

# German Federal Association of Hospital Pharmacists national survey of clinical pharmacy services in Germany, 2024

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## ABSTRACT

**Objectives** Clinical pharmacy care in German hospitals has recently evolved, driven by digitalisation and legal reforms. The only comprehensive overview of clinical pharmacy care in Germany was published in 2019. The current survey aims to update and describe the status quo of clinical pharmacy services in Germany, highlighting developments in this field since the previous publication.

**Methods** In 2024, an online survey with 45 questions was carried out among chief pharmacists, organised within the German Federal Association of Hospital Pharmacists (ADKA) e.V. (n=328). The survey collected structural data (eg, beds and workforce), as well as information on the extent and range of clinical pharmacy services.

**Results** The survey received 135 responses, resulting in a response rate of 41%. The provision of clinical pharmacy services (CPS) was already well established in 114 pharmacies (85.7%), meaning at least 32.4% of all German hospital pharmacies offer CPS. The average number of full-time equivalents dedicated to these services per hospital pharmacy is 4.3, which is an increase of 1.9 full-time equivalents compared with the first survey. Critical care units and general and trauma surgical wards were the most commonly served. The regular patient-centred services were offered daily or 2–3 times weekly, respectively.

**Conclusions** This follow-up survey provides a comprehensive overview of the developments since the initial survey, offering a detailed analysis of the current status of CPS in German hospitals. A general improvement has been observed regarding the range of services offered, utilisation of workforce resources and frequency of service delivery. Despite this positive development, further measures are necessary to ensure the enhancement and improvement of CPS in all hospitals.

## INTRODUCTION

Implementing clinical pharmacy services (CPS) remains a challenging goal, particularly within the German healthcare system, despite the 2021 commitment of the Federal Association of German Hospital Pharmacists (ADKA) e.V. to ‘closed loop medication management’.<sup>1</sup> In this vision, clinical pharmacists (CPs) and the digitalisation of the medication process are key factors contributing to safe and effective medication use for hospital inpatients. The number of German hospital pharmacists remains low compared with other European countries. By the end of 2023, around 477 000 hospital

## WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The only comprehensive overview of clinical pharmacy services (CPS) in Germany was published in 2019. Due to legal changes and significant advances in digitalisation in Germany, it was deemed essential to update the data.

## WHAT THIS STUDY ADDS

⇒ This follow-up investigation provides a current, comprehensive overview of CPS in German hospitals. The number of full-time equivalents dedicated to these services per hospital pharmacy, and the range and frequency of the services offered, have all increased compared with the first German survey in 2019.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings can support and promote the further development and improvement of CPS in Germany, as well as being helpful for updating and expanding the recently published ADKA standards in the field of CPS.

beds were registered, yet only 3041 hospital pharmacists were employed. This equates to 0.64 hospital pharmacists per 100 beds, thus showing a slight increase compared with previous analyses.<sup>2,3</sup> Furthermore, a resolution from the Council of Europe advocates for the systematic integration of pharmacy care into national healthcare systems, explicitly emphasising the development of comprehensive CPS in hospitals.<sup>4</sup> The role of qualified pharmacists should be strengthened through appropriate training and continuing professional development. The resolution calls for the active promotion of pharmacy care among all relevant stakeholders aiming for a widespread acceptance and shared responsibility for implementing CPS.<sup>4</sup> Several other European countries focus on establishing broader CPS in hospitals.<sup>5–9</sup> One of Europe’s most comprehensive programmes for patient-centred clinical pharmacy care is the NHS Scotland polypharmacy guidance.<sup>10</sup>

To obtain the necessary skills to deliver CPS and maintain a standardised training level in Germany, the specialisation curriculum ‘Medication management in hospital’ was created in 2018 and the German Federal Chamber of Pharmacists issued relevant recommendations on content and procedure.<sup>11</sup> Since then, it has been recognised as a



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nationwide specialisation course. This advanced training marks an essential step towards more specialised ward-based pharmacists in Germany.

In 2019, the first extensive data from a national survey on CPS in Germany were published.<sup>1</sup> Since this survey was conducted, the above-mentioned specialisation has been introduced and legal changes have come into force<sup>12</sup> that promote significant improvements to the digital medication process and medication management. These changes facilitate the implementation of pharmacist-led medication reviews (MRs) and medication reconciliation (MedRec), as outlined in the WHO's 'Action on Patient Safety – High 5s' initiative.<sup>13</sup> Establishing and maintaining digital medication processes along with patient-specific prescription monitoring requires well-trained CPs. Moreover, the number of pharmacists employed in German hospital pharmacies has increased by 27% since 2019, despite a 6% decline in the total number of hospital pharmacies. These significant changes in the working environment of hospital pharmacists in Germany gave rise to a follow-up survey on the current status of CPS in German hospitals.

The survey aimed to assess the current situation regarding the number of CPs employed, the services provided in terms of frequency and scope, the medical departments served, and the differences across various hospital types, and compare it with the results of the first survey. Another goal was to determine whether the increase in the number of hospital pharmacists is linked to a broader range of CPS.

## METHODS

An anonymous online questionnaire was created using the Survey Monkey tool (version October 2024, questionnaire available as an online supplement) and the survey published by Schulz *et al* in 2019.<sup>1</sup> Experts reviewed the questionnaire, which is divided into four sections: general information (seven questions), current and future clinical pharmacy care (26 questions), prescribing of medicines (two questions), and quality assurance (10 questions). Section 1 collects data on hospital pharmacy demographics. Section 2 describes the extent of and resources for CPS. Section 3 is about the medication process and prescription practices. Section 4 is about the quality assurance of CPS and workforce qualifications. Free-text entries were allowed at the end of each section. In this survey, a CP is a professional who optimises medicines use, for example, through MR. CPs

maintain direct contact with patients, doctors and other health-care professionals. The survey was emailed in November 2024 to all chief pharmacists (n=328) who were ADKA e.V. members, with an announcement letter and a link to the online questionnaire. It was open for 8 weeks, from November 2024 to January 2025. Reminders were sent in December 2024 and January 2025. Microsoft Excel, version 2019, was used for the descriptive analysis. The results and free-text comments were discussed by the expert group.

## RESULTS

A total of 135 responses were received from 328 contacted chief pharmacists, with 83% (111/135) being answered completely. This translates to a response rate of 41% (135/328). Most participating hospital pharmacies are affiliated with general hospitals (41.5%; 56/135), followed by university hospitals (23.0%; 31/135), maximum care hospitals (20.7%; 28/135), and specialised care hospitals (14.8%; 20/135). On average, a pharmacy provides services to 1398 beds (SD±1002) and employs 9.4 full-time equivalent (FTE) pharmacists (SD±7.8), including 4.3 FTE CPs (SD±4.6). For those providing CPS, a pharmacy manages 1498.2 beds (SD±1042.3) and employs 10.3 FTE pharmacists (SD±8.1), with 4.3 FTE CPs (SD±4.6). The median number of FTE CP per hospital is 3 (IQR 1–5.75), as few hospitals have a high number of CPs (see [table 1](#)).

CPS were offered by 85.7% (114/133) of pharmacies, while 5.3% (7/133) planned to implement them within the next 12 months, and 9.0% (12/133) reported they do not provide CPS. A government initiative on digitalisation (KHZG)<sup>12</sup> led to a workforce increase in 31.6% (42/133) of pharmacies, with 59.5% (25/42) comprising CPs and 40.5% (17/42) comprising other pharmacy personnel. However, 68.4% (91/133) stated that the KHZG did not increase personnel. CPs are primarily employed in hospital pharmacies (92.3%, 96/104). As a result, they are mainly funded through pharmacy budgets (78.6%, 81/103; multiple answers possible). Other sources of funding include the central hospital budget (15.5%, 16/103), the budgets of medical departments (6.8%, 7/103), and shared funding between the pharmacy and medical departments (6.8%, 7/103). Only 9.6% (10/104) of pharmacies have internal cost allocation for CPS. The percentage of CP weekly working hours allocated to CPS varies widely, with an average of 43% (SD±30.8, n=93).

**Table 1** Overview of pharmacists employed (persons/FTE) in hospital pharmacies offering CPS (n=110 valid responses, ie, not blank)

|  | University hospital | Maximum care hospital | General hospital | Specialised care hospital | Total           |
|--|---------------------|-----------------------|------------------|---------------------------|-----------------|
| Number of hospital pharmacies answering the question                 | 27                  | 25                    | 44               | 13                        | 109             |
| Total pharmacists (FTE)  | 493.2               | 278.4                 | 283.9            | 71.9                      | 1127.5          |
| Average number of pharmacist FTEs per hospital (min–max)             | 18.3 (3.5–40.0)     | 11.1 (2.0–26.0)       | 6.5 (1.5–27.0)   | 5.5 (2.0–9.5)             | 10.3 (1.5–40.0) |
| Number of hospital pharmacies answering the question                 | 27                  | 21                    | 35               | 11                        | 94              |
| Total clinical pharmacists (FTE, % of all pharmacists)               | 141.9 (29%)         | 107.6 (38%)           | 141.9 (50%)      | 15.2 (21%)                | 406.5 (36%)     |
| Average clinical pharmacist FTE per hospital (min–max)               | 5.3 (0.2–19.3)      | 5.1 (0.2–16.7)        | 4.1 (0–27.0)     | 1.4 (0–4.0)               | 4.3 (0–27.0)    |
| Number of hospital pharmacies answering the question                 | 25                  | 21                    | 38               | 11                        | 95              |
| Total clinical pharmacists (FTE) medication review                   | 125.2               | 57.1                  | 71.6             | 8.4                       | 262.2           |
| Average clinical pharmacists FTE per hospital with medication review | 5.0 (0–19.3)        | 2.7 (0–13.1)          | 1.9 (0–7.7)      | 0.8 (0–4.0)               | 2.8 (0–19.3)    |
| Number of hospital pharmacies answering the question                 | 27                  | 20                    | 34               | 11                        | 92              |
| Proportion of beds with CPS (average, range)                         | 39.9% (2–100)       | 37.4% (3–100)         | 31.0% (0–90)     | 17.7% (0–55)              | 33.7% (0–100)   |
| Number of hospital pharmacies answering the question                 | 25                  | 21                    | 36               | 11                        | 93              |
| Proportion of weekly working hours for CPS (average, range)          | 43.7% (3–100)       | 59.3% (0–100)         | 36.9% (0–100)    | 26.7% (4–90)              | 43.7% (0–100)   |

CPS, clinical pharmacy services; FTE, full-time equivalent.

**Table 2** Frequency and proportion of beds of medical departments provided with CPS

|                             | Frequency of CPS offered to departments |                 |               |               | Proportion of bed covered by CPS |               |              |              |               |
|-----------------------------|---|-----------------|---------------|---------------|----------------------------------|---------------|--------------|--------------|---------------|
|                             | Daily (Mon-Fri)                         | 2–3 times /week | Once a week   | On request    | <25%                             | 25–50%        | 51–75%       | 76–99%       | 100%          |
| Critical care/ anaesthesia  | 8.3% (7/84)                             | 27.4% (23/84)   | 44.0% (37/84) | 20.2% (17/84) | 23.7% (18/76)                    | 14.5% (11/76) | 10.5% (8/76) | 6.6% (5/76)  | 44.7% (34/76) |
| General surgery             | 36.7% (22/60)                           | 11.7% (7/60)    | 33.3% (20/60) | 18.3% (11/60) | 33.3% (18/54)                    | 9.3% (5/54)   | 7.4% (4/54)  | 9.3% (5/54)  | 40.7% (22/54) |
| Trauma surgery              | 29.0% (18/62)                           | 14.5% (9/62)    | 35.5% (22/62) | 21.0% (13/62) | 25.0% (13/52)                    | 15.4% (8/52)  | 7.7% (4/52)  | 7.7% (4/52)  | 44.2% (23/52) |
| Orthopaedics                | 35.7% (20/56)                           | 10.7% (6/56)    | 30.4% (17/56) | 23.2% (13/56) | 20.0% (9/45)                     | 13.3% (6/45)  | 15.6% (7/45) | 6.7% (3/45)  | 44.4% (20/45) |
| Haematology/oncology        | 34.7% (17/49)                           | 12.2% (6/49)    | 38.8% (19/49) | 14.3% (7/49)  | 20.9% (9/43)                     | 4.7% (2/43)   | 9.3% (4/43)  | 7.0% (3/43)  | 58.1% (25/43) |
| Internal medicine           | 28.3% (15/53)                           | 11.3% (6/53)    | 34.0% (18/53) | 26.4% (14/53) | 32.6% (14/43)                    | 18.6% (8/43)  | 4.7% (2/43)  | 7.0% (3/43)  | 37.2% (16/43) |
| Geriatrics                  | 26.4% (14/53)                           | 3.8% (2/53)     | 41.5% (22/53) | 28.3% (15/53) | 23.8% (10/42)                    | 7.1% (3/42)   | 7.1% (3/42)  | 4.8% (2/42)  | 57.1% (24/42) |
| Vascular surgery            | 30.6% (15/49)                           | 12.2% (6/49)    | 34.7% (17/49) | 22.4% (11/49) | 30.0% (12/40)                    | 2.5% (1/40)   | 10.0% (4/40) | 5.0% (2/40)  | 52.5% (21/40) |
| Gastroenterology            | 37.0% (17/46)                           | 13.0% (6/46)    | 26.1% (12/46) | 23.9% (11/46) | 31.6% (12/38)                    | 18.4% (7/38)  | 5.3% (2/38)  |              | 44.7% (17/38) |
| Cardiology                  | 22.9% (11/48)                           | 12.5% (6/48)    | 31.3% (15/48) | 33.3% (16/48) | 35.1% (13/37)                    | 13.5% (5/37)  | 10.8% (4/37) | 8.1% (3/37)  | 32.4% (12/37) |
| Neurology                   | 26.8% (11/41)                           | 17.1% (7/41)    | 31.7% (13/41) | 24.4% (10/41) | 26.5% (9/34)                     | 17.6% (6/34)  | 2.9% (1/34)  | 8.8% (3/34)  | 44.1% (15/34) |
| Palliative medicine         | 14.3% (6/42)                            | 16.7% (7/42)    | 26.2% (11/42) | 42.9% (18/42) | 39.4% (13/33)                    |               | 3.0% (1/33)  | 6.1% (2/33)  | 51.5% (17/33) |
| Urology                     | 38.5% (15/39)                           | 15.4% (6/39)    | 23.1% (9/39)  | 23.1% (9/39)  | 21.9% (7/32)                     |               | 3.1% (1/32)  | 15.6% (5/32) | 59.4% (19/32) |
| Gynaecology                 | 21.4% (9/42)                            | 4.8% (2/42)     | 31.0% (13/42) | 42.9% (18/42) | 38.7% (12/31)                    | 12.9% (4/31)  | 3.2% (1/31)  | 3.2% (1/31)  | 41.9% (13/31) |
| Paediatrics                 | 16.7% (6/36)                            | 5.6% (2/36)     | 25.0% (9/36)  | 52.8% (19/36) | 53.3% (16/30)                    | 3.3% (1/30)   | 6.7% (2/30)  | 3.3% (1/30)  | 33.3% (10/30) |
| Psychiatry                  | 16.7% (6/36)                            | 19.4% (7/36)    | 22.2% (8/36)  | 41.7% (15/36) | 33.3% (9/27)                     | 18.5% (5/27)  | 3.7% (1/27)  | 7.4% (2/27)  | 37.0% (10/27) |
| Neurosurgery                | 20.7% (6/29)                            | 20.7% (6/29)    | 34.5% (10/29) | 24.1% (7/29)  | 12.0% (3/25)                     | 16.0% (4/25)  | 4.0% (1/25)  | 8.0% (2/25)  | 60.0% (15/25) |
| Obstetrics                  | 21.9% (7/32)                            | 6.3% (2/32)     | 12.5% (4/32)  | 59.4% (19/32) | 43.5% (10/23)                    | 8.7% (2/23)   |              |              | 47.8% (11/23) |
| Neonatology                 | 10.0% (3/30)                            | 10.0% (3/30)    | 13.3% (4/30)  | 66.7% (20/30) | 36.4% (8/22)                     | 9.1% (2/22)   | 4.5% (1/22)  |              | 50.0% (11/22) |
| Plastic surgery             | 26.9% (7/26)                            | 7.7% (2/26)     | 23.1% (6/26)  | 42.3% (11/26) | 28.6% (6/21)                     |               |              | 9.5% (2/21)  | 61.9% (13/21) |
| Ear, nose and throat        | 25.9% (7/27)                            | 7.4% (2/27)     | 25.9% (7/27)  | 40.7% (11/27) | 19.0% (4/21)                     | 9.5% (2/21)   | 4.8% (1/21)  | 9.5% (2/21)  | 57.1% (12/21) |
| Nephrology                  | 29.6% (8/27)                            | 11.1% (3/27)    | 14.8% (4/27)  | 44.4% (12/27) | 27.8% (5/18)                     |               |              | 5.6% (1/18)  | 66.7% (12/18) |
| Ophthalmology               | 17.4% (4/23)                            |                 | 4.3% (1/23)   | 78.3% (18/23) | 47.1% (8/17)                     |               |              | 5.9% (1/17)  | 47.1% (8/17)  |
| Cardiac surgery             | 21.1% (4/19)                            | 26.3% (5/19)    | 36.8% (7/19)  | 15.8% (3/19)  | 35.3% (6/17)                     |               | 11.8% (2/17) | 11.8% (2/17) | 41.2% (7/17)  |
| Radiotherapy                | 23.8% (5/21)                            | 14.3% (3/21)    | 23.8% (5/21)  | 38.1% (8/21)  | 25.0% (4/16)                     |               | 6.3% (1/16)  | 12.5% (2/16) | 56.3% (9/16)  |
| Dermatology                 | 22.2% (4/18)                            | 11.1% (2/18)    | 16.7% (3/18)  | 50.0% (9/18)  | 26.7% (4/15)                     | 6.7% (1/15)   | 6.7% (1/15)  | 6.7% (1/15)  | 53.3% (8/15)  |
| Oral /maxillofacial surgery | 25.0% (5/20)                            |                 | 20.0% (4/20)  | 55.0% (11/20) | 35.7% (5/14)                     | 7.1% (1/14)   |              |              | 57.1% (8/14)  |

CPS, clinical pharmacy services.

### Clinical pharmacy services

The frequency of CPS varies. In most cases, CPS are offered 'weekly' (59.6%, 68/114) to at least one ward whereas 'daily' (Monday–Friday) and '2–3 times weekly' (each 38.5%, 45/114) are less common (multiple answers possible). Regular visits (at least once a week) are reported for critical care/anaesthesia (80.6%, 75/93) most often, followed by trauma surgery (67.1%, 55/82) and general surgery (60.5%, 49/81); 51.8% (59/114) of hospital pharmacies state to cover all beds in at least one medical department, of which almost half of them (45.8%, 27/59) indicate this for five or more departments. CPS are available to 33.7% (mean) of beds (SD±29.2%) with ranges from 39.9% (SD±30.8%, university hospitals) to 17.7% (SD±18.5%, specialised care hospitals, see [table 1](#)). The frequency of CPS per department and percentage of beds covered are shown in [table 2](#).

The CPS most commonly available across all hospital wards includes participation in committees (89.0%, 81/91) and antimicrobial/antibiotic stewardship services (52.1%, 49/94, see [table 3](#)). At the local site of hospital pharmacies, CPS are available to at least the majority of wards in 36.8% (35/95) whereas 93.7% (89/95) state to offer CPS to at least 'selected wards'. For other hospitals within the scope of care, CPS are available at least 'on selected wards' for 34.2% (26/76), and to at least the majority of wards in 17.1% (13/76).

During admission, an MR is conducted in 35.1% (34/97), a medication history is documented alongside a conversation with the patient in 33.3% (32/96), and MedRec is performed in 30.2% (29/96). For inpatients, an MR is carried out in 67.0%

(65/97), MedRec in 38.5% (37/96), and a medication history with a personal conversation in 19.8% (19/96). At discharge, MedRec is conducted in 7.3% (7/96), MR in 4.1% (4/97), and a medication history with a personal conversation in 3.1% (3/96).

Pharmaceutical interns are involved in managing admissions (17/24), supporting inpatient CPS (30/37) or handling discharges (3/7). Furthermore, pharmacy technicians support admission management (12/24), inpatient CPS (13/37) and discharges (4/7). Interns and technicians operate under the responsibility of CPs. Computerised physician order entry (CPOE) systems, whether they include clinical decision support or not, are implemented in all wards in 30.4% (35/115) and in 29.6% (24/115) in at least the majority of wards. Only 10.4% (12/115) report using CPOE in fewer than 25% of wards and 12.1% (14/115) have no such systems in place. The utilisation of these systems to assess patients' risk of medication-related problems (MRP) varies, with 50% (58/115) of hospital pharmacies reporting not using them. When they are used, common criteria include factors such as age (36.5%, 42/115), the number of medications (34.7%, 40/115), and the selection of high-risk medicines (eg, Priscus list etc, 40.9%, 58/115).

### Education and training

The majority of hospital pharmacies offering CPS (94.4%, 85/90) employ at least one pharmacist who has begun or completed further training in postgraduate specialisation in the area of 'Clinical pharmacy'; 64.4% (58/90) report that at least 50% of their CPs have completed or started this training. At

**Table 3** Clinical pharmacy services offered by hospital pharmacies to hospital wards

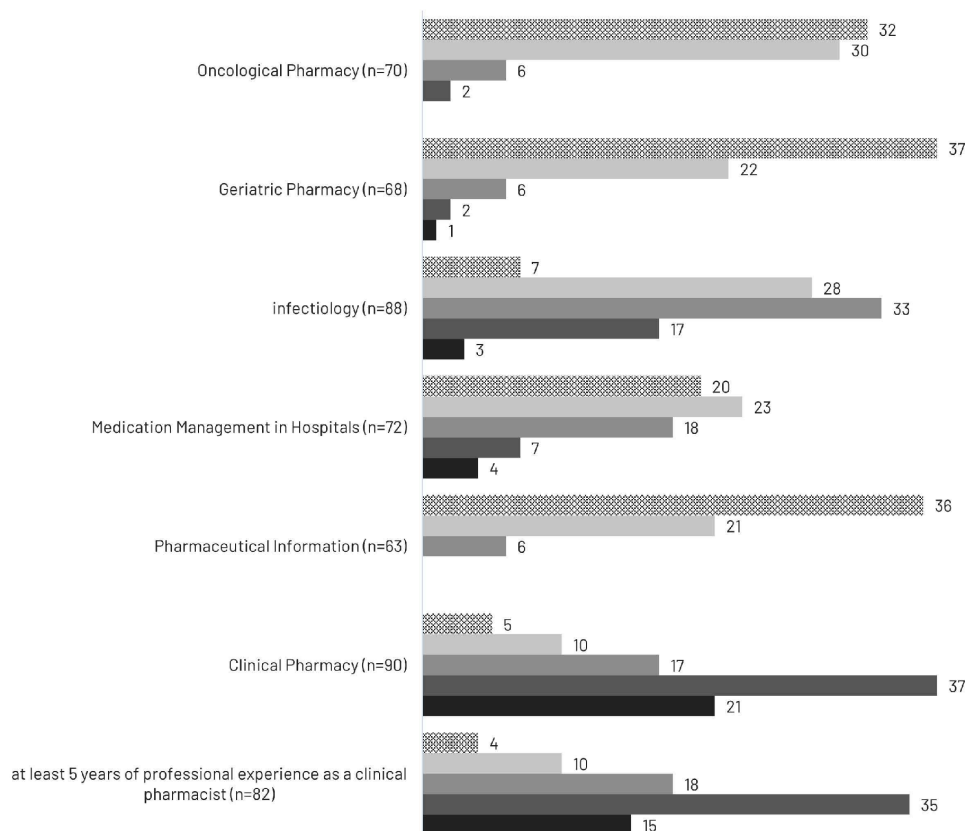
|   | All wards (%) | The majority of wards (%) | Selected wards (%) | On request (%) | No service (%) | All |
|---|---------------|---------------------------|--------------------|----------------|----------------|-----|
| Ward rounds (with previous medication review)                           | 1 (1.2)       | 8 (9.4)                   | 58 (68.2)          | 8 (9.4)        | 10 (11.8)      | 85  |
| Chart review/medication review by clinical pharmacists                  | 8 (8.5)       | 18 (19.1)                 | 51 (54.3)          | 15 (16.0)      | 2 (2.1)        | 94  |
| Pharmacy consultation service   | 27 (30.7)     | 8 (9.1)                   | 10 (11.4)          | 35 (39.8)      | 8 (9.1)        | 88  |
| Patient consultations and training                                      |               | 1 (1.3)                   | 11 (14.1)          | 38 (48.7)      | 28 (35.9)      | 78  |
| Unit dose management (including validation/plausibility checks)         | 2 (2.5)       | 8 (10.0)                  | 11 (13.8)          | 1 (1.3)        | 58 (72.5)      | 80  |
| Training for doctors and/or nursing staff                               | 13 (14.4)     | 5 (5.6)                   | 19 (21.1)          | 53 (58.9)      |                | 90  |
| Consultations with doctors and/or nursing staff                         | 30 (34.1)     | 9 (10.2)                  | 11 (12.5)          | 38 (43.2)      |                | 88  |
| Participation in the development of local therapy standards/guidelines  | 20 (21.7)     | 17 (18.5)                 | 18 (19.6)          | 35 (38.0)      | 2 (2.2)        | 92  |
| Participation in committees (eg, drug commission)                       | 81 (89.0)     | 5 (5.5)                   | 2 (2.2)            | 3 (3.3)        |                | 91  |
| Antimicrobial stewardship/antibiotic stewardship                        | 49 (52.1)     | 12 (12.8)                 | 27 (28.7)          | 5 (5.3)        | 1 (1.1)        | 94  |
| Pharmacoeconomic counselling  | 45 (47.9)     | 7 (7.4)                   | 17 (18.1)          | 25 (26.6)      |                | 94  |
| Specialised ward rounds (eg, wound ward rounds, pain team, etc)         | 2 (2.4)       | 2 (2.4)                   | 11 (13.4)          | 26 (31.7)      | 41 (50.0)      | 82  |
| Discharge management (eg, discharge interviews, discharge letters, etc) | 1 (1.2)       | 2 (2.5)                   | 7 (8.6)            | 26 (32.1)      | 45 (55.6)      | 81  |
| Admission/anamnesis by clinical pharmacists                             | 3 (3.7)       | 15 (18.3)                 | 25 (30.5)          | 9 (11.0)       | 30 (36.6)      | 82  |
| Medication reconciliation   | 4 (5.1)       | 11 (13.9)                 | 19 (24.1)          | 16 (20.3)      | 29 (36.7)      | 79  |
| Medication management   | 8 (9.5)       | 12 (14.2)                 | 22 (26.2)          | 27 (32.1)      | 15 (17.9)      | 84  |
| Therapeutic drug monitoring   | 4 (4.7)       | 6 (7.0)                   | 15 (17.4)          | 21 (24.4)      | 40 (46.5)      | 86  |

least one CP with over 5 years of experience is employed by 95.1% (78/82), and 61.0% (50/82) state that at least 50% of their workforce have this level of experience. Regarding the specialisation in the field of 'Medication management in hospitals', 72.2% (52/72) confirm that at least one CP has commenced or completed the qualification; 15.3% (11/72) indicate that at least half of their CPs have started or finished it. There are CPs who have undergone specialised further training in infectiology

or in antimicrobial stewardship (at least one CP: 92.0% (81/88), at least 50% of CPs: 22.7% (20/88)) (see figure 1).

### Quality assurance

Regarding quality assurance, standard operating procedures (SOP) are available for many CPS (see table 4). A defined process is established for MR (56.2%, (50/89); plan to implement:



**Figure 1** Postgraduate specialisation (area and field) of clinical pharmacists (CPs). Black=100% of CPs; dark-grey=50–75% of CPs; grey=25–49% of CPs; light-grey=<25% of CPs; dotted=none.

**Table 4** Standard operating procedures for clinical pharmacy services provided by hospital pharmacies

|   | Established (%) | Not established (%) | To be commenced (%) | All |
|---|-----------------|---------------------|---------------------|-----|
| Admission management (eg, medication history, admission interview)                          | 36 (40.9)       | 38 (43.0)           | 14 (15.9)           | 85  |
| Medication analysis/Medication safety checks  | 50 (56.2)       | 24 (27.0)           | 15 (16.8)           | 89  |
| Medication reconciliation process (comparison including change/reversal of home medication) | 36 (41.4)       | 33 (37.9)           | 18 (20.7)           | 87  |
| Procedure for high-risk patients (eg, adjustment of kidney function)                        | 32 (37.2)       | 36 (41.9)           | 18 (20.9)           | 86  |
| Procedure for contraindications/interactions  | 38 (43.7)       | 33 (37.9)           | 16 (18.4)           | 87  |
| Therapeutic drug monitoring, including interpretation of findings                           | 22 (26.2)       | 53 (63.1)           | 9 (10.7)            | 84  |
| Conducting and participating in ward rounds/chart reviews                                   | 42 (49.4)       | 34 (40.0)           | 9 (10.6)            | 85  |
| Plausibility check/validation of prescriptions  | 39 (47.0)       | 32 (38.5)           | 12 (14.5)           | 83  |
| Discharge management (with pharmacy involvement)  | 7 (8.6)         | 55 (67.9)           | 19 (23.5)           | 81  |

16.8% (15/89)), for ‘conducting and participating in ward rounds’ (49.4%, 42/85) and for ‘plausibility check or validation of prescriptions’ (47.0%, 39/83). In contrast, a job description for CP is only available in 37.0% (36/97). ‘Documentation and evaluation of CP interventions’ are mainly carried out for quality assurance (74.2%, 66/89), followed by experienced pharmacists accompanying rounds (mentoring, 49.4%, 44/89), ‘regular patient-centred learning activities’ (40.5%, 36/89), job shadowing (36.0%, 32/89), and internal audits (36.0%, 32/89). CP interventions are predominantly documented in medical records (89.7%, 70/78), in other systems (75.9%, 60/79), or using the online database ADKA-DokuPIK (47.9%, 35/73). For daily documentation (Monday to Friday), 47.4% (37/78) use medical records, and 38.0% (30/79) other tools (eg, Microsoft Excel). Conversely, ADKA-DokuPIK is utilised in 26.0% (19/73) of cases ‘at least once a month’ or event-driven (21.9%, 16/73).

## DISCUSSION

Over the past decade, the use of CPS in German hospitals has undergone significant changes, with 86% (2019: 63%,<sup>1</sup>) of participating pharmacies now offering CPS, which are available in at least 32.4% (114/352; 2019: 22%<sup>1</sup>) of all hospital pharmacies in Germany. This pronounced increase contributes to improving patient and medication safety in hospitals; however, the level of care varies considerably and is largely dependent on the budget of hospital pharmacies. The average number (FTE) of employed CPs has increased by 1.9 to 4.3 since the previous survey, which matches the rise in hospital pharmacies offering CPS.

Daily CPS to at least one ward is provided by 38.5% compared with 33% in 2019.<sup>1</sup> In 2019, most frequently, ‘pharmacy consultation’ and ‘training for nursing and medical staff’ were offered. Seven years later, more patient-centred services are well established (at least ‘on request’), as ‘chart review/MR’ and ‘antimicrobial/antibiotic stewardship’. During admission, CPs conduct MR in 35.1%, and even more (67.0%) provide MR to inpatients. Participation in discharge management has evolved over the years, with 44.4% engaging at least ‘on request’, while in 2019 only a small number of hospital pharmacies did.<sup>1</sup> Most changes in CPS reflect the growing acceptance of CP in interprofessional teams and a more patient-centred approach by qualified CPs, due to increased active participation in patient care.

A highly qualified workforce is essential to comply with CPS standards for medication safety, especially amid a growing number of supervised wards, increasing variety of CPS and limited personnel resources. Compared to 2019, the CP workforce has grown, with more specialisms. In this context, 94.4% (2019: 86%) of pharmacies report having at least one pharmacist with postgraduate specialisation in ‘Clinical pharmacy’; 72.2%

confirm this for the field ‘Medication management in hospitals’ which was established in 2018 and is now offered in limited and irregular courses, which vary across Germany. Notably, employment of at least one pharmacist with specialised training in infectious diseases has increased (2019: 55%; 2024: 92.0%). The German antimicrobial stewardship (AMS) guidelines, postgraduate specialisation courses, dedicated team members and hospitals’ commitment to AMS may have contributed to this. Currently, limited postgraduate specialisation courses may hinder more CPs from obtaining qualifications, but expanding opportunities are essential for high-quality CPS.

CPOE systems are increasingly utilised (2019: 32%; 2024: 87.8%). With limited personnel, using data from electronic systems to identify high-risk patients and prioritise CPS seems sensible, although half of the pharmacies do not use such systems in this context. The lack of IT infrastructure presents a significant challenge in focused patient care.<sup>14</sup> However, one must bear in mind that CPOE might trigger new challenges, for example, over-alerting, new (selection) errors<sup>15–17</sup> that need to be addressed within a multiprofessional team.

For quality assurance, primarily ‘documentation and evaluation of CP interventions’ (2019: 69%; 2024: 74.2%), followed by ‘mentoring’ (49.4%) and ‘regular patient-centred learning activities’ (40.5%) are used. The last two mentioned should be standard practice in all CPS-offering pharmacies as they provide direct feedback and facilitate learning. Most CPs use ‘medical records’ for documentation (2019: 49%; 2024: 89.7%), while medical records should be enabled to record CP interventions and MRP direct to patient clinical notes. In the context of continuous medication management, documentation of CP interventions should be structured and available to all involved within digital medication records. Using external systems could, in this case, lead to a loss of information. The quality of CPS is supported by the use of (local) SOP, but the degree of implementation varies greatly. Whereas 40.9% have SOP for admission management in place, only 8.6% confirm this for discharge management. On the initiative of ADKA, standards of CPS for admission and discharge were recently published.<sup>18 19</sup>

CPS reimbursement for inpatient care is not yet established and remains a challenge, as it is not part of nationwide disease-related groups. A clear reimbursement framework is needed to ensure continuous CPS development. At the end of 2020, the German local Pharmacy Strengthening Act (VOASG<sup>20</sup>) legally recognised patients’ entitlement to pharmaceutical services and their remuneration in the outpatient sector. These services include measures taken by pharmacists to enhance the safety and efficacy of medication therapy. This marks the first time that public pharmacies have access to legally regulated funding for the provision of pharmaceutical services. Such a model has the

potential to serve as a template by which CPS funding can be transferred to the inpatient sector.

### Limitations

The survey was only sent to chief hospital pharmacists who were organised in the ADKA. However, in 2024, a total of 352 hospital pharmacies were licensed in Germany. The survey only encompasses information on CPS provided by hospital pharmacies, meaning that no data are available for public pharmacies that supply hospitals (n=160 in 2024). Due to reporting bias, the hospital pharmacies that responded are likely those very engaged in CPS. The time allocated for CPS should be considered an estimate; however, it cannot precisely reflect the time genuinely devoted by CPs, as they may not have been questioned by their chief pharmacist, who responded to the survey.

### CONCLUSIONS

A key finding is that 86% of responding hospital pharmacies in Germany currently offer CPS, with an additional 5% planning to implement them within the following year.

This means at least 32.4% of all German hospital pharmacies provided CPS by the end of 2024. However, patient-centred CPS are currently available to about 34% of beds, highlighting a significant coverage gap. The survey also shows that implementation of CPS varies greatly between departments and hospital types. The frequency of CPS differs, but regular services (daily or 2–3 times weekly) are available in around 77% of participating hospitals for at least one ward, most commonly in critical care, trauma and general surgery. The data indicate that CPS have become an integral part of hospital pharmacy practice in Germany. Nevertheless, financial constraints and missing legal obligations to integrate CPS as a core element of inpatient care limit their reach and consistency. To enhance patient safety and the benefits of clinical pharmacy, further expansion and standardisation of CPS across all hospital settings are essential, including broader coverage, improved quality assurance and continued investment in specialised training for CPs.

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### REFERENCES

- Schulz C, Fischer A, Vogt W, et al. Clinical pharmacy services in Germany: a national survey. *Eur J Hosp Pharm* 2021;28:301–5.
- Frontini R, Miharija-Gala T, Sykora J. EAHF Survey 2010 on hospital pharmacy in Europe: Part 1. General frame and staffing. *Eur J Hosp Pharm* 2012;19:385–7.
- Bundesvereinigung Deutscher Apothekerverbände (ABDA). Die apotheke –zzahlen, daten, fakten. 2024. Available: [https://www.abda.de/fileadmin/user\\_upload/assets/ZDF/Zahlen-Daten-Fakten-24/ABDA\\_ZDF\\_2024\\_Broschuere.pdf](https://www.abda.de/fileadmin/user_upload/assets/ZDF/Zahlen-Daten-Fakten-24/ABDA_ZDF_2024_Broschuere.pdf) [Accessed 17 Jun 2025].
- European Directorate for the Quality of Medicines & HealthCare (EDQM). Resolution cm/res(2020)3 on the implementation of pharmaceutical care for the benefit of patients and health services. (Adopted by the Committee of Ministers on 11 March 2020 at the 1370th meeting of the ministers' deputies). 2020.
- Bech CF, Kart T, Kjeldsen LJ, et al. Development of hospital clinical pharmacy services in Denmark from 2008 to 2023. *Eur J Hosp Pharm* 2025;32:407–12.
- Guntschnig S, Courtenay A, Abuelhana A, et al. Clinical pharmacy interventions in an Austrian hospital: a report highlights the need for the implementation of clinical pharmacy services. *Eur J Hosp Pharm* 2025;32:57–63.
- Schepel LL, Kunnola E, Airaksinen M, et al. Evolution of hospital clinical pharmacy services in Finland in the period 2017–2022: the third nationwide follow-up survey. *Eur J Hosp Pharm* 2025;32:413–20.
- Studer H, Boeni F, Messerli M, et al. Clinical Pharmacy Activities in Swiss Hospitals: How Have They Evolved from 2013 to 2017? *Pharmacy (Basel)* 2020;8:19.
- Urbańczyk K, Guntschnig S, Antoniadis V, et al. Recommendations for wider adoption of clinical pharmacy in Central and Eastern Europe in order to optimise pharmacotherapy and improve patient outcomes. *Front Pharmacol* 2023;14:1244151.
- Scottish Government Polypharmacy Model of Care Group. Polypharmacy guidance, realistic prescribing 3rd edition: Scottish government. 2018. Available: <https://www.therapeutics.scot.nhs.uk/polypharmacy/> [Accessed 20 May 2025].
- Bundesvereinigung deutscher apothekerverbände (ABDA). Weiterbildung. Available: <https://www.abda.de/fuer-apotheker/fortweiterbildung/weiterbildung/> [Accessed 16 Jun 2025].
- Bundesgesetzblatt. Gesetz für ein zukunftsprogramm krankenhäuser (krankenhauszukunfts-gesetz – KHZG). Teil I Nr 482020. 2208–19.
- Leotsakos A, Zheng H, Croteau R, et al. Standardization in patient safety: the WHO High 5s project. *Int J Qual Health Care* 2014;26:109–16.
- Höckel M, Hilgarth H. Elektronische Unterstützung im Closed Loop Medication Management in Krankenhäusern Erkenntnisse aus der Umfrage zur Maßnahme 26 im 5. Aktionsplan zur Verbesserung der Arzneimitteltherapiesicherheit in Deutschland. *Krankenhauspharmazie* 2025;46:117–24.
- Stürzlinger H, Hiebinger C, Pertl D, et al. Computerized physician order entry–Wirksamkeit und Effizienz Elektronischer Arzneimittelverordnung mit Entscheidungsunterstützungssystemen. 2009.
- Zaal RJ, Jansen MMPM, Duisenberg-van Essen M, et al. Identification of drug-related problems by a clinical pharmacist in addition to computerized alerts. *Int J Clin Pharm* 2013;35:753–62.
- Bauer J, Busse M, Kopetzky T, et al. Interprofessional Evaluation of a Medication Clinical Decision Support System Prior to Implementation. *Appl Clin Inform* 2024;15:637–49.
- Richling I, Berger S, Britz HS, et al. Pharmazeutisches Entlassmanagement für Krankenhausapotheker\*innen. *Krankenhauspharmazie* 2025;46:376–87.
- Strobach D, Amelung S, Berger V, et al. Pharmazeutisches Aufnahmemanagement für Krankenhausapotheker\*innen. *Krankenhauspharmazie* 2025;46:337–52.
- Gesetz zur stärkung der vor-ort-apotheken vom 9, teil 1(Nr. 61). Bundesgesetzblatt; 2020.