, such as wearing sun glasses, mowing the grass regularly and dampening the lawns.9 From another research emerges the fact that a close connection to a park can be strongly related to the amount of current complaints related to asthma and partly to the amount of complaints related to hay fever in children in the immediate surroundings. Notable is, that a close-by forest only increases the hay fever complaints and an urban green space does not significantly increase the amount of complaints at all for both asthma and hay fever. This difference can be explained by the plant

7 http://www.aesthetics.net/; pictures on next pages are from this source
8 Whitehouse et. al. 2001: 304, 308-309; Cooper Marcus 1999: 98-99
9 Asthma foundation WA 2015: 1-2
species that occur in these green spaces and if these species distribute pollen.\textsuperscript{10} This leads to a very simple way of avoiding triggers, which is using plants that will not distribute pollen. In her book, Natasha Etherington gives a list of plants that can be used and will not spread pollen and therefore will not trigger an allergic reaction in children. By using plants on this list, it is still possible to make an interesting green garden for children that suffer from asthma and/or hay fever.\textsuperscript{11}

There are more ways in which the amount of triggers can decreased, as rain can tone down the symptoms of hay fever just as the change of wind direction. However, light rains, especially during spring and summer, could increase the amount of pollen, as it could break the grains of these pollen and thereby release the allergic parts. Fountains and sprinkler systems could lead to similar problems.\textsuperscript{12} In contrast to this, waterfalls are able to not only decrease hay fever symptoms, but the aerosols of large waterfalls, like the Krimml Waterfalls, also have a positive influence on the lungs of an asthmatic patient.\textsuperscript{13} Within a garden in the envisioned asthma centre, a smaller waterfall could be realised, which will contribute to purifying the air from in particular pollen. Another way to implement running water within the design, could be in the form of a brook. This can be combined with activities for children like crossing this water on top of large rocks. After all as successful garden for children should challenge them to be active. As is widely known, asthmatic patients experience less symptoms at some locations, such as at sea. This can be related to the different type and the saltiness of the air and the types of plants that are used.\textsuperscript{14} Even if the centre is not located near the sea, this type of environment can still be tried to simulate. This can be done similar to the Leichtag garden of by the use of a sandbox as suggested by Cooper Marcus before. Also salt caves are known can decrease symptoms of both asthma and hay fever (and many other allergies).\textsuperscript{15} These caves are rooms filled up with salt and by implementing salt caves inside the centre, the children are offered a place to play, which at the same time is beneficial for their health. These caves could be directly related to a strand themed garden, as they offer salty air. It could also function as an nearby way to decrease triggers, because when a child feels cramped outside, it can sit in such a cave, without going inside the centre itself.

\textbf{Challenging element}  
(http://inhabitat.com)  
\textbf{Use of water in a garden}  
(www.tripadvisor.nl/)  
\textbf{Saltcave} (www.haloclinic.nl)

\begin{footnotesize}
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\item \textsuperscript{10} Dadvand et al. 2014: 1333-1334
\item \textsuperscript{11} Etherington 2012: 125-130
\item \textsuperscript{12} Asthma foundation WA 2015: 2
\item \textsuperscript{13} Gaisberger et. al. 2012: 8
\item \textsuperscript{14} Scheppegrell 1916: 1907-1915
\item \textsuperscript{15} www.haloclinic.nl
\end{itemize}
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5. Conclusion

Asthmatic children have the same needs as ‘normal’ children when it comes to a garden, extended with some special needs related to their disease. Therefore, when designing a garden as a part of an asthma centre for children with asthma and/or hay fever, it is important to design an adventurous and playful garden in the first place, just as you would for healthy children. Children should have immediate access to a place in the open air, in this case a garden, where they can play. This garden should offer exciting possibilities to climb, be creative and discover. This challenging character of the garden can also be achieved by implementing elements that not only activate the children, but at the same time decrease triggers or symptoms of hay fever and/or asthma, such as large climbing stones in a brook or a large sandbox. Besides active elements, there are more elements that should be set inside a garden for an asthma centre, such as elements with running water (waterfall or brook) or salt caves. Next to this, a proper maintenance of the garden is important. The lawns should be damped and mowed regularly.

Another important element of the design should be, a direct connection with plants inside the garden, through creating space where children can participate in gardening. Even if children suffer from asthma or hay fever, this connection and the associated green garden remain possible to implement in the garden design. The big difference is, that in this case, special attention should be given to the flora used, with emphasis on the possible pollen distribution.

6. Designing a garden for children

6.1 Literature

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http://www.haloclinic.nl/kinderen/

6.3 Illustrations

Page 3 & 4:
Fig. 1-13  http://www.aesthetics.net/downloadimages/PDF%20files/Healing%20Garden%20SOQ.pdf (24-3-2015)

Page 6:
Fig. 1  http://inhabitat.com/stunning-nature-centric-childrens-garden-opens-at-singapores-gardens-by-the-bay/
Fig. 2  http://www.tripadvisor.nl/LocationPhotoDirectLink-g60878-d561308-i27012705-Kubota_Garden-Seattle_Washington.html
Fig. 3  http://www.haloclinic.nl/kinderen/