Every day, many people are catered for in hospitals and rehab clinics, old people’s homes, childcare centres, schools and school recreation camps, as well as corporate catering facilities. Due to the state of their health, their young or advanced age or their intake of certain medications, some catering participants are particularly susceptible to foodborne infections. In some cases, illnesses of this kind can result in severe health damage or even death. Mistakes made when selecting and preparing food can have fatal consequences, especially for particularly vulnerable groups of people.

Although people in this category can protect themselves in the gastronomy, hotel and corporate catering sector by choosing what they eat by themselves, this is only possible to a limited extent in certain curative and care facilities. For this reason, the operators of these facilities, including the management boards of clinics and homes, have a special responsibility for preparing and selecting the food. From a legal point of view, the responsible persons in facilities of this kind must ensure that the food they produce is safe, just like other food business operators.

The Commission for Hospital Hygiene and Infection Prevention at the Robert Koch Institute (KRINKO) has published requirements for hygiene in the medical care of immunosuppressed patients (1). Supplementary to these and the existing guidelines and DIN standards, the German Federal Institute for Risk Assessment (BfR) has prepared these recommendations in cooperation with the BfR Commission for Hygiene. They are aimed primarily at the management of childcare centres, old people’s homes and hospital kitchens, as well as hygiene specialists and the administrative directors and boards of trustees of curative and care institutions. These recommendations are intended to help the responsible persons in facilities which regularly cater for especially vulnerable sections of the population in the implementation of the existing legal provisions.
The challenge for large-scale catering

Foodborne diseases can occur in institutional catering (IC) when pathogens are carried into canteen kitchens via raw foods or infected personnel and spread to prepared foods through a lack of hygiene in the kitchens. Inappropriate temperature regimes can lead to survival and growth of pathogens in foods. For this reason, important elements in protecting against foodborne diseases are the conducting of hazard analyses, comprehensive personnel training and a functional separation of clean and unclean areas. Within the scope of in-house checks, the temperature control of the food supply should be examined critically all the way through from preparation to consumption, and a suitable transport system selected.

The differences between catering for especially vulnerable people and other IC facilities, such as dining halls and work canteens, exist primarily with regard to:

- Foods and food ingredients which should not be served
- Raw materials which should not be processed if possible
- Demands on suppliers
- Formulation of details in work instructions
- Frequency and intensity of operational monitoring measures (incl. temperature controls)
- Frequency and quality of staff training

Especially vulnerable persons

Especially vulnerable persons as defined by these recommendations include people whose body’s defences are either impaired with regard to foodborne infections or are not yet fully developed. These include:

- Children up to the age of 5
- Elderly people (especially if their immune system is weakened)
- Pregnant women
- Persons whose body’s defences are weakened by a previous illness or intake of medication (see KRINKO recommendation)

These groups of persons are often referred to by the abbreviation YOPi which stands for young, old, pregnant, immunosuppressed.

Hazard analysis and critical process stages

Because microbiological hazards (e.g. *Salmonella* or *Listeria*) are of vital importance when catering for especially vulnerable persons, the concentrations of pathogens in foods must be minimised even when selecting the ingredients and the recipes.

Every kitchen operator and everyone with responsibility for serving food is legally obliged to ensure that the foods they distribute are safe (2). For this reason, a system based on the HACCP principles must be established and continuously applied in all IC facilities (3).

HACCP is a system which helps to identify, evaluate, continuously record and control significant health risks in foods through all processing stages. You can find more information on this in the leaflet “Fragen und Antworten zum HACCP-Konzept” (in German only) under www.bfr.bund.de

A key element of this system is the hazard analysis which has to consider for which consumer groups the produced foods are intended. It must be taken into account here that different groups of persons have to be looked after in facilities such as hospitals and clinics, including those who have no restrictions with regard to what they eat.

In institutional catering, hazard analysis means that every step in the process, from the planning of the menu through procurement to the serving of the food has to be analysed with regard to whether the health of the persons catered for will be endangered if the step in question is not under control. It is essential here that every identified risk can be minimised or removed. If this is not possible, the planning of the food preparation and/or purchasing of raw products must be altered in such a way that the risk cannot occur in the first place. The necessary measures must be determined in procedural and work instructions and compliance with these must be strictly controlled and documented. The results of the hazard analysis determine to a great extent how the foods are to be produced and prepared.

The principle of hazard analysis should also be taken into consideration wherever food is produced and consumed jointly by children in day care centres or by the occupants of care facilities. Foods which are consumed
immediately after being thoroughly cooked are recommended for therapeutic or educational cooking with these groups. When processing raw foods of animal origin, especially fresh meat and fish and raw eggs, meticulous hygiene should be ensured in order to avoid smear infection and cross-contamination.

The essential process stages which should be observed during hazard analysis in IC facilities with regard to the YOPI risk group are listed below.

**Selecting the right foods**

Foods of animal origin and several of plant origin can be contaminated with pathogens (bacteria, viruses or parasites) which constitute a serious health hazard to vulnerable persons. Accordingly, it is prohibited by law to serve products such as raw milk in institutional catering facilities, for example (4). In addition to this, IC facilities may only serve dishes prepared with raw eggs to especially vulnerable persons if a suitable method is available which guarantees the elimination of *Salmonella* bacteria prior to serving (5).

In addition to this, the ready-to-eat foods listed below can contain pathogens in quantities which could, under certain circumstances, have severe effects on the health of persons whose body’s defences are impaired or not yet fully developed. If these foods are not intended to be heated directly before serving (see the “Cooking” section), it is advisable not to serve them to especially vulnerable persons.

**Foods of animal origin:**
- Dairy products (e.g. butter, mixed milk drinks and desserts) and soft cheese made from raw milk
- Sour milk cheese and soft cheeses made from pasteurised milk which are produced with a (yellow and/or red) surface smear (e.g. the varieties Harzer, Mainzer, Ölmützer Quargel, Limburger, Munster)
- Ice-cream produced in the IC facility
- Fresh ground pork, steak tartare and similar raw minced meat preparations, as well as raw sliced meat such as carpaccio
- Spreadable, rapidly matured, uncooked sausages (e.g. fresh Mettwurst, Teewurst, Braunschweiger)
- Unprocessed fish products or shellfish (e.g. sushi, oysters)
- Hot or cold smoked fish products (e.g. smoked salmon, smoked trout fillet)
- Gravlax

**Foods of plant origin:**
- Sprouts and shoots
- Frozen berries

For all other foods and beverages, it must be established on the basis of a hazard analysis whether it is possible to serve them to YOPIs, which other measures may be required to minimise the risks or whether they should not be served at all due to an increased health risk. The risk of food infections can be reduced, for example, by not only cleaning and thoroughly washing fruit and vegetables that are to be eaten raw, but also by peeling them if possible. To prevent the propagation of pathogens that already exist, fruit (especially melon pieces), raw and sliced vegetables and leaf lettuces should be consumed immediately or refrigerated after chopping.

The decisive factors are whether and in what numbers potentially health-damaging microorganisms are to be expected in the finished food at the time of consumption and for whom the food is intended. When catering for pregnant women and people who are particularly vulnerable due to a massive impairment of the body’s own defences against listeria infections, it can be advisable to heat not only raw foods but also pre-heated, ready-to-eat foods before serving. Alternatively, these foods can be substituted by other ready-to-eat foods which are free of listeria due to the production method (e.g. canned foods). More tips on how to protect against infections with Listeria can be found at BfR Consumer Tips “Protection against food infections with Listeria” (German only).

In certain cases, the consumption of foods containing probiotic cultures can also pose a hazard. The Commission for Hospital Hygiene and Infection Prevention (KRINKO) recommended in 2010 that all hospitals stop serving probiotic foods to immunosuppressed patients until a sufficient number of studies on their safety are available.

It is also advised against reusing foods produced in excess of requirements. This can only be considered if the foods were not negatively influenced during interim storage and it can be proven that temperature requirements were complied with during all phases of refrigeration, cooking and keeping warm. Delicatessen salads and cream dishes, including cakes with a cream filling not baked all the way through, and cream containing confectionery products must be disposed of under all circumstances at the end of the production day. Other dishes produced in excess of requirements which have not left the kitchen area can be frozen or should be properly stored and used up within two days after sufficient reheating.
Procurement of goods

Specifications for the foods to be procured can be taken from the hazard analyses. It is important to select suppliers who can prove their ability to guarantee the required quality. It is not sufficient to merely shift responsibility for the microbiological properties of the raw ingredients to the supplier, e.g. by means of a specification stating “free of pathogenic germs”.

In the interest of preventing foodborne infections, it is also recommended that catering facilities minimise the risk of introducing and subsequently spreading pathogens in their kitchens by imposing “procurement bans” for certain raw foodstuffs. Food ingredients with a higher processing level (degree of convenience), such as preportioned meat preparations or pasteurised whole eggs, can help to reduce the introduction of germs to the production process.

Storage

Proper storage can prevent the introduction of pathogens to foods and their propagation and spread throughout the premises. It is important to have written procedural instructions on such matters as how to deal with stored foods requiring refrigeration in the event of a technical breakdown.

Foods which can easily be recontaminated with Listeria after heat treatment through further processing steps, such as slicing and packaging, thus enabling the growth of the bacteria, should be regarded critically. This includes meat products, such as sliced boiled sausages soft cheese and self-prepared delicatessen salads. As listeria bacteria are fundamentally capable of proliferating at cooler temperatures, it is recommended that foods of this kind be consumed as fresh as possible prior to the expiry of their best-before date. They should not be used at all if the cold chain has been interrupted.

Preparation/interim storage of semi-finished products

A lack of hygiene can allow germs to get into foodstuffs and spread under certain circumstances. That is why the spatial and/or chronological separation of “clean” and “unclean” processes has to be monitored particularly strictly in IC facilities which regularly cater for especially vulnerable persons. This should go hand in hand with a clear segregation of equipment and work surfaces.

Cooking

As most pathogens die off in foods through sufficient heating (minimum +72 °C for two minutes at the core), compliance with the necessary temperature specifications and the regular control thereof are of vital importance when cooking foods. To this end, the core temperature should be measured as often as possible. With low-temperature cooking processes, temperatures of at least +65 °C must be reached and cooking times extended in such a way that the same level of microbiological safety is achieved.

Cooling

Heat-resistant bacterial spores are insensitive to cooking processes at temperatures of up to 100 °C. If hot foods are cooled down slowly, these spores can germinate so that high concentrations of pathogens can build up which could possibly form toxins. For this reason, kitchen staff must adhere strictly to the instructions for re-cooling and refrigeration. The prerequisite is that the kitchen is suitably equipped with the appropriate appliances. Foods which are produced hot and served cold at a later point in time (e.g. cooked pudding) should be cooled down to below +10 °C within max. 120 minutes and then kept at a constant temperature of max. +7 °C until served. Even stricter temperature and time specifications apply to foods produced using the Cook & Chill method (see the table “Hazard analysis for hot food” for more information).
Using the Cook & Chill method, foods are quickly chilled to +3 °C to +1 °C shortly before the end of the cooking process, transported and stored under refrigeration, reheated immediately before consumption and served hot.

Regeneration/Final Cooking

Regeneration is understood to be the reheating of fully cooked dishes before serving them hot, whereas final cooking is the completion of the cooking process of pre-cooked foods. In order to safely eliminate subsequently introduced pathogens and germinated bacterial spores in foods, the temperature specifications and checks should also be complied with in this process stage (see “Cooking”).

Keeping warm/Portioning

As properly cooked foods no longer contain any unspored germs capable of reproduction, germinating bacteria spores can grow in them unchallenged under certain circumstances and form toxins. This hazard is most prominent with dishes portioned on trays for hospital catering. Keeping foods warm in the correct manner (over +65 °C for max. three hours incl. transport) can prevent any existing spores from germinating. It should be ensured by means of suitable methods and equipment (e.g. transport systems with active heat retention), as well as regular temperature checks when serving the food, that these requirements are complied with.

Serving

Clear regulation and agreements between the production and serving points are required where the serving of food is concerned (interface management). Only in this way can a high level of food hygiene, including temperature specifications, be guaranteed. Hot foods should be served at a minimum temperature of +65 °C. With cold dishes (e.g. salads, desserts), it should be ensured that they are kept at a maximum of +7 °C before serving and that they are consumed without delay thereafter.

Examples of a detailed hazard analysis for the production of hot food and for an HACCP plan developed from it are listed in the annex (Page 7/8).

Monitoring Measures

IC facilities which regularly cater for especially vulnerable persons should place paramount importance on temperature monitoring. The availability of suitable measuring instruments (e.g. data recording devices for refrigeration areas, cooling and transport processes) and their regular calibration are the necessary prerequisites for this. As the orderly implementation of cleaning and disinfection measures is also of great importance, their effectiveness should be checked as often as possible using suitable methods. It goes without saying that all monitoring measures should also be carefully documented.

Components of the Hygiene Management System

- Basic hygiene measures with regard to cleanliness and tidiness, cleaning and disinfection
- Care of the infrastructure and equipment, including maintenance
- Compliance with and control of temperatures
- Hygienically correct handling of foods under observation of production instructions
- Measures of the operational HACCP system incl. proper documentation of all operational self-assessment measures, including those at the Critical Control Points (CCPs)

Personnel

Personnel play a key role in the above-mentioned curative and nursing institutions, because any mistakes made by personnel in the production of food can trigger severe illnesses among especially vulnerable persons in particular. To ensure that personnel can meet the special requirements on hygiene, they must be professionally qualified, thoroughly acquainted with the in-house self-assessment systems and hygiene management measures, and regularly trained (6). In addition to the conveying of knowledge, it all depends on sensitising and motivating the staff in such a way that they comply with the hygiene rules on their own. This concerns the personal hygiene of each individual on the one hand (e.g. regular hygienic hand washing, the wearing of hygienic clothing, including a head covering and disposable gloves where necessary, and a ban on jewellery and smoking), as well as the correct implementation of the control measures on the other (compliance with all instructions, immediate reporting of any deviations, precise documentation).
SAFE FOOD: ESPECIALLY VULNERABLE GROUPS IN COMMUNAL FACILITIES

Businesses which cater regularly for especially vulnerable people must observe the following in particular:

- Sufficient personnel with the relevant professional training and experience must be employed; kitchen manager and deputy must have knowledge and experience of hygiene management and the HACCP concept
- New staff should be carefully selected with verification of the necessary specialised knowledge
- Prerequisites should be created to ensure that work bans (7) are observed by staff members; minimise the risk of infected persons handling foods by taking additional health monitoring measures
- Training should be conducted several times a year with increased intensity while pointing out the special risks for YOPIs
- Personnel in hospital and nursing home wards should also be trained in food hygiene matters

NOTES ON PERSONNEL TRAINING

Regular training with small blocks of subjects attracts more attention and creates more motivation for the correct and proper implementation of all hygiene measures. The following is important when conducting staff training:

- Training contents and the manner in which they are conveyed should be adapted to the previous knowledge and fields of activity of the personnel undergoing training
- Personnel fluctuation increases the need for instruction and training
- Hygiene rules should be justified with the appropriate background information
- Rules for the serving of food and temperature specifications should always be addressed
- Always refer to the special vulnerability of YOPIs and the resultant restrictions and special requirements where the choice of food is concerned
- Ensure that the kitchen manager and deputy are also given intensive training in theoretical and legal requirements, as well as the principles of hygiene management and HACCP
- Make use of new (interactive) media above all for the self-assessment of acquired knowledge
- Combine on-the-job training with practical exercises, e.g. in the serving of food
- Document training and always combine it with a performance and comprehension check (counter-signing alone is not sufficient)

OTHER VALID DOCUMENTATION

- www.bfr.bund.de/en: Information and leaflets
- Consumer tips on protection against food infections with Listeria (German only): www.bfr.bund.de/cm/350/verbrauchertipps-schutz-vor-lebensmittelinfektionen-mit-listerien.pdf
- DIN 10506, Food Hygiene – Institutional Catering
- DIN 10508, Food Hygiene – Temperatures for Foods
- DIN 10514, Food Hygiene – Hygiene Training
- DIN 10526, Food Hygiene – Reference Samples in Institutional Catering
- Deutscher Caritasverband e.V. and Diakonisches Werk der Evangelischen Kirche in Deutschland e.V. (pub.): Cooking in Communal Facilities. Guideline for good food hygiene practices in social institutions, ISBN 978-3-7841-1788-1
- Lund BM. Microbiological food safety and a low-microbial diet to protect vulnerable people. Foodborne Pathog Dis 2014; 11(6): 413–424
Appendix

Hazard analysis “Production of hot food”

The process stages which are of particular importance for the production of hot food for vulnerable persons in institutional catering facilities are listed in more detail below.

The potential biological hazards and appropriate preventive measures in these process stages are listed in the table below. General hygiene measures of good manufacturing practice are included as Hygiene Control Points (HCP).

<table>
<thead>
<tr>
<th>Process Stage</th>
<th>Raw Material/Product/Individual Process</th>
<th>Hazard</th>
<th>CCP or HCP</th>
<th>Preventive Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving</td>
<td>All foods</td>
<td>Pathogenic microorganisms, mycotoxins</td>
<td>HCP</td>
<td>• Visual inspection of deliveries for contamination, damaged or soiled packaging, pest infestation and spoilage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• With foods requiring refrigeration (including semifinished products such as pre-cleaned vegetables, packed peeled potatoes) and deep-frozen foods, additional checks for compliance with the cold or deep-freeze chain and delivery temperature (see also Storage)</td>
</tr>
<tr>
<td>Storage</td>
<td>Foods requiring refrigeration and deep-frozen foods</td>
<td>Pathogenic microorganisms, mycotoxins</td>
<td>HCP</td>
<td>• Observe best before dates and manufacturers’ information on storage temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If no information is provided, the following temperature recommendations apply:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>–18° C or lower: deep-frozen foods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>max. +2° C: raw meat and poultry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>max. +7° C: dairy products, ready to eat foods and foods requiring refrigeration, pre-cleaned vegetables and peeled potatoes</td>
</tr>
<tr>
<td>Preparation</td>
<td>Preparation of interim products, preparing ingredients for cooking containers</td>
<td>Salmonella and other unspored pathogenic bacteria</td>
<td>HCP</td>
<td>• Use egg products where possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If raw eggs are used, crack them open at a separate workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Process all interim products containing raw eggs separate from other foods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Further process or refrigerate all interim products without delay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Cleaning/disinfection of hands and equipment</td>
</tr>
<tr>
<td>Cooking</td>
<td>Individual hot components or complete hot dishes</td>
<td>Unspored pathogenic bacteria</td>
<td>CCP1</td>
<td>Heat to +72 °C core temperature for at least two minutes reaction time or equally effective process</td>
</tr>
<tr>
<td>Filling and portioning</td>
<td>Cooked foods</td>
<td>Pathogenic spore-forming bacteria (Bacillus cereus, Clostridium perfringens); pathogenic bacteria (recontaminations)</td>
<td>HCP</td>
<td>Hygienic work methods, short standing times</td>
</tr>
<tr>
<td>Keeping warm, serving (Cook &amp; Serve)</td>
<td></td>
<td></td>
<td>CCP2</td>
<td>Keep warm at min. +65 °C core temperature for max. three hours</td>
</tr>
<tr>
<td>Quick chilling (Cook &amp; Chill)</td>
<td></td>
<td></td>
<td>CCP3</td>
<td>Cool from +65 °C core temperature to below +4 °C within 90 minutes</td>
</tr>
<tr>
<td>Regeneration or final cooking</td>
<td></td>
<td></td>
<td>CCP4</td>
<td>Heat to +72 °C core temperature for at least two minutes reaction time or equally effective process</td>
</tr>
</tbody>
</table>

The criteria for classification as Critical Control Points (CCP) are:
- A lack of control of the process stage will lead to an unacceptable health risk for the catering participant.
- The risk cannot be sufficiently reduced in a subsequent process stage.
- The hazard potential can be sufficiently reduced in this process stage by taking measures to control the risk.
Example: HACCP plan for “Production of hot food”

<table>
<thead>
<tr>
<th>CCP-No.</th>
<th>Process stage</th>
<th>Hazard to be controlled</th>
<th>Control measures</th>
<th>Benchmark</th>
<th>Limit value</th>
<th>Monitoring</th>
<th>Corrective measure</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cooking</td>
<td>Unspored pathogenic bacteria</td>
<td>Correct cooking temp. and times</td>
<td>+72 °C core temperature reached or similarly effective process</td>
<td>Compliance with time-temperature settings; core temperature measuring with foods with which it is difficult to recognize when the target temperature has been reached</td>
<td>Re-cook</td>
<td>AA No. ... Head chef</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Keeping warm, serving (Cook &amp; Serve)</td>
<td>Pathogenic spore-forming bacteria (Bacillus cereus, Clostridium perfringens); bacterial food infection pathogens (recontamination)</td>
<td>Correct keep warm temp. and duration</td>
<td>+65 °C core temperature, three hours (incl. transport)</td>
<td>Measure temperature before serving</td>
<td>Dispose of product</td>
<td>AA No. ... Head chef</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Quick chilling (Cook &amp; Chill)</td>
<td>Correct cool down speed</td>
<td>From a core temperature of +65 °C to below +4 °C in 90 minutes</td>
<td>Measure temperature after 90 minutes</td>
<td>Dispose of product</td>
<td>AA No. ... Head chef</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Regeneration or final cooking</td>
<td>Correct heating temp. and duration</td>
<td>+72 °C core temperature reached or similarly effective process</td>
<td>Compliance with time-temperature settings; core temperature measuring with foods with which it is difficult to recognize when the target temperature has been reached</td>
<td>Keep heating</td>
<td>AA No. ... Head chef</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References

5. Art. 20 a of Tier-LMHV, References. (4)
6. Art. 4 and Appendix 1 of the regulation on hygiene requirements when producing, treating and marketing certain foods (Food Hygiene Regulation – LMHV) of 08 August 2007, BGBl I, No. 39, P. 1816, last amended by the First Regulation on the Amendment of Regulations on the Implementation of Community Food Hygiene Law (Article 1 Amendment of the Food Hygiene Regulation) of 11 May 2010, BGBl I, 2010, No. 23, P 612–619 (in its currently valid version); Regulation (EC) No. 852/2004, Appendix II Chapter XII

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This text version is a translation of the original German text which is the only legally binding version.

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