

# Development and implementation of a children's menu according to the criteria of the optimized mixed diet in a paediatric hospital – a feasibility study

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## Summary

Up until now, recommendations for a healthy diet for hospital patients have been designed for adults. As a result, one aim of the Previkids NRW project was to develop a children's menu according to the criteria of the optimized mixed diet (OMD), to label it with the associated optiMIX® seal and to implement it at the Clinic of Paediatrics in Dortmund. The practicability in the kitchen and on the hospital wards, as well as the acceptance of the meals among children, was also taken into consideration. The optimized menu contained four breakfasts and four evening meals, ten midday meals and five snacks. Children gave the OMD lunch a higher rating than before. In contrast, the OMD breakfast and dinner were given a lower rating than before. A menu according to the criteria of the OMD is feasible in terms of practicability in canteen kitchens. However, for this type of food selection to be accepted by children, assistance from the medical personnel is necessary.

**Keywords:** *Previkids NRW*, optimized mixed diet, preventative diet, catering industry, paediatric hospital, children and young people

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## Introduction

The diet of children in hospital becomes particularly crucial, when it comes to the consideration of certain disease-related requirements, e. g. in the event of intensive care or metabolic diseases [1, 2]. Aside from such special dietary needs, there is still an opportunity to introduce children and adults to a generally healthy diet, even during a short stay in hospital. Recommendations for a healthy hospital diet, like the so-called rationalisation scheme [3] and the DGE quality standard for care in hospitals [4, 5], apply solely to adults. As children have a greater

need for energy and nutrients, in relation to their body weight, it makes sense to implement a healthy diet tailored to children in paediatric hospitals.

The *Previkids NRW Project (Präventionsernährung für Kinder in NRW [Preventative Diet for Children in North Rhine-Westphalia])*<sup>1</sup> 2009–2012 aimed to develop healthy-eating products for children in accordance with the optimized mixed diet (OMD) and to introduce them into the catering and retail industry with marketing support via the optiMIX® seal [6]. As the midday meal is the focus for catering in children's day centres and schools [7], the above-mentioned sub-project, run in collaboration with the Clinic of Paediatrics at the Municipal Hospital Dortmund, initially examined how the overall daily OMD programme could be implemented in a paediatric hospital. Together with ServiceDO GmbH (the hospital's meal provider), a children's menu was to be developed according to OMD criteria and its feasibility to be tested in the kitchens and hospital. In the process, the existing routine was to be altered as little as possible. The experience would be used for planning future implementations in similar and

<sup>1</sup>With funding from North Rhine-Westphalia and the European Union

other institutions (e. g. rehabilitation clinics).

## Methodology

### Existing circumstances

The Clinic of Paediatrics at the Municipal Hospital Dortmund is one of the largest clinics in North Rhine-Westphalia and ServiceDO GmbH is a meals provider supplying more than 2,700 hot meals and 2,200 cold meals every day. The cooking procedures used in canteen kitchens are based on microwave steam cooking; the raw and pre-cooked foods are seasoned, portioned onto plates and shrink-wrapped with cooking foil. The foil is ventilated to ensure constant steam during cooking. Once cooled, the meals are delivered to the wards and the cooking is finished off by care assistants in their own purposely-acquired microwave machines.

The optimized mixed diet developed at the Research Institute of Child Nutrition (FKE) in Dortmund is a diet concept which translates scientific nutrient-related recommendations into food- and meal-related recommendations and adapts them to the family diet and the catering industry. Account is also taken of children's taste preferences [8]. The recommendations for food options according to the OMD can be summarized with three simple rules: plant-based foods and drinks should be consumed in abundance, animal-based foods in moderation and fat- and sugar-rich foods sparingly. Five meals per day are planned for the OMD: two cold principal meals, one hot principal meal and two snacks [9]. The composition of OMD meals served as a reference for the children's menu.

### Development of the children's menu

The development of the children's menu was designed in three stages:

meal selection, nutritional assessment and feasibility in canteen kitchens and daily hospital routine.

The meal selection, including the determination of mealtime structure/frequency, took place in consultation between the hospital's meals provider and the FKE. Several aspects were considered during this process: the options available in the daily canteen routine, the wide variability of hot midday meals and the pre-existing children's menu. As a result, four breakfasts, four evening meals (cold principal meals) and five snacks were formulated based on the existing food selection. For the hot midday meal, the original four-meal children's menu was extended to ten meals with proven recipes from ServiceDO GmbH and FKE. Among which, three would be available as fixed standard dishes every day and one meal would change daily through the week.

In the first stage of the nutritional assessment of the 23 meals, the food itself was considered. To this end, average consumption amounts for two age groups, in terms of energy needs for lower physical activity, were gathered (1–9 years: 1,225 kcal/day; 10–18 years: 2,300 kcal/day) [10]. Secondly, the nutrients were considered. For this purpose, an overall average value of the daily diet was determined from the average values of nutrient contents per meal type (8 cold principal meals, 10 hot principal

meals, 5 snacks), and calculated from the nutrient densities (mg, g, g/MJ). The evaluation took place with the help of so-called scores, into which nutrients were grouped: essential nutrients (n = 3), saturated fats (n = 1), unsaturated fats (n = 2), vitamins and minerals (n = 19), total nutrients (n = 25). A percentage range of the OMD reference values of 75–125 % was regarded as acceptable in the evaluation. This range took into account the naturally-occurring fluctuation due to the variable food composition of nutrients in a recipe and the supplement of 20–30 % typically applied to average needs when deducing recommendations for nutrient intake [10].

The practicability of the recipes in the daily canteen routine was trialled by the meal provider's food assistants. In the process, sensory aspects were also considered and, if necessary, portion sizes were adapted to the special steam cooking procedures.

### Introduction of the children's menu

For the introduction of optimized meals to the wards, an illustrated "children's menu" was developed that would appeal to children, which called attention to the new meal selection and the OMD resp. optiMIX® and aimed to help children to decide on OMD meals in the place of standard foods. In addition, FKE infor-

<b>hot principal meals</b>	whole-grain and potatoes/noodles/rice ↑ vegetables and salad ↑ fish ↑ vegetarian dishes ↑ meat ↓
<b>cold principal meals</b>	whole-grain ↑ low-fat milk (products) ↑ fruit, vegetables ↑ charcuterie ↓
↑ increase, ↓ reduction	

Tab. 1: Changes to canteen meal options in accordance with the optimized mixed diet (OMD)

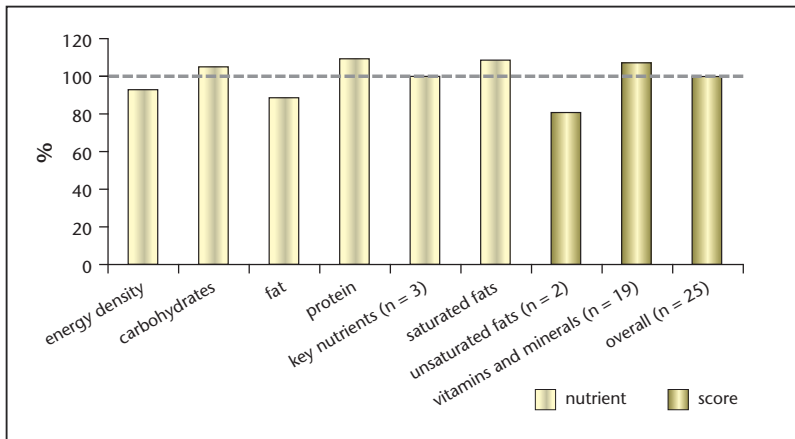


Fig. 1: Percentage proportions of nutrients and scores of the children's menu against the optimized mixed diet (OMD) reference values

Overall, the nutrient contents of the daily diet met the OMD criteria within the permitted range (75–125 %) (♦Figure 1). The proportion of carbohydrates, fat and protein in energy supply was 55, 29 and 16 % respectively.

### Introduction of the children's menu

♦Figure 2 shows the children's menu which was first introduced alongside the original meal selection, yet was planned to be the sole offering in the long-term.

mation events were held for ward personnel, to explain the new food selection and to ensure a smooth operation.

relatively large portions of plant-based foods for older children and young people, to make standardized cooking possible.

The taste acceptance of meals and dishes was recorded before and after optimization among children and young people aged 3–17. Due to short hospital stays the pre- and

The acceptance of the optimized meals was ascertained from selected wards. To this end, surveys were conducted by the FKE before and after the introduction of the new children's menu. This took place using question-supported interviews and questionnaires. Children on a special diet were excluded. The taste acceptance of the meals was questioned based on a hedonic scale (very good = 1, up to very bad = 5).

## Results

### Development of the children's menu

Snacks were introduced to adapt the existing meal structure to the OMD. Changes in the composition of the food options (e. g. increased use of whole-grain products, vegetables and fruit, reduction of meat portions and use of low-fat milk products) affected all meals (♦ Table 1). For the implementation of recipes into daily canteen routine, preparation methods had to be chosen that were suitable for the steam cooking system. Portion sizes also had to be partially adapted to the special crockery. As a result, it was necessary to reduce the



Fig. 2: Front (a) and reverse (b) of the illustrated children's menu for the optimized mixed diet [2., updated edition]

post-surveys had to be carried out with different collectives. The mid-day meal overall and its individual components were valued higher after optimization than before (♦ Table 2). The optimized midday meal received an average score of 2.19, compared to a score of 2.67 before optimization. In contrast, the cold meals and their components were (except for bread topping) valued lower after optimization than before. The snacks were either not selected or returned untouched.

## Discussion

In the above-mentioned study, the introduction of the optimized mixed diet and all related meals to the canteen was examined among children and young people. The initial experiences with the “optimized” children’s menu demonstrate that with communicative personnel in a children’s hospital canteen, a food selection in accordance with the OMD is possible for children and young people. For this offering to be accepted on the wards and by the children, cooperation from medical personnel acting as intermediaries to the children is essential.

The original canteen food selection for the paediatric clinic comprised a children’s lunch menu with four meals, a lunch menu for adults and a free selection for cold meals. The new “optimized” children’s menu continued to allow the children a daily diet composition according to their wishes, yet at the same time a diet according to the OMD.

The optimized children’s menu attained the OMD nutrient criteria on average. In comparison to the OMD, it was lower in fat (29 vs. 33 energy percent [E%]), compensated by higher carbohydrate and protein proportions (55 vs. 53 E% and 16 vs. 14 E% respectively). The lower fat content is explained by the use

Meal resp. components	Average score		Difference
	before optimization (n)	after optimization (n)	
<b>hot principal meal</b>	<b>2.67 (67)</b>	<b>2.19 (54)</b>	<b>0.48*</b>
noodles	2.06	1.78	0.28
potatoes	2.75	2.5	0.25
rice	2.46	2.28	0.18
meat/fish/egg	2.47	2.32	0.15
vegetables	2.84	2.56	0.28
sauce	2.38	2.02	0.36*
<b>cold principal meals</b>	<b>2.09 (116)</b>	<b>2.41 (27)</b>	<b>-0.32</b>
bread/flakes	2.04	2.33	-0.29
spread	2.16	2.34	-0.18
topping	2.44	2.13	0.31
vegetables/fruit	2.21	2.32	-0.11

1 = very good; 5 = very bad, \*p < 0.05 (Mann-Whitney U Test)

Tab. 2: Taste evaluation of hot and cold principal meals and their respective components by the children

of low-fat variants of milk (products) and meat and the relinquishment of frying fat during steam cooking processes. The high proportion of saturated fats is (among other reasons) due to the use of processed foods, particularly processed sauces and salad dressings, and the comparably low usage of cooking oils. The extent to which there may be room for a general change in products and suppliers on the part of the meal provider was not examined as part of the above-mentioned study.

For practicability reasons in the canteen and hospital routine, the portion sizes were limited to only two relatively broad age groups. As there was only one portion size for all age groups before the introduction of the optimized children’s menu, the division into two groups represented progress towards age-related portioning of meals in accordance with the OMD in comparison to the existing system.

Through this division, the food-related recommendations for the younger age group were achieved without any problems. In the group of older children and young people (10–18 years), the originally recommended amounts, particularly of potatoes/noodles/rice and vegetables, partially exceeded the volume capacity of the plates used as part of the cooking system. The food was adapted to the plates, so amounts were reduced; even after reduction, however, this fell within the accepted range of 75–125 %.

The offer of healthy meals alone is insufficient to arouse the interests of children. In fact, the results of the survey show that the illustrated children’s menu was regarded as helpful for choosing meals by the majority of children questioned. Therefore, the menu still needed to be communicated more intensively. Here the hospital personnel could have an effect as positive reinforcers and the trust accorded to medical

**Glossary**

**food neophobia** = refusal to/aversion of new (unknown) foods

personnel could produce an effect among children and adults.

Basically, so-called **food neophobia** among children must be taken into account in the introduction of foods. This can be overcome through repeated offering [11] and a combination of the known and unknown [12], such as e. g. the mix of “normal” white and whole-grain noodles. Only limited familiarisation is to be expected during most short stays and must be supported by corresponding offerings in the child’s family routine.

The optimized cold principal meals at breakfast and evenings were unexpectedly poorly accepted by the children. This could be due to a discrepancy between the fixed composition of meals and the eating habits of children in the family, e. g. through the frequent use of whole-grain bread and raw food in the OMD. The lack of options for variation was criticized by many children. A free choice of components, with which the acceptance of cold meals could have been improved, could not be implemented as part of this feasibility study, as corresponding control options, e. g. electronic recording of individual selection and comparison with the other meals selected in the day, were not available.

The snacks introduced as part of the optimization of meal selection were only ordered by a few children. This could be due to insufficient communication. Nonetheless, snacks remain part of the children’s menu, because they make an important contribution to nutrient provision in the OMD. This also applies to the prevention of malnutrition in the hospital [13].

**Limitations**

A key limitation of the study was that, due to normal hospital conditions, the pre- and post-surveys had

to be carried out with different collectives. However, the questionnaires used and the cooking process, which has been used professionally for many years at ServiceDO GmbH, were the same on both occasions.

A possible disadvantage could also be the special cooking process, which stipulates highly professional equipment and is barely used in Germany. It could therefore be seen as an advantage that the feasibility of the OMD was examined under these demanding conditions. It can be assumed that transferability into a traditional hospital kitchen would be simpler. As a result, conclusions can be drawn for further applications (e. g. in rehabilitation clinics). This relates to e. g. the standardized composition of cold meals and snacks, the handling of processed foods and the motivation of kitchen and ward personnel. Regardless of these limitations it seems appropriate, in terms of public health and behavioural prevention, to use even a relatively short period to easily acquaint many children and adults of various socio-demographic backgrounds with healthy food. One advantage of the above-mentioned study is therefore that it enabled the kitchen processes and nutritional evaluation processes used to introduce optimized meals into children’s full-time care to be tested and their basic feasibility to be demonstrated.

**Conclusions**

As part of the research project Previkids NRW, the feasibility study has shown that the optimized mixed diet is fundamentally possible in a paediatric hospital. In fact, the major challenge of implementing the OMD as the fixed daily diet proved possible for the canteen, yet was not completely accepted by the children. In future, the OMD with the children’s menu shall be the standard offering in the paediatric clinic, but the decision on the selection of cold principal

meals and snacks shall be left to the children and avoidance of the free selection from the general offering shall be allowed. Children can thus gradually and voluntarily decide on the OMD.

Speedy recovery is the priority in a paediatric hospital for children, adults and medical personnel. In these circumstances and in the unfamiliar hospital environment, children and adults are possibly less receptive to new things in food in comparison to family habits. If an empathetic and persuasive introduction by medical personnel could arouse the interest of the children and parents in the OMD, the feasibility of a preventative diet from the start might be achieved in these exceptional circumstances.

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**Conflict of Interest**

Professor Dr. Mathilde Kersting is Scientific Director of FKE GmbH.

The other authors declare no conflict of interest according to the guidelines of the International Committee of Medical Journal Editors.

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