



## Nursing interventions in a newly established community health nursing system: A cross sectional survey

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### ABSTRACT

**Background:** Community health nursing was introduced in Austria in 2022. Information about nurses' activities, their alignment with established public health frameworks, and their relationship to existing care services is crucial for understanding the role's implementation and potential impact.

**Objective:** This study examines the activities of the first cohort of Austrian Community Health Nurses, focusing on their alignment with the Public Health Intervention Wheel and the Nursing Intervention Classification. An important aspect comes from the question, whether these new services complement or substitute existing direct care services. In this process, we also address heterogeneity across urbanization levels.

**Design:** Cross-sectional survey.

**Setting(s):** An online survey (April to June 2023) among Community Health Nurses captured their perception of activity frequencies based on the Public Health Intervention Wheel and Nursing Intervention Classification.

**Participants:** 130 nurses (59 %,  $N = 220$ ) answered >6 (out of 33) questions, 98 nurses (45 %,  $N = 220$ ) provided all required information.

**Methods:** The analysis used descriptive statistics, statistical tests, and hierarchical cluster analysis, employing Excel®, Stata® and R.

**Results:** Austrian Community Health Nurses implement many principles of the Public Health Intervention Wheel, with a focus on counselling, consultation, and health teaching. Direct care interventions (according the Nursing Intervention Classification) are rarely performed. Findings indicate that community health nurses complement rather than substitute existing direct care and home nursing services. However, unlike international practices, activities are primarily at the individual level, with limited engagement at community and systems levels.

**Conclusions:** Community health nursing in Austria demonstrates a public health focus and therefore complements existing care services. However, it focuses primarily at the individual level, which differs from international norms where activities span individual, community, and systems levels.

**Tweetable abstract:** First Austrian Community Health Nurses implement public health intervention principles mainly on individual level.

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### What is already known

- Community health nursing was newly introduced in Austria in 2022.
- So far, no analysis of community health nursing activities in Austria is available.
- It is unclear, to which extent Austrian community health nurses fulfil public health-oriented duties (in contrast to direct care and home nursing services).

### What this paper adds

- Austrian community health nurses align with Public Health Intervention Wheel principles without substituting direct (mobile) care services.
- While they implement a wide spectrum of activities, their primary focus is on the individual level.
- Cluster analysis shows the alignment of the Public Health Intervention Wheel with the Nursing Intervention Classification based on actual doings.

Community health nurses, also known as public health nurses, play a pivotal role in healthcare systems worldwide (Schaffer et al., 2022; Glavin, et al., 2019). While community nursing has existed in Austria for many years in the form of publicly funded, direct care and home nursing services, community health nursing - with a public health focus - is a novelty. Only since 2022, the European Union (within the framework of NextGenerationEU) has supported 115 pilot projects in selected Austrian regions to kick-start the implementation of community health nursing as part of the Austrian Recovery and Resilience Plan (Gesundheit Österreich GmbH, 2024).

The pilot project framework has outlined objectives following the guidance of the Public Health Intervention Wheel (Schaffer, et al., 2022), which is widely used to describe public health practice (Anderson, et al., 2018; Bigbee and Issel, 2012; Depke and Onitilo, 2011; Leahy-Warren, et al., 2018; McDonald, et al., 2015). In this paper, we analyse whether activities have truly been in line with the Public Health Intervention Wheel. In this context, we further investigate whether community health nurses merely substitute direct care and home nursing services, an apprehension that has characterised the inception of community health nursing in Austria. Therefore, we exploit the Nursing Intervention Classification Scheme (Butcher, et al., 2018), which includes a much broader range of nursing activities than just public health aspects. Analysing and comparing the extent of interventions according to both classifications then helps to understand whether Austrian community health nurses currently constitute a substitute or a complement to home nursing services.

We conducted a cross-sectional survey among the existing community health nurses and used the data to address the following main research aspects.

- **Alignment of activities with the Public Health Intervention Wheel:** We explore how community health nursing activities in Austria relate to the various components of the Wheel, emphasising prevention, health promotion and community-based interventions.
- **Alignment of activities with the Nursing Intervention Classification:** We examine the alignment of Austrian community health nurses' practice with the components of this.
- **Identification of activity clusters across classifications:** Based on the nurses' stated activity levels, we jointly cluster both activity sets (Public Health Interventions Wheel and Nursing Intervention Classification).

For both schemes, we also stratify activities across regions with varying levels of urbanisation to address regional heterogeneity. Depending on the size of the catchment area, individual nurses take care of 3000 to 5000 individuals (Gesundheit Österreich GmbH, 2024), suggesting substantial variety in the activity distribution.

While studies of nursing activities for special groups often take the form of pure literature studies, see, e.g., (Doody, et al., 2022) and (Scheydt and Hegedüs, 2021), we analyse the actual frequency of activities. Thereby, we contribute to the literature as follows. We organised the first survey among Austrian community health nurses, which allowed us to explore their actual roles and activities in detail. Based on this information, we can assess the activity levels for interventions classified by two important classification schemes. In particular, the results show whether community health nursing constitutes an innovation in the field of public health or just replaces something already existing. The information about the actual activity is vital for shaping job profiles, developing bespoke training, and determining the feasibility of a broader rollout. Moreover, our data permit the analysis of the alignment of the Public Health Intervention Wheel with the Nursing Intervention Classification by actual doings – not by clustering joint themes on a theoretical basis.

## 1. Background

The World Health Organization (WHO, 2017) has emphasised the role of community health nurses in a well-functioning primary healthcare system, which is the foundation for achieving universal health coverage. According to the pilot guidelines, Austrian

community health nurses are supposed to offer their assistance specifically to older adults (75+) with an imminent or existing need for information, counselling, and support but should abstain from direct care activities. The service extends to their families/carers. The nurses are required to be registered nurses according to Austrian Law. While some educational institutions have already implemented study programmes involving community health nursing aspects, these are not a requirement for the job.

When analysing community health nursing activities, we base our study on two classification schemes: the Public Health Intervention Wheel and the Nursing Intervention Classification. Note that we additionally collected information on specific counselling activities for the cluster analysis in the results section under the heading “Creating an Overall Activity Picture”.

In our study, the Public Health Intervention Wheel is used as a benchmark to compare the public health-related activities of Austrian nurses with international practice. The Wheel was introduced >20 years ago by Keller et al. (1998) as a scientific approach to describe public health practice. It addresses the foundations of health promotion and disease prevention, holistic care, including consideration of living conditions, collaboration with clients, the government and health organisations, caring relationships, and independence and autonomy at work. Over the years, revised and more robust versions of the Wheel have been introduced (Keller, et al., 2004; Schaffer, et al., 2016, 2017, 2022). The Wheel is widely used in the United States and other countries (Anderson, et al., 2018; Bigbee and Issel, 2012; Depke and Onitilo, 2011; Leahy-Warren, et al., 2018; McDonald, et al., 2015).

The Public Health Intervention Wheel is divided into five “wedges” that group 17 interventions with a similar focus. These interventions have to be applied at the individual, community, and systems levels. According to Schaffer et al. (2022), the five activity wedges are:

- Red wedge: Surveillance, Disease and Health Event Investigation, Outreach, Screening
- Green wedge: Referral and Follow-up, Case Management, Delegated Functions
- Blue wedge: Health Teaching, Counselling, Consultation
- Orange wedge: Collaboration, Coalition Building, Community Organising
- Yellow wedge: Advocacy, Social Marketing, Policy Development and Enforcement

To assess the extent of direct care by the community health nurses, we use the Nursing Intervention Classification, which does not focus on public health aspects but brings in a much broader range of nursing interventions. This scheme was developed by the University of Iowa College of Nursing. It is periodically revised, and for this paper, we use the 2018 version of the classification scheme (Butcher, et al., 2018). This classification is research-based, covers general practice and comprises all speciality areas.

The Nursing Intervention Classification categorises 565 typical nursing interventions into 30 classes (subsumed into seven domains: Physiology: basic, Physiology: complex, Behaviour, Safety, Family, Health System, and Community). Butcher et al. (2018) organised domains 1 to 6 into 28 classes and domain 7 into two classes. The classes for each domain are also listed in Table 2. Note that in this work, we use the expression “domain” solely in the context of the Nursing Intervention Classification, in the sense of Butcher et al. (2018).

Other evidence-based classification schemes have been developed in the literature, e.g. OASIS used particularly in the US in the context of Medicare with the main aim of outcome analysis, see (Shaughnessy, et al., 2002) and (Richard, et al., 2000) or the Omaha System (Martin, 2005). Still, we selected the classification schemes described above because both are very commonly used in Europe, and the Public Health Intervention Wheel is also communicated as the theoretical basis for the funded community nursing projects. Furthermore, Austrian nurses are more familiar with our selection than with alternative ones, which might have also enhanced the response rate of the underlying survey.

## 2. Methods

### 2.1. Design

This study employs a cross-sectional design using an online survey.

### 2.2. Participants and setting

The population under investigation consists of community health nurses working in one of the 115 Austrian pilot projects. The inclusion criterion for this study was employment as a community health nurse in an Austrian pilot project between April and June 2023. Using publicly available information, these nurses were invited to participate indirectly by emails to their project management offices. All local projects were included in the invitation process. The invitation included information about the study aims, anonymity safeguards, contact details of the research group, and the link to the online survey (conducted by LimeSurvey; see the questionnaire at (Kovacevic, et al., 2024)). Participation was voluntary. Given these circumstances, this approach resulted in a convenience sample.

### 2.3. Response rate

At the time of the study, 220 community health nurses were eligible to participate; 181 questionnaires were filled at least marginally, 130 questionnaires (59 %,  $N = 220$ ) had 6+ questions answered, and 98 (45 %,  $N = 220$ ) included all information except for disclosing their income.

## 2.4. Measurements

The questionnaire design comprised 33 closed-ended questions developed by the authors based on the two applied classification schemes. Supplementary Table S1 provides a list of all relevant resulting variables and their measurement. Iteratively running pre-tests with varying groups of nurses (until potential misunderstandings were cleared) assured the validity of the questions. Academic nursing experts from Austrian universities assessed content validity. Students (continuing education) from our department, all of them active registered nurses, evaluated face validity. The results of these assessments and discussions were taken into account in the final version of the survey, as outlined below.

The overall questionnaire consists of five parts: working environment, activity levels, networking, job satisfaction, and basic participant information. Only the parts on participant information and activity levels relate to the Public Health Intervention Wheel and the Nursing Intervention Classification and are discussed in the work at hand:

- Participant information comprises basic information like respondents' workplace location, working hours, gross income, and demographic information such as age, gender, educational background, and nursing experience (see Table 1).
- Activity levels are based on three items concerning the Public Health Intervention Wheel (at individual and community levels, each queried by 13 subitems), the Nursing Intervention Classification (22 subitems), and selected counselling activities (8 subitems); see the discussion in the subsequent paragraphs. This results in 56 subitems. For all these subitems the activity level is measured on the same scale: the frequency assessment included the categories "never", "less than once a month", "approximately once a month", "twice a month", "weekly", "several times per week", and "daily". Henceforth, we refer to these ordinal data as frequentness data to distinguish them from the frequency concept in statistics.

Based on our pretests, we had to reduce the complexity of the questionnaire because, according to the testers, questions on Public Health Interventions or Nursing Interventions consisted of too many subquestion items, which negatively influenced the motivation to answer the survey. To reduce some of the Wheel's complexity, our final questionnaire treated "Case Management & Follow-up", "Counselling & Consultation", and "Collaboration & Coalition Building" as single activities and excluded questions on "Social Marketing" and "Community Organising". In exchange, we included "Quality Assurance" because it was implemented to better understand the novel community health nursing service during its implementation/early phase. These modifications left us with 13 activities (representing 15 Public Health Intervention Wheel activities) collected at the individual and community levels. We did not gather data on the system level because discussions in the pretest phase made it clear that this aspect does not play any role in the work of community health nurses.

For the same reasons, we also adapted the survey regarding questions on the Nursing Intervention Classification. We subsumed classes "Activity and Exercise Management" and "Physical Comfort Promotion" into the "Promotion of Physical Wellbeing" (in the domain Physiology: Basic). For the Behaviour domain, we reduced the six classes from Butcher et al. (2018) into three and the three classes of the Health System domain into one. In sum, instead of 28 classes, we come up with 22 activities for domains 1 to 6. Data for domain 7 were collected via questions on Public Health Intervention Wheel activities provided at the municipality/borough level. Note

**Table 1**

Demographic properties, experience, working conditions, and education level of community health nurses in Austria (stratified by gender); we use Wilcoxon's rank sum test to analyse gender differences with respect to numerical variables and Fisher's exact test to examine gender differences for the categorical variable "Highest level of education".

	N	Q2 (Q1, Q3)	Female	male	p-value
Gender (f/m)	100	–	90	10	–
Age (y)	99	41 (33, 46)	42 (34, 46)	32 (31, 37)	0.005
Nurse experience (y)	100	15 (9, 24)	17 (10, 24)	9 (7, 11)	0.016
CHN <sup>1</sup> experience (month)	98	10 (8, 12)	10 (8, 12)	9 (7, 13)	0.960
Gross income (€)	90	2600 (1750, 3277)	2575 (1700, 3207)	3100 (2515, 3550)	0.093
Hourly gross income (€/h)	90	20.0 (17.4, 22.7)	19.9 (17.2, 22.7)	23.2 (19.3, 25.7)	0.100
		<b>Count</b>	<b>Female</b>	<b>male</b>	<b>p-value</b>
Highest level of education	97				0.200
GuKPS <sup>2</sup>		72 (74.2 %)	67 (76.1 %)	5 (55.6 %)	
Bachelor's degree		5 (5.2 %)	4 (4.5 %)	1 (11.1 %)	
GuKPS <sup>2</sup> & Bachelor		3 (3.1 %)	2 (2.3 %)	1 (11.1 %)	
Master's degree		17 (17.5 %)	15 (17.1 %)	2 (22.2 %)	
Weekly working time (h)	130				0.928
≤25h		62 (47.7 %)	40 (43.9 %)	4 (44.5 %)	
25h-35h		33 (25.4 %)	24 (26.4 %)	2 (22.2 %)	
<35h		35 (26.9 %)	27 (29.7 %)	3 (33.3 %)	
Degree of urbanisation	122				0.747
Urban areas		10 (8.2 %)	8 (9.2 %)		
Suburban areas		55 (45.1 %)	41 (47.1 %)	5 (55.6 %)	
Rural areas		57 (46.7 %)	38 (43.7 %)	4 (44.4 %)	

<sup>1</sup> CHN = community health nursing.

<sup>2</sup> GuKPS = Gesundheits- und Krankenpflegeschule.

that, henceforth, we refer to the “classes of interventions” as activities.

Counselling activities include Advising on (1) Disease Prevention, (2) other Health-Related Measures, (3) the Client’s Social Environment, (4) Navigating the Health System, (5) Dealing with Government Agencies, (6) Making Social Welfare Applications, (7) Obtaining Auxiliary Materials/Devices, and (8) Other Issues.

## 2.5. Definitions

Throughout this study, the frequency of an activity is measured by the number of monthly working days for which a community health nurse reported doing a particular activity at least once, adjusted to reflect full-time working arrangements. Henceforth, we refer to this number as full-time equivalent FTE workdays per month. FTE workdays are generated by converting the frequentness categories (“never”, “less than once a month”, “approximately once a month”, “twice a month”, “weekly”, “several times per week”, and “daily”) into numerical values representing an activity’s monthly frequency. For example, daily frequentness is represented by “22 (FTE workdays)”, while monthly frequentness corresponds to “1 (FTE workday)”. To make the monthly frequentness data comparable across different worktime arrangements, all numbers are divided by the respondent’s working hours and multiplied by 40 (hours per week), thereby reflecting full-time equivalent frequentness.

To account for differences between working environments, we use the DEGREE of URBANISATION (DEGURBA), a classification scheme that characterises an area by information on the regional population density based on postal codes (Statistics Austria, 2024a, 2024b, 2024c). According to the DEGURBA, for each municipality, one of three codes is assigned to the survey outcomes:

- Cities (urban areas) are defined as contiguous areas with a high population density (1500+ inhabitants per square kilometre) and a population of at least 50,000.
- Towns and suburbs (subsumed as suburban areas) show medium population density, characterised by >300 inhabitants per square kilometre. The second criterion is a population level of at least 5000 inhabitants and/or being located adjacent to an area with a high population density.
- Rural areas correspond to areas outside urban and suburban areas.

## 2.6. Data analysis

For exploratory analysis, we use descriptive tables and graphics. Moreover, we use statistical tests (Wilcoxon-rank-sum test and Fisher’s exact test to examine gender differences for numerical and categorical variables, respectively), hierarchical cluster analysis (to group nurses according to their activity profiles), and principal component analysis (to reduce the dimensionality of the activity information). All calculations were done in Excel®, Stata® and R. Missing data are treated as missing completely at random. In particular, no imputations were made.

While statistical analysis is straightforward for most tasks, we comment briefly on the clustering approach. We cluster activities, searching for groups of activities that are similar with respect to their frequentness patterns across all nurses. This allows the analysis of similarities across the different classification schemes used. Clustering builds on the transposed data matrix, considering the respondents as “variables” and the activities as “observations”. All 56 activity questions (see supplementary Table S1) are used for this procedure. For data reduction, we employ principal component analysis, using the first five principal component scores as the basis for subsequent computations. Lastly, we apply hierarchical clustering (using the R-function “eclust”, with algorithm “hclust” and agglomerative method “ward.D2”) to this matrix of selected principal components to perform the final clustering step. The confidence intervals for the median FTE workdays in the clusters are computed following the formula  $FTEWD \pm 1.58 \cdot MAD / \sqrt{n}$  (Chambers, et al., 1983, p. 62), where MAD denotes the mean absolute deviation and  $n$  is the product of the number of respondents and the number of activities within the relevant cluster.

## 2.7. Ethical considerations

The Ethics Committee at the University of Krems provided consent on 23.02.2023 under No EK GZ 39/2021–2024. All participants were shown the privacy policy and had to give their consent at the beginning of the online survey. European data protection guidelines were followed. No patients and no animals were involved at any point during the study.

## 3. Results

### 3.1. Characteristics of participants

The survey retrieved information on gender, professional experience, working hours and educational background of the community health nurses.

Table 1 describes the sample in terms of median quantities (with the upper and lower quartiles presented in parentheses) and counts for the highest education level. Wilcoxon’s rank sum test and Fisher’s exact test are used to analyse gender gaps.

We find that around nine in ten survey respondents are female, with one in ten being male. Note that the label “diverse” was offered to the participants but not selected. A “typical” respondent is 41 years old, has worked as a registered nurse for 15 years and

commenced community health nursing ten months prior to the survey. Three out of four respondents (74.2 % + 3.1 % = 77.3 %; N = 97) have graduated from an Austrian Healthcare and Nursing Academy (Gesundheits- und Krankenpflegeschule), which provided formal (non-tertiary) nursing education before the induction of the Bologna education system in 1999. A small yet substantial proportion (17.5 %, N = 97) holds a master’s degree in nursing studies. The least prevalent among the respondents’ highest relevant levels of education is a bachelor’s degree.

About 48 % of the community health nurses have a worktime arrangement up to (and including) 25 hours per week; 25 % of nurses work between 25+ and up to (and including) 35 hours; 27 % are full-time employed (35+ hours). The variety of part-time working arrangements produces substantial variations in gross incomes. The median gross income for female community health nurses is €2575 and for male nurses €3100. Therefore, we standardised income to hourly wages and inferred from respondents’ statements about monthly wages and weekly working hours that the median gross income per hour is 20€.

Table 1 suggests a gender pay gap. However, the income difference is not statistically significant (p = 0.2), which might stem from missing test power because of the small number of male respondents. Conversely, the gender age gap is statistically significant (p = 0.005), with the median age of female and male respondents at 42 and 32, respectively. This gap may partially explain why male community health nurses are less experienced (as registered nurses) than their female counterparts.

Using the degree of urbanisation to account for differences between working environments, we find that most survey respondents (91.8 %) work in suburban and rural areas.

### 3.2. Alignment of activities with the Public Health Intervention Wheel

Fig. 1 displays the average FTE workdays per month (for their definition, see the Methods section) calculated for the Public Health Intervention Wheel activities.

Fig. 1 shows that Surveillance is most prominent among the Wheel’s red wedge activities. While, on average, such activities take place on 11.3 FTE workdays per month (i.e., at least once every other workday), they are performed on 5.3 and 1.9 FTE workdays less in rural areas and suburban areas, respectively, than in urban areas. Screening and Outreach are carried out on 3.1 FTE workdays, on average, and performed less frequently in the countryside than in suburban or urban areas. Despite Disease and Health Event Investigations peaking in the suburbs (followed by urban and then rural areas), we observe that the red wedge encompasses activities that are more popular in Austrian cities.

Huge differences between activities characterise both the green and the blue wedges. While Case Management & Follow-Up is

Frequency of Intervention Wheel Activities (in Average FTE Workdays)

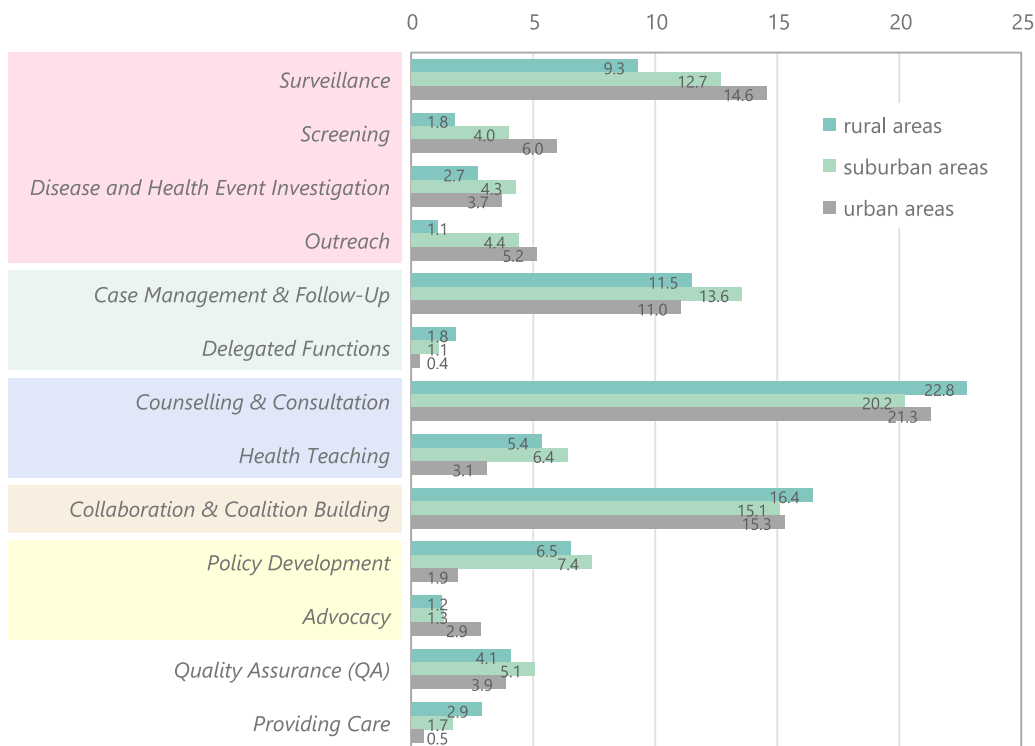


Fig. 1. Frequency of Public Health Intervention Wheel activities (measured in average FTE workdays per month); within the wedges, activities are ordered by declining FTE workdays, averaged over all levels of urbanisation.

provided on average on 12.0 FTE workdays, a Delegated Function is done on 1.0 FTE workday. For such a care task carried out by community health nurses under the authority of a General Practitioner, differences across urbanisation levels are relatively high, with rural areas exceeding cities by 1.5 FTE workdays. Information or bespoke advice and care (Counselling & Consultation) are provided on 21.0 FTE workdays per month, i.e., almost every workday, while Health Teaching is offered on 6.0 FTE workdays, on average. These findings highlight the advisory, educating, and coordinating aspects of community health nursing in Austria, focusing on suburban and rural areas.

The orange wedge activity Collaboration & Coalition Building is the second most common activity among community health nurses. It is done on average on 15.0 FTE workdays, nearly irrespective of where clients reside. In the yellow sector, Policy Development is done on average on 6.0 FTE workdays, and engagement in association with committees or political bodies forming Advocacy happens on 1.5 FTE workdays. A look at the urbanisation levels suggests that Policy Development is more important in rural areas (it is done on 2.0 FTE workdays in cities compared to almost 7.0 FTE workdays in rural areas), while it is the other way around for Advocacy.

Finally, we find that Quality Assurance is executed at least once each week (4.5 FTE workdays), with only minor differences between differently populated areas. We infer that Quality Assurance is a fundamental building block of what community health nurses currently do in Austria. Furthermore, we find that, with an average frequency of 2.0 FTE workdays, Providing Care plays a negligible role in their work. This is in line with the public-health-oriented functions of community health nursing within the healthcare system.

### 3.3. Alignment of activities with the Nursing Intervention Classification

In Table 2, columns 2–5 report median FTE workdays per month for activities grouped by the domain of the Nursing Intervention Classification. Signposting in the Health System in domain 6 is executed most frequently by Austria's community health nurses (overall, on 12.7 FTE workdays, i.e., at least once every other workday). While in suburban areas, the need for signposting exceeds the average (14.3 vs 12.7 FTE workdays), urban and rural areas provide signposting less often (11.7 and 10.0 FTE workdays, respectively). In this context, community health nurses make a valuable contribution to the health system literacy of their clients.

With activities carried out on 10.0 FTE workdays (i.e., almost once every other workday), the Behaviour domain is almost equally important. Again, in the suburbs, nurses provide activities from the Behaviour domain most frequently (11.4 FTE workdays) compared to urban areas (10.0 FTE workdays) and rural areas (9.0 FTE workdays). Activities from this domain include Advice on Current Health Situation, Mental Wellbeing Facilitation and Preventive Counselling, typically related to health promotion.

Ordered by frequency, the next domain is Basic Physiology. The associated activities are provided on 4.0 FTE workdays (i.e., about once a week) and support clients in the management of their specific physiological needs. Suburban and rural areas (4.3 and 4.0 FTE workdays, respectively) provide these services much more often than urban areas (2.7 FTE workdays). Note that Self-Care Facilitation and the Promotion of Physical Wellbeing, by far, dominate the Basic Physiology domain. For a detailed ranking of all Nursing Intervention Classification activities across all three urbanisation levels, please see Table S2 in the supplements.

The overall number of FTE workdays for the Safety domain is 2.7 (i.e., at least once every fortnight). Urban areas dominate with 5.1 FTE workdays, followed by suburban areas with 4.0 workdays and the rural regions with 2.0 workdays.

As shown by Table 2, activities related to the Community domain are, on average, performed only on 1.1 FTE workdays (i.e., at

**Table 2**  
Frequency of Nursing Intervention Classification domain by the degree of urbanisation.

NIC <sup>1</sup> Domain	Median FTE workdays				NIC <sup>1</sup> Activities
	Overall	Urban	Suburban	Rural	
1. Physiology: Basic	4.0	2.7	4.3	4.0	Elimination Management, Immobility Management, Nutrition Support, Promotion of Physical Wellbeing (consisting of the NIC classes Activity and Exercise Management and Physical Comfort Promotion), Self-Care Facilitation
2. Physiology: Complex	0.6	0.0	0.8	0.0	Drug Management, Electrolyte and Acid-Base Management, Neurologic Management, Perioperative Care, Respiratory Management, Skin/Wound Management, Thermoregulation, Tissue Perfusion Management
3. Behaviour	10.0	10.0	11.4	9.0	<i>Advice on Current Health Situation</i> (consisting of NIC classes Coping Assistance and Communication Enhancement), <i>Mental Wellbeing Facilitation</i> (consisting of NIC classes Psychological Comfort Promotion, Cognitive Therapy), <i>Preventive Counselling</i> (consisting of NIC classes Behavioural Therapy and Patient Education)
4. Safety	2.7	5.1	4.0	2.0	Crisis Management, Risk Management
5. Family	0.0	0.0	0.0	0.0	Childbearing Care, Childrearing Care, Lifespan Care
6. Health System	12.7	11.7	14.3	10.0	<i>Signposting in the Health System</i> (consisting of NIC classes Health System Mediation, Health System Management, and Information Management)
7. Community	1.1	1.3	1.6	1.0	Surveillance, Screening, Disease and Health Event Investigation, Counselling & Consultation, Health Teaching, Quality Assurance, Collaboration & Coalition Building, Policy Development, Advocacy

Note: <sup>1</sup> NIC = Nursing Intervention Classification.

The middle columns display FTE workdays stratified by the degree of urbanisation. For domains 1–6, the right-hand column lists activities based on the nursing intervention classes (Butcher et al. (2018)); for domain 7, the right-hand column lists Public Health Intervention Wheel activities provided on the community level.

least once a month). The least prevalent activities are related to direct (home-based) care (domain 2), Childbearing/-rearing Care and Lifespan Care (domain 5).

### 3.4. Identifying activity clusters

In this section, we use hierarchical clustering to analyse 26 Public Health Intervention Wheel activities (13 at the individual level and 13 at the community level) and 22 nursing interventions. We integrate eight more activities into the survey to better understand what encompasses “counselling” in the context of community health nursing in Austria (see Measurement section).

Clustering actions with similar response patterns in terms of frequencies (not in terms of themes) supports the identification of groups of activities aligned with the Public Health Intervention Wheel and the Nursing Intervention Classification scheme.

Applying the clustering procedure described in the Methods section results in eleven activity clusters. Table 3 characterises these clusters by reporting the median FTE workdays per month within a cluster. The activities are marked by source (“PHIW” for Public Health Intervention Wheel activities on the individual level, “PHIW-c” for Wheel activities on the community level and “NIC-domain number” for nursing interventions).

Fig. 2 displays median full time equivalent (FTE) workdays and the related estimation errors for each cluster introduced in Table 3. This allows us to analyse the nursing intensity within an activity cluster by employing median FTE workdays calculated across all 98 nurses. Note that clusters 01 and 08 contain only one activity (Table 3).

The intensity analysis suggests that a pivotal area of work is counselling (specifically, providing bespoke information on their clients’ (health) situation and their navigation of the health- and social care systems; clusters 01, 02, 05, 06, 08). This result complements previous findings on both the Public Health Intervention Wheel and the Nursing Intervention Classification. Another focus of Austrian community health nurses is improving client autonomy and wellbeing (cluster 04) with 9.7 FTE workdays. Also, networking (both at the individual and the community level; cluster 03) is, with 10.0 FTE workdays, among the most frequent activities. This result is backed up by the previous finding that Collaboration & Coalition Building is an important activity. Finally, we find that Crisis Management and Risk Management (part of cluster 07), while less frequently required, also play a vital role in the schedules.

Even with these convincing results, which support findings derived by different methods, we must acknowledge that some of the clusters contain activities that can hardly be interpreted in a unified way. For example, cluster 09 contains basic physiological

**Table 3**

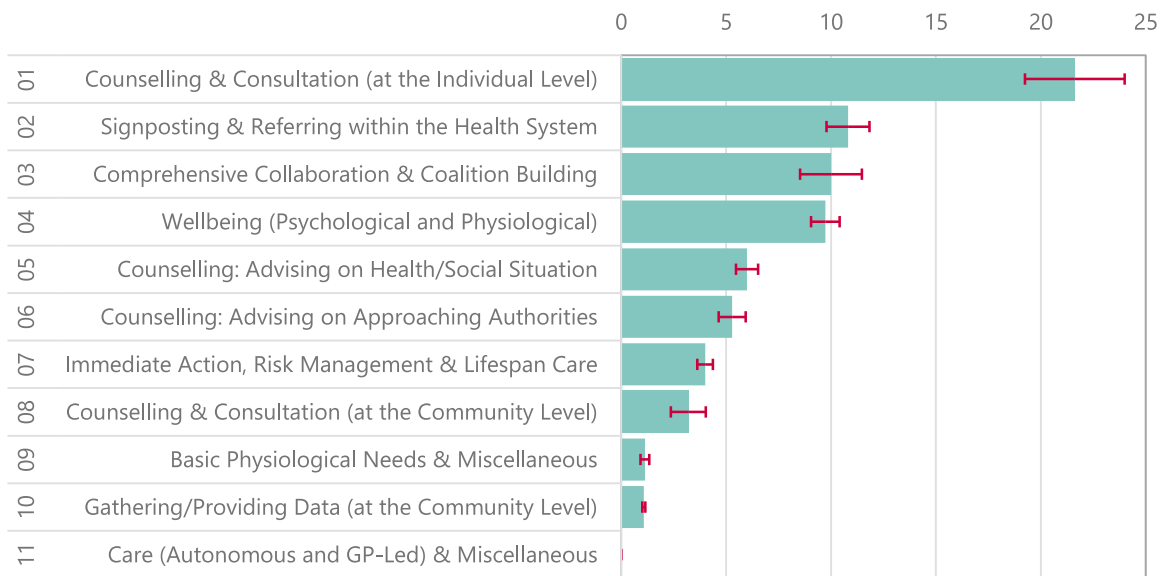
Intensity levels within the clusters by descending median FTE workdays.

Median FTE workdays	Activities
<b>01</b>	<b>Counselling &amp; Consultation (at the Individual Level)</b>
21.6	Counselling & Consultation (PHIW)
<b>02</b>	<b>Signposting &amp; Referring within the Health System</b>
10.8	Advising on Navigating the Health System, Signposting in the Health System (NIC-6), Case Management & Follow-Up (PHIW)
<b>03</b>	<b>Comprehensive Collaboration &amp; Coalition Building</b>
10.0	Collaboration & Coalition Building (PHIW), Collaboration & Coalition Building (PHIW-c)
<b>04</b>	<b>Health Promotion &amp; Prevention of Disease Progression</b>
9.7	Promotion of Physical Wellbeing (NIC-1), Self-Care Facilitation (NIC-1), Mental Wellbeing Facilitation (NIC-3), Advice on Current Health Situation (NIC-3), Preventive Counselling (NIC-3), Surveillance (PHIW)
<b>05</b>	<b>Counselling: Advising on Health/Social Situation</b>
6.0	Advising on Disease Prevention, Advising on other Health-Related Measures, Advising on the Client’s Social Environment, Advising on Other Issues
<b>06</b>	<b>Counselling: Advising on Approaching Authorities</b>
5.3	Advising on Dealing with Government Agencies, Advising on Making Social Welfare Applications, Advising on Obtaining Auxiliary Materials/Devices
<b>07</b>	<b>Immediate Action, Risk Management &amp; Lifespan Care</b>
4.0	Immobility Management (NIC-1), Drug Management (NIC-2), Crisis Management (NIC-4), Risk Management (NIC-4), Lifespan Care (NIC-5)
<b>08</b>	<b>Counselling &amp; Consultation (at the Community Level)</b>
3.2	Counselling & Consultation (PHIW-c)
<b>09</b>	<b>Basic Physiological Needs &amp; Miscellaneous</b>
1.1	Elimination Management (NIC-1), Nutrition Support (NIC-1), Skin/Wound Management (NIC-2), Screening (PHIW), Screening (PHIW-c), Disease and Health Event Investigation (PHIW), Disease and Health Event Investigation (PHIW-c), Outreach (PHIW), Outreach (PHIW-c), Health Teaching (PHIW), Health Teaching (PHIW-c), Quality Assurance (PHIW), Quality Assurance (PHIW-c), Policy Development (PHIW), Policy Development (PHIW-c)
<b>10</b>	<b>Gathering/Providing Data (at the Community Level)</b>
1.1	Case Management & Follow-Up (PHIW-c), Surveillance (PHIW-c)
<b>11</b>	<b>Care (Autonomous and GP-Led) &amp; Miscellaneous</b>
0.0	Electrolyte and Acid-Base Management (NIC-2), Neurologic Management (NIC-2), Perioperative Care (NIC-2), Respiratory Management (NIC-2), Thermoregulation (NIC-2), Tissue Perfusion Management (NIC-2), Childbearing Care (NIC-5), Childrearing Care (NIC-5), Delegated Functions (PHIW), Delegated Functions (PHIW-c), Providing Care (PHIW), Providing Care (PHIW-c), Advocacy (PHIW), Advocacy (PHIW-c)

Note: 13 Public Health Intervention Wheel activities are differentiated by individual level (PHIW) and community level (PHIW-c); the 22 Nursing Intervention Classification activities are augmented by a number indicating the domain.



## Nursing Intensity within Activity Clusters (in median FTE workdays)



**Fig. 2.** Nursing intensity within activity clusters. The green bars show the overall median activity level in each cluster (measured in median FTE workdays). The red error bars indicate the intervals [ $FTEWD \pm 1.58 \times SE$ ], where SE denotes the standard error of the FTE workday, calculated from the mean absolute deviation.

interventions like Nutrition Support, Elimination Management, Skin/Wound Management, and a wide range of Public Health Intervention Wheel activities like Screening, Disease and Health Event Investigation, and Policy Development. Moreover, cluster 11 contains complex physiological interventions that are usually associated with highly specialised nursing interventions in secondary care, like Thermoregulation, Tissue Perfusion Management, and Neurologic Management, together with activities like Childrearing and other Care that are not included in the overall community health nursing project aims, and political activities at the community level. As Fig. 2 shows, these diverse activities are performed very infrequently, which might be the common denominator of the corresponding activities.

#### 4. Discussion

Our findings show that the Austrian community health nursing pilot projects implement many principles outlined by the Public Health Intervention Wheel (Schaffer et al., 2022) but also display a deviation from the (theoretical) concept of the Wheel. The blue wedge activities—counselling, providing consultation and offering health teaching—that are most pronounced for community health nurses in Austria primarily focus on the individual/family level. This deviates from the international standard described by Schaffer et al. (2022), who emphasise the importance of interventions at all levels. The focus on individual-level interventions rather than community-level activities raises questions about the full realisation of community health nursing's potential in Austria.

However, international comparison shows that Austria is not an exception in this respect: several examples from other countries suggest that evenly distributed attention to individual, community, and system levels is the exception rather than the rule. For the United Kingdom, in the early stages of the introduction of community nursing, similar restrictions were observed. In this context, Poulton (2009) identified several barriers to achieving community-focused public health nursing practice, including organisational structures and professional role expectations. These factors may also be influencing the practice patterns we observed in this study.

Moreover, a study from Israel reveals that 70 % of the surveyed public health nurses provide individual-level interventions but fewer activities at the community level, such as community needs assessments or participation in community health decision-making committees (Haron, et al., 2019). Ma et al. (2019) show that the most frequent activity of Chinese community health nurses is immunisation, followed by basic medical services (all at the individual level). While this mixture is in line with their job description, other key activities, such as promoting check-ups or screenings, are mostly neglected (Ma, et al., 2019). Another study finds that community health nurses in Northeastern Thailand played an important role during the COVID-19 pandemic (Yodsuban, et al., 2023). Their activities focus on the individual level and included educating and advocating health, providing care, promoting and empowering people in the community toward health, and giving emotional and nutritional support to older adults. In a U.S. study, see (McCollum, et al., 2017), the authors find that public health nurses also tend to focus on the individual level while affecting the community level outside their jobs. About three-quarters of the surveyed U.S. nurses perceive non-job-related activities, like health-related community volunteering, volunteering related to a specific population or disease, family-related volunteering, church

activities, health fairs, raising or donating money, and travelling abroad for volunteer work, as effective in promoting health in their communities (McCollum, et al., 2017), while not >17 % identified job-related activities like patient education or educating colleagues to do so.

An exception seems to be a qualitative study by Glavin et al. (2019) about Norway, where public health nurses have a primary role in promoting health and preventing illness and work evenly across individual, community, and system levels. An explanation for Norway could be that the Act regulating public health nursing was passed already in 1957 (Clancy, 2007), rendering a mature service at the time of the Glavin paper.

When applying the Nursing Intervention Classification to describe the activity portfolio of Austrian public health nurses, we derive results that are qualitatively similar to those of using the Public Health Intervention Wheel. This is despite the fact that this second scheme, as defined by Butcher et al. (2018), contains a much broader range of interventions, including classic direct care activities, allowing us to assess the extent to which community health nurses perform such activities. Results show that activities typically related to health promotion, like signposting in the healthcare system, providing case management, giving advice on a client's current health situation, facilitating mental wellbeing and offering preventive counselling, are executed most frequently. In stark contrast, activities related to direct (home-based) care, childbearing/-rearing care, and so-called lifespan care are rarely executed. Interestingly, Israeli nurses' current tasks explicitly include breastfeeding consultation and infant and early childhood growth and development assessment, which indicates a broader target group than in Austria (Haron, et al., 2019).

The low frequency of direct care activities in Austria provides strong evidence that community health nurses do not substitute existing home care services but rather complement them with a focus on health promotion and coordination, which answers our main research question. Note that these findings from Austria differ from those described for other countries above. The studies from Israel, China and Thailand include at least some direct care activities in the portfolio of public health nurses (Haron, et al., 2019; Ma, et al., 2019; Yodsuban, et al., 2023). Studying more closely the effectiveness of such an approach to public health activities like the one implemented in Austria could shed light on the advantages and drawbacks of employing specialised nursing services with non-overlapping responsibilities.

Another interesting finding in our analysis is that an aggregation of activities according to frequency patterns reported by nurses results in thematically meaningful groups. Cluster analysis shows that counselling and consultation at the individual level play a pivotal role in the work of Austrian public health nurses. General counselling activities are related to the cluster with the highest frequentness. Additionally, other clusters containing more specific counselling activities were identified. While other (non-counselling) clusters consist of activities from both the Public Health Intervention Wheel and the Nursing Intervention Classification (suggesting that many activities can be subsumed under common themes), this is not true for all activities (as already discussed above). Also, the findings about the low-intensity clusters could be understood as further evidence that Austrian community health nurses are implementing the advisory, educating, and coordinating aspects of nursing (in agreement with most of the principles outlined by the Public Health Intervention Wheel) while leaving care activities to direct care and nursing services. However, activities at the community (or system) level, like surveillance and screening activities, disease and health event investigations or advocacy activities (clusters 09–11), play a minor role in the daily routine.

Regarding the influence of urbanisation on nursing activities, we found that their doings are indeed related to the population density of the work environment. For example, Austrian suburbs show the highest activity frequencies for carrying out case management and providing health teaching. In contrast, in suburban regions, the frequentness of counselling and consultation activities is lower than in cities and rural areas. Surveillance and outreach activities are more important in urban than in suburban or rural areas. Similarly, rural public health nurses in Norway emphasise a person-centred approach to adequately support children with a body mass index greater than what is characterised as 'normal' (Heggem, et al., 2023). They believe it is advantageous to know children in their local surroundings, including their family history and leisure activities, all of which are more feasible in a rural than in an urban setting. This may be an explanation for why case management is even more popular in suburban and rural areas.

The results presented in this paper provide insights into the early stages of a community health nursing service. The focus on individual-level interventions, particularly in counselling and health system navigation, demonstrates the immediate value these nurses are providing. The absence of activities at the community and systems levels and the variation across urban, suburban, and rural areas observed in Austria reflect challenges typical for introducing this new nursing role. To overcome these obstacles, an increased emphasis on collaboration and coalition building, as well as strategies for overcoming barriers to the implementation of community-level interventions, could be helpful.

## 5. Strengths and limitations

The study is based on a convenience sample of community health nurses working in Austrian pilot projects. Due to the voluntary nature of our survey, a self-selection bias cannot be ruled out. Nurses who were more engaged or had stronger opinions about their role might have been more likely to participate, potentially skewing the results.

Missing data are treated as missing completely at random. In particular, no imputations were made. However, any alternative requires additional assumptions.

We were unable to fully assess the sample's representativeness in terms of demographic quotas due to a lack of publicly available information on the demographic composition of the whole population of community health nurses in Austria. This limits our ability to generalise the findings to all community health nurses in the country. However, the proportion of female survey participants corresponds to the gender distribution in Austrian direct care and nursing services (Statista, 2023). The same applies to the observed average age of 41 years, as 60 % of the workforce in Austria is between 30 and 54 years of age (Statistics Austria, 2024a, 2024b,

2024c). In terms of income, the median gross income for female community health nurses is almost identical to the median gross income for women in Austria (€2545); for male nurses, it is below the median gross income of men calculated for all occupations (€3721) (Statistics Austria, 2024a, 2024b, 2024c).

The study's cross-sectional design provides a snapshot of community health nursing activities at a specific point in time. This approach doesn't capture potential changes in practice over time as the role evolves and nurses gain more experience in their positions.

The differentiation by degree of urbanisation results in a small urban subsample. Therefore, the related results have to be interpreted with caution. Future studies might benefit from a stratified sampling approach to ensure adequate representation across urbanisation levels.

Despite these limitations, the study has several strengths. The high response rate (45 %) enhances the credibility of our findings. The use of multiple analytical methods (descriptive statistics, statistical tests, cluster analysis, applied to two classification schemes) to answer the question about the innovative character of the community health nursing service strengthens the validity of the results.

Furthermore, this study provides the first comprehensive analysis of community health nursing activities in Austria since the introduction of this job role in 2022. It offers valuable insights into the early implementation of this new nursing speciality and provides a foundation for future research and policy development in this area.

## 6. Conclusions

Based on survey data, this study presents the first comprehensive analysis of community health nursing activities in Austria and a widely applicable methodology to evaluate whether community health nursing replaces existing direct care and home nursing services. The Austrian experience demonstrates how community nursing can be adapted to local contexts while still maintaining the core principles of public health nursing.

Our findings reveal that these nurses primarily focus on counselling, preventive, and coordinating tasks at the individual level, with activities tailored to local needs. The clear delineation of roles, with minimal engagement in physiological interventions, suggests that community health nursing in Austria complements rather than substitutes existing healthcare services.

While other studies have examined the role of community and public health nursing in various healthcare systems (see, e.g., (Kroneman, et al., 2016; Philibin, et al., 2010)), our study has its focus on the initial implementation phase of community health nursing in a country where it previously did not exist. Moreover, we employ a dual framework, utilising both the Public Health Intervention Wheel and Nursing Intervention Classification to map activities.

As community health nursing evolves in Austria, opportunities exist to enhance its impact by expanding community and systems-level activities. This study provides a foundational understanding of community health nursing in Austria, offering lessons for other countries considering similar initiatives. It highlights both the adaptability of the community health nursing model and the challenges of fully implementing its principles in a new context.

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## Data availability

Due to the protection of data privacy, the data are available only for nonprofit research in agreement with the authors, according to the consent given by participants.

## CRedit authorship contribution statement

**Raimund M. Kovacevic:** Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Doris A. Behrens:** Writing – review & editing, Writing – original draft, Visualization. **Walter Hyll:** Writing – review & editing, Writing – original draft, Validation, Investigation, Formal analysis, Conceptualization.

## Declaration of competing interest

None.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ijnsa.2024.100258](https://doi.org/10.1016/j.ijnsa.2024.100258).

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