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Evaluation of a complex integrated, cross-sectoral psycho-oncological care program (isPO): a mixed-methods study protocol

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Abstract

Introduction: International standards of care require the complete integration of psycho-oncological care into biomedical cancer treatment. The structured integrated, cross-sectoral psycho-oncological program ”isPO” is aiming to ensure a provision of care in inpatient and outpatient settings according to a stepped-care approach. Up to now, psycho-oncological care is missing regulated and standardized processes to demonstrate the effectiveness. This study protocol describes the process and outcome evaluation that is conducted, along with the isPO study. The program evaluation is aiming to proof effectiveness, explain potential discrepancies between expected and observed outcomes. Additionally, provide insight into the implementation process, as well as contextual factors that might promote or inhibit the dissemination and implementation of the stepped care program will be gained. In addition to these measures, a cost consequence analysis will provide further evidence aimed at integrating psycho-oncological care into primary health care.

Methods and Analysis: The evaluation concept is based on a tripartite strategy consisting of a prospective, formative and summative evaluation. To capture all determinants a concurrent mixed-method design is applied comprising qualitative (interviews and focus groups) and quantitative (standardized questionnaires) surveys of patients and health care providers. In addition, analysis of the psycho-oncological care data (isPO care data) and statutory health insurance claims data will be conducted. Primary and secondary data will complement one another (data linkage) to obtain a more comprehensive picture of the effectiveness and implementation of the complex intervention within the isPO study.

Ethics and Dissemination: The study has been approved by the ethics committee of the Medical Faculty of the University of Cologne. For all collected data, the relevant national and European data protection regulations will be considered. All personal identifiers (e.g. name, date of birth) will be pseudonymised. Dissemination strategies include annual reports as well as quality workshops for the organizations, the presentation of results in publications and on conferences, and public relations.

Registration Details:

The study has been registered in the German Clinical Trials Register (No. DRKS00015326).

Strengths and Limitations

- The mixed-methods approach (qualitative and quantitative data) and the linking of primary and secondary data sources allow a multidimensional view on the quality and effectiveness of the psycho-oncological care program.
- Results of the process evaluation are directly used to continuously improve the care program.
- Regression discontinuity design (RDD) allows estimation of the average treatment effect since a Randomised controlled trial (RCT) is not possible for ethical reasons in this specific setting
- The cost-consequence is of limited generalizability but is able to estimate a broader range of costs and consequences and help decision makers structure their consideration of the different consequences of a decision
- Risk of selection bias due to the quasi-experimental study design, in which patients are assigned to care-level groups on the basis of a cut-off value (validity of cut-off value will be analysed alongside with the primary outcome to ensure group equivalence)

Introduction

There were 14.1 million new cancer cases and 32.6 million people living with cancer (within 5 years) in 2012 worldwide [1]. In Germany, recent epidemiology studies showed an annual incidence of about 480.000 cancer cases in 2014 [2]. A cancer diagnosis is often associated with emotional distress as well as symptoms of anxiety and depression [3–5]. Psychological well-being is increasingly seen as an important component of cancer care. In line with this, psycho-oncology is an area of multi-disciplinary interest that deals with the psychological, social, behavioural, and ethical aspects of cancer [6, 7]. This subspecialty addresses the two major psychological dimensions of cancer: the psychological responses of patients to cancer at all stages of the disease, and that of their families and caretakers; and the psychological, behavioural and social factors that may influence the disease process. Overall psycho-oncology aims to enable cancer patients to cope with their illness and actively contribute to their medical treatment and follow-up care [6–8]. Although the German national cancer plan [9] as well national and international guidelines and standards of care [10–12] call for the full integration of psycho-oncology into biomedical cancer treatment, essential structures, processes and financing for psycho-oncological treatment is not yet established [13–16] . As funding is not uniformly regulated in Germany, the affordability of psycho-oncological treatment is a major challenge for private and statutory health insurances (SHI) [14–16].

Systematic reviews and meta-analyses show that different psychotherapeutic and psychosocial intervention are associated with small-to-medium effects on quality of life and emotional distress [17–20]. Effect size was positively correlated with high levels of distress at the starting point and the duration of intervention [17]. However, most of the studies are restricted to female breast-cancer patients [17, 21] and do not comprise a pre-defined screening process of cancer patients to deliver need-based psycho-oncological care in a stepped-care manner.

Therefore, the integrated cross-sectional psycho-oncology (isPO) program aims to develop, implement and evaluate a new stepped-care psychosocial and psychotherapeutic care program for adult newly diagnosed cancer patients. The German version of the widely accepted “hospital anxiety and depression scale” (HADS) [11, 22, 23] and two self-developed and validated questionnaires (publication in preparation; [24, 25]), will be used as screening instruments to assess individual patient needs, i.e. the assignment to a specific care level, and as an outcome measure. The RDD as a regression-based quasi-experimental approach is used to measure efficacy, reduction of anxiety and depression after 12 months of treatment via HADS-questionnaire. Secondary outcomes are the quality of the care program, including feasibility, patient satisfaction and perceived benefit.

Because an effectiveness study is limited in its ability to provide information regarding whether an intervention is successful (including the implementation process) [26] and what are relevant costs and type of costs, the isPO study is accompanied by a complex process evaluation and a health economic analysis. This external evaluation aims to gain guidance on the quality and appropriateness of the psycho-oncological care program and on implementation and dissemination strategies for complex health intervention. The evaluation will focus on implementation outcomes, such as acceptance, feasibility, appropriateness, effectiveness and costs [27], as well as patient reported outcomes, such as quality of life and satisfaction with care.

In order to cover all relevant aspects, two frameworks are combined for the analysis: The Medical Research Council (MRC)-Framework for the evaluation of complex interventions [28] and the Consolidated Framework for Implementation Research (CFIR) [29]. The MRC guidance defines the function of process evaluation at different stages of development, evaluation and implementation of complex intervention and was therefore used to design the tripartite evaluation design, consisting of a prospective, formative and summative part. This framework gives equal attention to the implementation itself, the mechanism of impact (participant’s responses and mechanisms of change) and the influence of contextual factors that may act as barriers and facilitators to implementation, dissemination and intervention effects [28, 30]. For the systematic identification and evaluation of relevant context factors

and potential barriers and facilitators, constructs related to an effective implementation of the CFIR are used. This framework captures the complexity of the implementation across the key aspects and provides a theoretically based coverage of the internal and external settings, the characteristics of the intervention and the people involved, and the process itself. This meta-theoretical framework can be used across all phases of implementation (pre-, during, and post-implementation) [29, 31], and has been shown to be effective for guiding successful implementation across numerous health domains, such as weight management and cancer screening [31, 32]. Overall, both frameworks advocate a multilevel contextual perspective on the implementation and evaluation of interventions. The objective in using these two frameworks was to ensure that we took into account and addressed all the important factors based on well-validated constructs that are essential for the evaluation of a new health program and its effective implementation.

Main research questions

- Does the structured 12-month psycho-oncological care program reduce anxiety and depression in cancer patients?
- How are quality of care, structures and processes perceived by patients and employees, and what is the experience of psychotherapists, social workers, onco-guides, nurses and physicians implementing isPO across settings?
- Which contextual factors and which baseline implementation constructs (CFIR) predict implementation success for each health-care network?
- What effects does the isPO program have on costs and use of SHI health services in comparison to standard care?
- Do the structures and contents of the health care program provide a suitable basis for their integration in the standard health care system?

Secondary research questions:

- How do sociodemographic factors, comorbidities, the cancer entity or the form of medical treatment influence the effectiveness of psycho-oncological care?
- Which sociodemographic and health care-related risk factors predict the extent of psychological stress reactions on the initial diagnosis of cancer?

Methods and Analysis

Study Design

The project isPO aims to develop, implement, and evaluate a new cross-sectoral form of psycho-oncological care. The study receives funding from the German Federal Joint Committee (G-BA), a public legal entity comprising the four leading umbrella organizations of the self-governing German healthcare system. During the 4-year project (October 2017 – September 2021), up to 3.484 outpatients and inpatients of full legal age (≥ 18 years) with a primary diagnosis of cancer (ICD-10-GM C00 – C97) will be included in the isPO program. Patients will be assigned to either the control group (HADS ≤ 14; care level 1 and 2) or the intervention group (HADS ≥ 15; care level 3) depending on the anxiety and depression level upon enrollment in the study. The control group will receive support of an onco-guide (level 1) or psychosocial support (level 2), whereas the intervention group receives psychotherapeutic treatment (level 3). Patients with a starting HADS ± 2 around the cut-off will be evaluated for the treatment effect. . This is based on the assumption that the distribution around the threshold is at random [33]. The treatment effect (primary outcome) is analysed using the RDD for patients with initial HADS values between 13 and 16 [34]. The RDD represents a valid alternative to RCT studies to estimate treatment effects [35]. Anticipated treatment effects (reduction of HADS after 12 months of psycho-oncological treatment) are expected to lead to a discontinuity of the linear regression at the cut-off. In the course of the effectiveness measure the preset cut-off value of the HADS will also be validated. In addition, further self-developed screening instruments are used to assess individual psychosocial risk factors and the cognitive-emotional response to cancer diagnosis and to assign patients to a certain level of care (level 1 or 2). Publication of the validation of these screening instruments is in preparation [24, 25].

In order to ensure the full integration of psycho-oncological treatment into clinical care, the psycho-oncological care is provided under supervision of the treating physician. The physicians therefore recommend their cancer patients for the isPO program. Depending on the needed level of care either onco-guides, trained former cancer patients (level 1), social worker (level 2) or psychotherapists (level 3) will take over the treatment. Recruitment and care of the patients started in January 2019 and will continue until March 2021.[1]

The development and implementation of the isPO program are based on the model of program theory for health promotion programs [36]. The process and outcome evaluation, carried out alongside the isPO care program, applies a mixed-methods design based on several data sources, including health insurance claims data, clinical psychotherapeutic and

[1] Publication of the detailed description of the psycho-oncological stepped-care concept of the isPO project is in preparation.

psychosocial data (isPO care data) as well as qualitative and quantitative surveys of patients and health care providers. Both quantitative and qualitative data are collected in parallel and analysed separately. The results are then compared. In addition, there is an increasing need to assess the economic impact of psycho-oncology services on cancer in order to provide the necessary evidence to guide decision-making [37]. Not only the efficacy, but also the cost-effectiveness of an intervention will be decisive, whether it will be transferred into standard care. Therefore, a health economic evaluation of isPO is necessary and also requested by the SHI. A cost-consequences analysis from the point of view of the German health insurance funds using SHI claims data is planned. This analysis examines costs and consequences without attempting to isolate a single consequence or aggregate consequences into a single measure [38]. The health economic evaluation is financed by the University Hospital Cologne's own funds. Furthermore, fidelity, quality and feasibility will be monitored during the entire project using the clinical psychotherapeutic and psychosocial documentation (isPO care data), quarterly quality reviews of each network and quarterly inter- and cross-network quality workshops.

Setting

The isPO study is conducted in four health-care networks in North Rhine-Westphalia (Germany) each consisting of one hospital (rural, urban or university) with two or more certified oncological centres in collaboration with several resident physicians. All four sites were selected based on predetermined criteria that are representative for the different health care providers in rural and urban regions.[2] For the process and outcome evaluation all participating patients (approx. 3.400) and health care providers (approx. 200), including nurses, psychotherapists, social workers, and physicians, will be included in the quantitative study. For qualitative studies participants will be selected based on the principal of “purposeful sampling”, a technique widely used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources [39]. This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest [39–41]. The potential selection bias caused by this sampling method is offset by the mixed-method design, which increases the credibility of results.

[2] Publication of the detailed description of the psycho-oncological stepped-care concept of the isPO project including the inclusion criteria for the networks is in preparation.

Patient and public involvement

The House of the Cancer Patient Support Associations of Germany (association of ten cancer support groups) as well as the German Cancer Society North Rhine-Westphalia are also applicants of the study. Both groups have been working on the concept, design and implementation since the planning of the study and give advice to the scientists regarding the outcome measures and research questions. They assess and represent the patient's perspective and will provide up-to-date information about the project status for the public on their homepages and events. In addition, all questionnaires were pre-tested with at least three former cancer patients to ensure that the questionnaires met the needs of a patient in content, length and comprehensibility. The questionnaires were adapted as best as possible based on the patients' comments.

Process and outcome evaluation design

Prospective, formative and summative evaluation

Due to the high complexity of the isPO project, a multifaceted evaluation design is applied. For the current study, the MRC framework by *Moore et al.* [28] for process evaluation of complex interventions in combination with the CFIR constructs seems to be suitable. Therefore, a tripartite evaluation design will be applied comprising a prospective, formative, and summative evaluation. Prospective and formative the concept, implementation and appropriateness will be evaluated on an ex ante and in-process basis. All results will be reported and promptly used to optimize the care program and the implementation process. Finally, primary and secondary outcomes, as well as the transferability, will be evaluated summatively. By using this multidimensional mixed-method design, it will be possible to account for the different contextual factors influencing the implementation as well as patient-related and patient-reported outcomes. Among others we will report implementation outcomes, such as acceptability, appropriateness, feasibility, fidelity, efficiency, effectiveness, and satisfaction [27]. In addition to patient-related factors, such as age, comorbidities or sociodemographic factors, variables such as structural conditions, readiness, and attitude towards change, knowledge-based and experience-based variables can play a role on the care provider’s side. The planned data collection and the corresponding data sources as well as research questions are listed in Table 1.

Quantitative data collection and analysis

Within the scope of the study patients and health care provider, such as physicians, nurses, psychologists, social worker, and onco-guides, are questioned at two points in time by means of a written (postal) survey. The aim of these surveys and the subsequent quantitative

analysis is to determine the appropriateness and feasibility of the stepped-care program. Essential aspects of the patient questionnaire are satisfaction with the psycho-oncological care, other social support, and quality of life. The provider questionnaire focuses on the attitude towards the new psycho-oncological program, intervention characteristics, and personal as well as organizational barriers and facilitators, such as attitude towards change and corporate culture [29].

In order to archive the highest possible response rate, the survey is conducted according to Dillmann's "Total Design Method" [42]. To create the questionnaires and to import paper-based survey data, the data capturing software Teleform® is used. Validated scales are analysed according to the coding manual. Psychometric analyses of factorial validity and reliability are carried out on the scales developed in-house.

Qualitative data collection and analysis

To enable patients to describe their experiences with the intervention, approximately 30 patients will be interviewed. In addition to the quantitative surveys, this qualitative analysis provides a deeper insight into the perceptions and opinions of the respondents. In addition, this method enables the identification of further factors that influence patient acceptance and perceived benefit. To meet the needs of vulnerable patients, such as cancer patients, respondents can choose to participate in a single interview or focus group. The number of interviews will be adapted with respect to the saturation point. Participants will be approached through the data trustee of the project, who is the only one (other than the health care provider) with access to patient contact addresses for the data linkage and patient surveys. Through the targeted selection of interviewees, we take relevant criteria such as age, gender, assigned level of care, and region into account. In addition, we will conduct approximately eight focus groups (six to eight persons each) with health care providers and interviews with each network coordinator (quality management representatives of the clinics), leading physicians and each leading psycho-oncologist of the four health-care networks (four persons each). Interviews and focus groups will be guided by scientific rules, audio recorded, transcribed, pseudonymised, and analysed based on content [43] or documentary analyses [44].

Overall, these qualitative analyses will provide in-depth understanding of the mechanisms of action, how context affects implementation or why those who carry out or receive the intervention engage as planned or not. It gives a greater insight into barriers and facilitators of the implementation process at the different sites as well as into the perception of different professions. In this way, we will collect data from all participants on key aspects of the process and combine these results with in-depth data from smaller samples.

Administrative data analysis: statutory health insurance and clinical data – data linkage

In order to gain a greater insight into the impact of acute cancer treatment, health, and medical history and comorbidities on the effectiveness of psycho-oncological care and the changing use of health care services during the care program, the following data sets will be analysed:

1.) Statutory health insurance claims data of all recruited patients insured with one of the four largest German health insurance funds, covering around 70 % of the statutory insured patients in Germany
2.) Clinical psychological and psychosocial data (isPO care data) from each recruited patient in each network (hospital)
3.) Cancer registry data from each recruited patient in each network (hospital)

Statutory health insurance claims data will be analysed at each care level within the framework of the stepped-care program and at regional level (each network). In addition to patient characteristics, this hierarchical data set contains further information at the provider level. Data at the patient level includes age, gender, insurance status, inpatient and outpatient treatment, diagnoses, and drug prescriptions. At the provider level, it is possible to consider the attending physicians and hospitals at regional and medical specialist level. Hierarchical multi-level analysis allows us to consider the clustering of data at different levels in order to identify relevant influencing factors.

Clinical psychological and psychosocial data (isPO care data) of each recruited patient will provide information about the delivered care in each network and at each care level. This enables the isPO program's range, fidelity and dose to be analysed.

A third data set (cancer registry data), containing the differentiated medical diagnosis and biomedical treatment, will provide additional information on the medical status of the patients included. This dataset will include additional clinical measures such as the tumour state, surgical procedures or the type of chemotherapy or radiotherapy. The analyses will provide further insights into the influence of biomedical treatment or the severity of the disease on the effectiveness of psycho-oncological treatment.

All analyses follow the guidelines and recommendations of Good Practice of Secondary Data Analysis [45]. As the data are not collected for scientific reasons but for reimbursement, resulting impact on the validity of the data is taken into account.

By linking the administrative data sets with the survey results, the perceived benefits and quality of life as well as sociodemographic data can be linked with the more general health status and the use of other health services. It also enables the identification of predictors of increased stress response after cancer diagnosis. In addition, multi-level analyses will take

into account the health context in each network (hospital) and the relationship between the context and health care outcomes [46].

Health economic analysis

A health economic analysis is conducted in form of a cost-consequences analysis from German SHI perspective. This economic evaluation is based on SHI claims data. The advantage of using routine data for evaluation is that cross-sectoral costs and the use of health services are taken into account. The result can help the decision-makers to assess and compare the costs and use of health services between isPO patients and patients in standard care. The intervention group (isPO patient) is selected based on the isPO inclusion criteria, legal age (≥ 18 years) and a primary diagnosis of cancer (ICD-10-GM C00 – C97). However, due to the delayed availability of SHI claims data, not all isPO patients can be considered in the health economic analysis.

IsPO patients (intervention group) will be compared to patients in standard care (control group). The control group is generated based on SHI claims data using propensity score matching [47–49]. Each isPO patient will be assigned to up to five patients from standard health care according to predefined criteria. Propensity score matching is a method to balance covariates observed in non-randomized studies between subjects in the control and intervention groups. The matching is carried out by the participating statutory health insurance funds, so that the data of the control group can then be transferred and analysed anonymously. Costs and use of inpatient and outpatient treatments, medicines, remedies and aids as well as periods of inability to work will be analysed. The economic evaluation examines differences in costs, use of health services and hospitalisation during 12 months of treatment in isPO compared to standard care. Costs and consequences of different outcomes are listed separately in a disaggregated format and the results are presented using descriptive statistics.

Ethics and Dissemination

Ethical considerations

The study was reviewed and has received ethics approval from the ethics committee of the Medical Faculty University hospital of Cologne and has been registered within the German Clinical Trial register (No. DRKS00015326). Up to the point of submission, there was still no ethics vote available for the health economic analysis. Review of the health economics analysis by the ethical commission is currently in progress. For all analysed data relevant national and international data protection regulations will be respected. In accordance with

national requirements and the principles of the Declaration of Helsinki, written informed consent will be obtained from all participants prior to enrolment and all study participants can revoke their consent without any negative consequences. The focus groups, as well as the interviews will be performed solely by trained researchers, trying to minimize the psychological burden of the patients as well as the health care providers. The survey will be performed pseudonymously. Personal identifiers will be only recorded to manage the responses to the questionnaire. Confidentiality will be maintained at all levels of data management. Cognitive pre-test on the postal survey will be performed before dissemination in order to facilitate the answering of the questionnaire and reduce mental stress. For the data analysis, all personal names are removed and all data records used are sufficiently coarsened to ensure pseudonymisation, especially with regard to data linkage. A complex approach to data protection, involving the use of three different pseudonyms (for the different data transmission channels) and the establishment of a project data trustee, who is not involved in data analysis, ensures the highest possible level of data protection in line with the requirements of the European General Data Protection Regulation (GDPR).

Dissemination

The isPO project partners have agreed on publication guidelines, a publication strategy and a publication plan. The publication strategy consists of the dissemination in scientific peer-reviewed journals and presentations at national and international academic conferences. Moreover, there is a strategy to ensure dissemination in popular science forums, such as research gate, and in public media. Professional exchange and patient participation will be a prominent task within in the project to gain the necessary dissemination and sustainability of the research findings. Therefore, a homepage was created to spread up to date news on the project progress. In addition, the House of the Cancer Patient Support Associations of Germany (association of ten cancer support groups) as well as the German Cancer Society North Rhine-Westphalia will provide up-to-date information on their homepages and events.

The publication plan will evolve over time but includes the following planned scientific activities:

- Six Ph.D. theses at four different scientific institutes of the university of cologne
- About twenty scientific articles in different peer-reviewed journals
- Local seminars at the study sites
- Information events of cancer self-help groups and the Cancer Society North Rhine-Westphalia

- Special sessions planned at the 19. annual meeting of the PSO (Psycho-Oncology Committee of the German cancer Society) in 2020 and the German congress of Health Care Research (DKVF) 2020
- Presentations at national and international conferences
- Popular science presentations in national media and healthcare magazines

Conclusion

IsPO aims to reduce symptoms of anxiety and depression in cancer inpatients and outpatients, to improve their psychosocial situation and to promote self-help. Different sectors of the German health care system and a wide range of scientific institutes cooperate to implement and evaluate a cross-sectoral psycho-oncological care program more responsive to patients' needs. The evaluation of the new care program will provide important evidence-based results from the perspective of patients and practitioners for cross-sectoral psychosocial and psycho-oncological care of patients with initial cancer diagnosis and opens the way for a transfer of the care program into standard care. Cost-consequence analyses examine whether the care concept also favors the effective use of existing resources.

From a methodological point of view, the proposed project is highly innovative. It takes into account all relevant perspectives, enables new needs-based health care, has a prospective, multicentre and controlled design and offers a linkage of primary and secondary data from different health insurance funds for efficacy, effectiveness and cost analyses.

The aim of the project is to meet the requirements that make it possible to implement this new form of care in the standard care system in Germany. The care program will combine approaches of cancer self-help (care level 1), psychosocial cancer counselling (care level 2) and psycho-oncological psychotherapy (care level 3) in a uniform care concept, operationalize them and integrate them into oncological care. It will provide a care management to regulate interdisciplinary and cross-sectoral cooperation in health care. Results of the process and outcome evaluation will provide insight into the quality and appropriateness of the care concept as well as the implementation process of a complex health innovation. In the long-term, the program could also be suitable for the care of patients other than those suffering from oncological diseases.

A particular strength of the study is the participation of several statutory health insurance funds and a possible linkage of primary and secondary data. For the first time in Germany, this study thus offers an evidence-based basis for decision-making on the integration of a new demand-oriented psycho-oncological care structure into standard health care.

Contribution

MH, MK, MHe, ALG, HP, NS, PH and STS are applicants of the funded study. IJ, AD, NS, JCC, CL, MHe, CS, HL and MK designed the study. IJ drafted manuscript and incorporated the revisions between authors. MHe, AH, CS, IJ and AD drafted and finalized the concept of data protection for all patient related research data and data transfers involved as part of the ethics application. The final manuscript has been critically revised and approved by all authors.

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Competing interests

The authors declare no conflicts of interest.

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Table 1: Data collection of different domains of the intervention

Section of evaluation		Research Question	Data source		Procedure of data collection	Time of data collection
Prospective evaluation	Development of the isPO program	Was the program developed as intended?	A	Focus group with isPO project developers (*n* = 8)	Interviewed by evaluators	During development
			B	Documentary analyses (quarterly progress reports of all isPO project developers)	Progress reports made for the external evaluation by project developers	
Prospective and formative evaluation	Recruitment and selection of cluster	How where the cluster selected and recruited? Why have the cluster participated to the isPO study?	C	Written documentation of the recruitment procedure (quarterly progress reports)	Progress reports made for the external evaluation by project developers	During recruitment of cluster
			D	Semi-structured interviews with the head of each health-care network (*n* = 4)	Interviewed by evaluators	At the beginning of intervention phase
Formative and summative evaluation	Delivery and response of clusters	How was the intervention delivered to each cluster? How was the intervention adopted by each cluster?	E	Documentary analyses of protocols and further documents of quarterly cross-network quality workshops (*n* = 3 out of 10)		During intervention phase
			F	Quarterly standardized quality reviews of each cluster and protocols of each quality workshops		During intervention phase
			G	Written documentation and attendance list of trainings		Before intervention
			H	Standardized questionnaire of all		Two time-points

				providers (n ~ 200)		during intervention phase
			I	Clinical data of the isPO care program to assess accordance to the care concept		
	Individual response of health care provider	What are the expectations/experience of/with the project? What is the attitude of the health care providers toward the intervention?	J	Focus groups (*n* = 5: 1 per cluster/network and 1 cross-network) and semi-structured interviews with the head of the psycho-oncology departments and leading physicians of each cluster (*n* = 8)	Interviewed by evaluators	During intervention phase
			H	Standardized questionnaire of all providers (*n* ~ 200)	Self-assed by health care providers	Two time-points during intervention phase
	Individual response of patients	Patient-experienced- and patient-reported-outcomes	K	Focus groups (*n* = 3) or according to the patient's wishes semi-structured single interviews	Interviewed by evaluators	During intervention phase
			L	Standardized questionnaire of all patients (*n* = 3,484)	Self-assed by patients	At the beginning and end of intervention phase
	Context (intervention)	What is the context in which the intervention is being implemented?	F, J, H	Focus groups with providers to assess ´care as usual` and standardized questionnaires to assess organizational characteristics	Interviewed by evaluators or rather self-assed by providers	During intervention phase
		What contextual factors promote or inhibit the implementation of the intervention?	A-L	All data assessed throughout process evaluation		

	Appropriateness and Efficiency of the intervention	Was the treatment efficient in all levels of care? How is the effectiveness and utilization of the intervention affected by sociodemographic factors, previous conditions and medications?	M	Clinical data of the isPO care program at an individual patient level	Documented by health care providers	During and at the end of intervention phase
			N	Statutory health insurance claims data of isPO-patients (4 years before intervention and 12 month of intervention)	provided by four German health insurance funds	
Outcome evaluation	Effectiveness	Is the psycho-oncological care program effective?	M	Clinical data (HADS value) of the isPO care program at an individual patient level to assess the primary outcome (reduction of anxiety and depression after 12 month)	Self-assed by patients	At the end of intervention phase
Planned: Health economic evaluation	Cost-consequence analysis	What effects does the isPO program have on the costs and use of SHI health services in comparison to patients in standard care?	N	Statutory health insurance claims data of *n* ~ 300 patients (decreased number of patients due to methodological restrictions and delayed data provision)	provided by four German health insurance funds	At the end of intervention phase

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Evaluation of a complex integrated, cross-sectoral psycho-oncological care program (isPO): a mixed-methods study protocol

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Evaluation of a complex integrated, cross-sectoral psycho-oncological care program (isPO): a mixed-methods study protocol

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Abstract

Introduction: International standards of care require the complete integration of psycho-oncological care into biomedical cancer treatment. The structured integrated, cross-sectoral psycho-oncological program ”isPO” is aiming to ensure a provision of care in inpatient and outpatient settings according to a stepped-care approach. Up to now, psycho-oncological care is missing regulated and standardized processes to demonstrate the effectiveness. This study protocol describes the process and outcome evaluation that is conducted, along with the isPO study. The program evaluation is aiming to proof effectiveness, explain potential discrepancies between expected and observed outcomes. Additionally, provide insight into the implementation process, as well as contextual factors that might promote or inhibit the dissemination and implementation of the stepped care program will be gained. In addition to these measures, a cost consequence analysis will provide further evidence aimed at integrating psycho-oncological care into primary health care.

Methods and Analysis: The evaluation concept is based on a tripartite strategy consisting of a prospective, formative and summative evaluation. To capture all determinants a concurrent mixed-method design is applied comprising qualitative (interviews and focus groups) and quantitative (standardized questionnaires) surveys of patients and health care providers. In addition, analysis of the psycho-oncological care data (isPO care data) and statutory health insurance claims data will be conducted. Primary and secondary data will complement one another (data linkage) to obtain a more comprehensive picture of the effectiveness and implementation of the complex intervention within the isPO study.

Ethics and Dissemination: The study has been approved by the ethics committee of the Medical Faculty of the University of Cologne. For all collected data, the relevant national and European data protection regulations will be considered. All personal identifiers (e.g. name, date of birth) will be pseudonymised. Dissemination strategies include annual reports as well as quality workshops for the organizations, the presentation of results in publications and on conferences, and public relations.

Registration Details:

The study has been registered in the German Clinical Trials Register (No. DRKS00015326).

Strengths and Limitations

- The mixed-methods approach (qualitative and quantitative data) and the linking of primary and secondary data sources allow a multidimensional view on the quality and effectiveness of the psycho-oncological care program.
- Results of the process evaluation are directly used to continuously improve the care program.
- Regression discontinuity design (RDD) allows estimation of the average treatment effect since a Randomised controlled trial (RCT) is not possible for ethical reasons in this specific setting
- The cost-consequence is of limited generalizability but is able to estimate a broader range of costs and consequences and help decision makers structure their consideration of the different consequences of a decision
- Risk of selection bias due to the quasi-experimental study design, in which patients are assigned to care-level groups on the basis of a cut-off value (validity of cut-off value will be analysed alongside with the primary outcome to ensure group equivalence)

Introduction

There were 14.1 million new cancer cases and 32.6 million people living with cancer (within 5 years) in 2012 worldwide [1]. In Germany, recent epidemiology studies showed an annual new cancer cases of about 480.000 cancer cases in 2014 [2]. A cancer diagnosis is often associated with emotional distress as well as symptoms of anxiety and depression [3–5]. Psychological well-being is increasingly seen as an important component of cancer care. In line with this, psycho-oncology is an area of multi-disciplinary interest that deals with the psychological, social, behavioural, and ethical aspects of cancer [6, 7]. This subspecialty addresses the two major psychological dimensions of cancer: the psychological responses of patients to cancer at all stages of the disease, and that of their families and caretakers; and the psychological, behavioural and social factors that may influence the disease process. Overall psycho-oncology aims to enable cancer patients to cope with their illness and actively contribute to their medical treatment and follow-up care [6–8]. Although the German national cancer plan [9] as well national and international guidelines and standards of care [10–12] call for the full integration of psycho-oncology into biomedical cancer treatment, essential structures, processes and financing for psycho-oncological treatment is not yet established [13–16] . As funding is not uniformly regulated in Germany, the affordability of psycho-oncological treatment is a major challenge for private and statutory health insurances (SHI) [14–16].

Systematic reviews and meta-analyses show that different psychotherapeutic and psychosocial intervention are associated with small-to-medium effects on quality of life and emotional distress [17–20]. Effect size was positively correlated with high levels of distress at the starting point and the duration of intervention [17]. However, most of the studies are restricted to female breast-cancer patients [17, 21] and do not comprise a pre-defined screening process of cancer patients to deliver need-based psycho-oncological care in a stepped-care manner.

Therefore, the integrated cross-sectional psycho-oncology (isPO) program aims to develop, implement and evaluate a new stepped-care psychosocial and psychotherapeutic care program for adult newly diagnosed cancer patients. The German version of the widely accepted “hospital anxiety and depression scale” (HADS) [11, 22, 23] and two self-developed and validated questionnaires (publication in preparation; [24, 25]), will be used as screening instruments to assess individual patient needs, i.e. the assignment to a specific care level, and as an outcome measure. The RDD as a regression-based quasi-experimental approach is used to measure efficacy, reduction of anxiety and depression after 12 months of treatment via HADS-questionnaire. Secondary outcomes are the quality of the care program, including feasibility, patient satisfaction and perceived benefit.

Because an effectiveness study is limited in its ability to provide information regarding whether an intervention is successful (including the implementation process) [26] and what are relevant costs and type of costs, the isPO study is accompanied by a complex process evaluation and a health economic analysis. This external evaluation aims to gain guidance on the quality and appropriateness of the psycho-oncological care program and on implementation and dissemination strategies for complex health intervention. The evaluation will focus on implementation outcomes, such as acceptance, feasibility, appropriateness, effectiveness and costs [27], as well as patient reported outcomes, such as quality of life and satisfaction with care.

In order to cover all relevant aspects, two frameworks are combined for the analysis: The Medical Research Council (MRC)-Framework for the evaluation of complex interventions [28] and the Consolidated Framework for Implementation Research (CFIR) [29]. The MRC guidance defines the function of process evaluation at different stages of development, evaluation and implementation of complex intervention and was therefore used to design the tripartite evaluation design, consisting of a prospective, formative and summative part. This framework gives equal attention to the implementation itself, the mechanism of impact (participant’s responses and mechanisms of change) and the influence of contextual factors that may act as barriers and facilitators to implementation, dissemination and intervention effects [28, 30]. For the systematic identification and evaluation of relevant context factors and

potential barriers and facilitators, constructs related to an effective implementation of the CFIR are used. This framework captures the complexity of the implementation across the key aspects and provides a theoretically based coverage of the internal and external settings, the characteristics of the intervention and the people involved, and the process itself. This meta-theoretical framework can be used across all phases of implementation (pre-, during, and post-implementation) [29, 31], and has been shown to be effective for guiding successful implementation across numerous health domains, such as weight management and cancer screening [31, 32]. Overall, both frameworks advocate a multilevel contextual perspective on the implementation and evaluation of interventions. The objective in using these two frameworks was to ensure that we took into account and addressed all the important factors based on well-validated constructs that are essential for the evaluation of a new health program and its effective implementation.

Main research questions

- Does the structured 12-month psycho-oncological care program reduce anxiety and depression in cancer patients?
- How are quality of care, structures and processes perceived by patients and employees, and what is the experience of psychotherapists, social workers, onco-guides, nurses and physicians implementing isPO across settings?
- Which contextual factors and which baseline implementation constructs (CFIR) predict implementation success for each health-care network?
- What effects does the isPO program have on costs and use of SHI health services in comparison to standard care?
- Do the structures and contents of the health care program provide a suitable basis for their integration in the standard health care system?

Secondary research questions:

- How do sociodemographic factors, comorbidities, the cancer entity or the form of medical treatment influence the effectiveness of psycho-oncological care?
- Which sociodemographic and health care-related risk factors predict the extent of psychological stress reactions on the initial diagnosis of cancer?

Methods and Analysis

Study Design

The project isPO aims to develop, implement, and evaluate a new cross-sectoral form of psycho-oncological care. The study receives funding from the German Federal Joint Committee (G-BA), a public legal entity comprising the four leading umbrella organizations of the self-governing German healthcare system. During the 4-year project (October 2017 – September 2021), up to 3.484 outpatients and inpatients of full legal age (≥ 18 years) with a primary diagnosis of cancer (ICD-10-GM C00 – C97) will be included in the isPO program. During the project period, patients will be treated for a period of 12 months from cancer diagnosis. Patients will be assigned to either the control group (HADS ≤ 14; care level 1 and 2) or the intervention group (HADS ≥ 15; care level 3) depending on the anxiety and depression level upon enrollment in the study. The control group will receive support of an onco-guide (level 1) or psychosocial support (level 2), whereas the intervention group receives psychotherapeutic treatment (level 3). Patients with a starting HADS ± 2 around the cut-off will be evaluated for the treatment effect. This is based on the assumption that the distribution around the threshold is at random [33]. The treatment effect (primary outcome) is analysed using the RDD for patients with initial HADS values between 13 and 16 [34]. The RDD represents a valid alternative to RCT studies to estimate treatment effects [35]. Anticipated treatment effects (reduction of HADS after 12 months of psycho-oncological treatment) are expected to lead to a discontinuity of the linear regression at the cut-off. In the course of the effectiveness measure the preset cut-off value of the HADS will also be validated. In addition, further self-developed screening instruments are used to assess individual psychosocial risk factors and the cognitive-emotional response to cancer diagnosis and to assign patients to a certain level of care (level 1 or 2). Publication of the validation of these screening instruments is in preparation [24, 25].

In order to ensure the full integration of psycho-oncological treatment into clinical care, the psycho-oncological care is provided under supervision of the treating physician. The physicians therefore recommend their cancer patients for the isPO program. Depending on the needed level of care either onco-guides, trained former cancer patients (level 1), social worker (level 2) or psychotherapists (level 3) will take over the treatment. Recruitment and care of the patients started in January 2019 and will continue until March 2021.[1]

The development and implementation of the isPO program are based on the model of program theory for health promotion programs [36]. The process and outcome evaluation, carried out alongside the isPO care program, applies a mixed-methods design based on several data

[1] Publication of the detailed description of the psycho-oncological stepped-care concept of the isPO project is in preparation.

sources, including health insurance claims data, clinical psychotherapeutic and psychosocial data (isPO care data) as well as qualitative and quantitative surveys of patients and health care providers. Both quantitative and qualitative data are collected in parallel and analysed separately. The results are then compared. In addition, there is an increasing need to assess the economic impact of psycho-oncology services on cancer in order to provide the necessary evidence to guide decision-making [37]. Not only the efficacy, but also the cost-effectiveness of an intervention will be decisive, whether it will be transferred into standard care. Therefore, a health economic evaluation of isPO is necessary and also requested by the SHI. A cost-consequences analysis from the point of view of the German health insurance funds using SHI claims data is planned. This analysis examines costs and consequences without attempting to isolate a single consequence or aggregate consequences into a single measure [38]. The health economic evaluation is financed by the University Hospital Cologne's own funds. Furthermore, fidelity, quality and feasibility will be monitored during the entire project using the clinical psychotherapeutic and psychosocial documentation (isPO care data), quarterly quality reviews of each network and quarterly inter- and cross-network quality workshops.

Setting

The isPO study is conducted in four health-care networks in North Rhine-Westphalia (Germany) each consisting of one hospital (rural, urban or university) with two or more certified oncological centres in collaboration with several resident physicians.[2] All four sites were selected based on predetermined criteria that are representative for the different health care providers in rural and urban regions.[3] For the process and outcome evaluation all participating patients (approx. 3.400) and health care providers (approx. 200), including nurses, psychotherapists, social workers, and physicians, will be included in the quantitative study. For qualitative studies participants will be selected based on the principal of “purposeful sampling”, a technique widely used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources [39]. This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest [39–41]. The potential selection bias caused by this sampling method is offset by the mixed-method design, which increases the credibility of results.

[2] Contrary to hospitals, that provide basic medical cancer care, oncology centres bundle competences in the areas of treatment, cooperation and research. A certified oncological centre is a network of qualified and jointly certified, multi- and interdisciplinary, trans-sectoral and, if necessary, cross-locational facilities (hospitals, physicians, rehabilitation facilities) which best cover the various care areas for patients as far as possible.To meet the rapidly growing need for comprehensive, holistic, multidisciplinary and integrative oncological care of the population, these oncology competence centres have emerged.

3 Publication of the detailed description of the psycho-oncological stepped-care concept of the isPO project including the inclusion criteria for the networks is in preparation.

Patient and public involvement

The House of the Cancer Patient Support Associations of Germany (association of ten cancer support groups) as well as the German Cancer Society North Rhine-Westphalia are also applicants of the study. Both groups have been working on the concept, design and implementation since the planning of the study and give advice to the scientists regarding the outcome measures and research questions. They assess and represent the patient's perspective and will provide up-to-date information about the project status for the public on their homepages and events. In addition, all questionnaires were pre-tested with at least three former cancer patients to ensure that the questionnaires met the needs of a patient in content, length and comprehensibility. The questionnaires were adapted as best as possible based on the patients' comments.

Process and outcome evaluation design

Prospective, formative and summative evaluation

Due to the high complexity of the isPO project, a multifaceted evaluation design is applied. For the current study, the MRC framework by *Moore et al.* [28] for process evaluation of complex interventions in combination with the CFIR constructs seems to be suitable. Therefore, a tripartite evaluation design will be applied comprising a prospective, formative, and summative evaluation. Prospective and formative the concept, implementation and appropriateness will be evaluated on an ex ante and in-process basis. All results will be reported and promptly used to optimize the care program and the implementation process. Finally, primary and secondary outcomes, as well as the transferability, will be evaluated summatively. By using this multidimensional mixed-method design, it will be possible to account for the different contextual factors influencing the implementation as well as patient-related and patient-reported outcomes. Among others we will report implementation outcomes, such as acceptability, appropriateness, feasibility, fidelity, efficiency, effectiveness, and satisfaction [27]. In addition to patient-related factors, such as age, comorbidities or sociodemographic factors, variables such as structural conditions, readiness, and attitude towards change, knowledge-based and experience-based variables can play a role on the care provider’s side. The planned data collection and the corresponding data sources as well as research questions are listed in Table 1.

Table 1: Data collection of different domains of the intervention

Section of evaluation		Research Question	Data source		Procedure of data collection	Time of data collection
Prospective evaluation	Development of the isPO program	Was the program developed as intended?	A	Focus group with isPO project developers (*n* = 8)	Interviewed by evaluators	During development
			B	Documentary analyses (quarterly progress reports of all isPO project developers)	Progress reports made for the external evaluation by project developers	
Prospective and formative evaluation	Recruitment and selection of cluster	How where the cluster selected and recruited? Why have the cluster participated to the isPO study?	C	Written documentation of the recruitment procedure (quarterly progress reports)	Progress reports made for the external evaluation by project developers	During recruitment of cluster
			D	Semi-structured interviews with the head of each health-care network (*n* = 4)	Interviewed by evaluators	At the beginning of intervention phase
Formative and summative evaluation	Delivery and response of clusters	How was the intervention delivered to each cluster? How was the intervention adopted by each cluster?	E	Documentary analyses of protocols and further documents of quarterly cross-network quality workshops (*n* = 3 out of 10)		During intervention phase
			F	Quarterly standardized quality reviews of each cluster and protocols of each quality workshops		During intervention phase
			G	Written documentation and attendance list of trainings		Before intervention
			H	Standardized questionnaire of all providers (n ~ 200)		Two time-points during intervention phase
			I	Clinical data of the isPO care program to assess accordance to the care concept		
	Individual response of health care provider	What are the expectations/experience of/with the project? What is the attitude of the health care providers toward the intervention?	J	Focus groups (*n* = 5: 1 per cluster/network and 1 cross-network) and semi-structured interviews with the head of the psycho-oncology departments and leading physicians of each cluster (*n* = 8)	Interviewed by evaluators	During intervention phase
			H	Standardized questionnaire of all providers (*n* ~ 200)	Self-assed by health care providers	Two time-points during intervention phase

	Individual response of patients	Patient-experienced- and patient-reported-outcomes	K	Focus groups (n = 3) or according to the patient's wishes semi-structured single interviews	Interviewed by evaluators	During intervention phase
			L	Standardized questionnaire of all patients (n = 3,484)	Self-assed by patients	At the beginning and end of intervention phase
	Context (intervention)	What is the context in which the intervention is being implemented?	F, J, H	Focus groups with providers to assess ´care as usual` and standardized questionnaires to assess organizational characteristics	Interviewed by evaluators or rather self-assed by providers	During intervention phase
		What contextual factors promote or inhibit the implementation of the intervention?	A-L	All data assessed throughout process evaluation		
	Appropriateness and Efficiency of the intervention	Was the treatment efficient in all levels of care? How is the effectiveness and utilization of the intervention affected by sociodemographic factors, previous conditions and medications?	M	Clinical data of the isPO care program at an individual patient level	Documented by health care providers	During and at the end of intervention phase
			N	Statutory health insurance claims data of isPO-patients (4 years before intervention and 12 month of intervention)	provided by four German health insurance funds	
Outcome evaluation	Effectiveness	Is the psycho-oncological care program effective?	M	Clinical data (HADS value) of the isPO care program at an individual patient level to assess the primary outcome (reduction of anxiety and depression after 12 month)	Self-assed by patients	At the end of intervention phase
Planned: Health economic evaluation	Cost-consequence analysis	What effects does the isPO program have on the costs and use of SHI health services in comparison to patients in standard care?	N	Statutory health insurance claims data of n ~ 300 patients (decreased number of patients due to methodological restrictions and delayed data provision)	provided by four German health insurance funds	At the end of intervention phase

Quantitative data collection and analysis

Within the scope of the study patients and health care provider, such as physicians, nurses, psychologists, social worker, and onco-guides, are questioned at two points in time by means of a written (postal) survey. The aim of these surveys and the subsequent quantitative analysis is to determine the appropriateness and feasibility of the stepped-care program. Essential aspects of the patient questionnaire are satisfaction with the psycho-oncological care, other social support, and quality of life. The provider questionnaire focuses on the attitude towards the new psycho-oncological program, intervention characteristics, and personal as well as organizational barriers and facilitators, such as attitude towards change and corporate culture [29].

In order to archive the highest possible response rate, the survey is conducted according to Dillmann's "Total Design Method" [42]. To create the questionnaires and to import paper-based survey data, the data capturing software Teleform® is used. Validated scales are analysed according to the coding manual. Psychometric analyses of factorial validity and reliability are carried out on the scales developed in-house.

Qualitative data collection and analysis

To enable patients to describe their experiences with the intervention, approximately 30 patients will be interviewed. In addition to the quantitative surveys, this qualitative analysis provides a deeper insight into the perceptions and opinions of the respondents. In addition, this method enables the identification of further factors that influence patient acceptance and perceived benefit. To meet the needs of vulnerable patients, such as cancer patients, respondents can choose to participate in a single interview or focus group. The number of interviews will be adapted with respect to the saturation point. Participants will be approached through the data trustee of the project, who is the only one (other than the health care provider) with access to patient contact addresses for the data linkage and patient surveys. Through the targeted selection of interviewees, we take relevant criteria such as age, gender, assigned level of care, and region into account. In addition, we will conduct approximately eight focus groups (six to eight persons each) with health care providers and interviews with each network coordinator (quality management representatives of the clinics), leading physicians and each leading psycho-oncologist of the four health-care networks (four persons each). Interviews and focus groups will be guided by scientific rules, audio recorded, transcribed, pseudonymised, and analysed based on content [43] or documentary analyses [44].

Overall, these qualitative analyses will provide in-depth understanding of the mechanisms of action, how context affects implementation or why those who carry out or receive the

intervention engage as planned or not. It gives a greater insight into barriers and facilitators of the implementation process at the different sites as well as into the perception of different professions. In this way, we will collect data from all participants on key aspects of the process and combine these results with in-depth data from smaller samples.

Administrative data analysis: statutory health insurance and clinical data – data linkage

In order to gain a greater insight into the impact of acute cancer treatment, health, and medical history and comorbidities on the effectiveness of psycho-oncological care and the changing use of health care services during the care program, the following data sets will be analysed:

1.) Statutory health insurance claims data of all recruited patients insured with one of the four largest German health insurance funds, covering around 70 % of the statutory insured patients in Germany
2.) Clinical psychological and psychosocial data (isPO care data) from each recruited patient in each network (hospital)
3.) Cancer registry data from each recruited patient in each network (hospital)

Statutory health insurance claims data will be analysed at each care level within the framework of the stepped-care program and at regional level (each network). In addition to patient characteristics, this hierarchical data set contains further information at the provider level. Data at the patient level includes age, gender, insurance status, inpatient and outpatient treatment, diagnoses, and drug prescriptions. At the provider level, it is possible to consider the attending physicians and hospitals at regional and medical specialist level. Hierarchical multi-level analysis allows us to consider the clustering of data at different levels in order to identify relevant influencing factors.

Clinical psychological and psychosocial data (isPO care data) of each recruited patient will provide information about the delivered care in each network and at each care level. This enables the isPO program's range, fidelity and dose to be analysed.

A third data set (cancer registry data), containing the differentiated medical diagnosis and biomedical treatment, will provide additional information on the medical status of the patients included. This dataset will include additional clinical measures such as the tumour state, surgical procedures or the type of chemotherapy or radiotherapy. From the scope of cancer registry data, group differences are extracted, for example, in terms of age, entities or gender. The analyses will provide further insights into the influence of biomedical treatment or the severity of the disease on the effectiveness of psycho-oncological treatment.

All analyses follow the guidelines and recommendations of Good Practice of Secondary Data Analysis [45]. As the data are not collected for scientific reasons but for reimbursement, resulting impact on the validity of the data is taken into account.

By linking the administrative data sets with the survey results, the perceived benefits and quality of life as well as sociodemographic data can be linked with the more general health status and the use of other health services. It also enables the identification of predictors of increased stress response after cancer diagnosis. In addition, multi-level analyses will take into account the health context in each network (hospital) and the relationship between the context and health care outcomes [46].

Health economic analysis

A health economic analysis is conducted in form of a cost-consequences analysis from German SHI perspective. This economic evaluation is based on SHI claims data. The advantage of using routine data for evaluation is that cross-sectoral costs and the use of health services are taken into account. The result can help the decision-makers to assess and compare the costs and use of health services between isPO patients and patients in standard care. The intervention group (isPO patient) is selected based on the isPO inclusion criteria, legal age (≥ 18 years) and a primary diagnosis of cancer (ICD-10-GM C00 – C97). However, due to the delayed availability of SHI claims data, not all isPO patients can be considered in the health economic analysis.

IsPO patients (intervention group) will be compared to patients in standard care (control group). The control group is generated based on SHI claims data using propensity score matching [47–49]. Each isPO patient will be assigned to up to five patients from standard health care according to predefined criteria. Propensity score matching is a method to balance covariates observed in non-randomized studies between subjects in the control and intervention groups. The matching is carried out by the participating statutory health insurance funds, so that the data of the control group can then be transferred and analysed anonymously. Costs and use of inpatient and outpatient treatments, medicines, remedies and aids as well as periods of inability to work will be analysed. The economic evaluation examines differences in costs, use of health services and hospitalisation during 12 months of treatment in isPO compared to standard care. Costs and consequences of different outcomes are listed separately in a disaggregated format and the results are presented using descriptive statistics.

Ethics and Dissemination

Ethical considerations

The study was reviewed and has received ethics approval from the ethics committee of the Medical Faculty University hospital of Cologne and has been registered within the German Clinical Trial register (No. DRKS00015326). Up to the point of submission, there was still no

ethics vote available for the health economic analysis. Review of the health economics analysis by the ethical commission is currently in progress. For all analysed data relevant national and international data protection regulations will be respected. In accordance with national requirements and the principles of the Declaration of Helsinki, written informed consent will be obtained from all participants prior to enrolment and all study participants can revoke their consent without any negative consequences. The focus groups, as well as the interviews will be performed solely by trained researchers, trying to minimize the psychological burden of the patients as well as the health care providers. The survey will be performed pseudonymously. Personal identifiers will be only recorded to manage the responses to the questionnaire. Confidentiality will be maintained at all levels of data management. Cognitive pre-test on the postal survey will be performed before dissemination in order to facilitate the answering of the questionnaire and reduce mental stress. The study information for patients is accompanied by a written consent, in which patients also give their written consent to the storage, processing and linking of all obtained data. This also includes the planned data linkage between the statutory health insurance claims data, the clinical psychological and psychosocial data (isPO care data) and the cancer registry data from each recruited patient in each network (hospital). All personal names are removed and all data records used are sufficiently coarsened to ensure pseudonymisation, especially with regard to data linkage. A complex approach to data protection, involving the use of three different pseudonyms (for the different data transmission channels) and the establishment of a project data trustee, who is not involved in data analysis, ensures the highest possible level of data protection in line with the requirements of the European General Data Protection Regulation (GDPR).

Dissemination

The isPO project partners have agreed on publication guidelines, a publication strategy and a publication plan. The publication strategy consists of the dissemination in scientific peer-reviewed journals and presentations at national and international academic conferences. Moreover, there is a strategy to ensure dissemination in popular science forums, such as research gate, and in public media. Professional exchange and patient participation will be a prominent task within in the project to gain the necessary dissemination and sustainability of the research findings. Therefore, a homepage was created to spread up to date news on the project progress. In addition, the House of the Cancer Patient Support Associations of Germany (association of ten cancer support groups) as well as the German Cancer Society North Rhine-Westphalia will provide up-to-date information on their homepages and events.

The publication plan will evolve over time but includes the following planned scientific activities:

- Six Ph.D. theses at four different scientific institutes of the university of cologne

- About twenty scientific articles in different peer-reviewed journals
- Local seminars at the study sites
- Information events of cancer self-help groups and the Cancer Society North Rhine-Westphalia
- Special sessions planned at the 19. annual meeting of the PSO (Psycho-Oncology Committee of the German cancer Society) in 2020 and the German congress of Health Care Research (DKVF) 2020
- Presentations at national and international conferences
- Popular science presentations in national media and healthcare magazines

Discussion

IsPO aims to reduce symptoms of anxiety and depression in cancer inpatients and outpatients, to improve their psychosocial situation and to promote self-help. Different sectors of the German health care system and a wide range of scientific institutes cooperate to implement and evaluate a cross-sectoral psycho-oncological care program more responsive to patients' needs. The evaluation of the new care program will provide important evidence-based results from the perspective of patients and practitioners for cross-sectoral psychosocial and psycho-oncological care of patients with initial cancer diagnosis and opens the way for a transfer of the care program into standard care. Cost-consequence analyses examine whether the care concept also favors the effective use of existing resources.

From a methodological point of view, the proposed project is highly innovative. It takes into account all relevant perspectives, enables new needs-based health care, has a prospective, multicentre and controlled design and offers a linkage of primary and secondary data from different health insurance funds for efficacy, effectiveness and cost analyses.

The aim of the project is to meet the requirements that make it possible to implement this new form of care in the standard care system in Germany. The care program will combine approaches of cancer self-help (care level 1), psychosocial cancer counselling (care level 2) and psycho-oncological psychotherapy (care level 3) in a uniform care concept, operationalize them and integrate them into oncological care. It will provide a care management to regulate interdisciplinary and cross-sectoral cooperation in health care. Results of the process and outcome evaluation will provide insight into the quality and appropriateness of the care concept as well as the implementation process of a complex health innovation. In the long-term, the program should ensure care of cancer patients from diagnosis to cure or palliative care and combine psychosocial and psychological care with further integrative oncology approaches,

such as music and art therapy. In addition, the program could also be suitable for the care of patients other than those suffering from oncological diseases.

A particular strength of the study is the participation of several statutory health insurance funds and a possible linkage of primary and secondary data. For the first time in Germany, this study thus offers an evidence-based basis for decision-making on the integration of a new demand-oriented psycho-oncological care structure into standard health care.

Contribution

Mr. Hallek, Mr. Kusch, Mr. Hellmich, Mr. Gerlach, Mr. Pfaff, Mrs. Scholten, Mr. Haas and Mrs. Stock are applicants of the funded study. Mrs. Jenniches, Mrs. Dresen, Mrs. Scholten, Mr. Cwik, Mrs. Lemmen, Mr. Hellmich, Mrs. Samel, Mrs. Labouvie and Mr. Kusch designed the study. Mrs. Jenniches drafted manuscript and incorporated the revisions between authors. Mr. Hellmich, Mrs. Hagemeier, Mrs. Samel, Mrs. Jenniches and Mrs. Dresen drafted and finalized the concept of data protection for all patient related research data and data transfers involved as part of the ethics application. The final manuscript has been critically revised and approved by all authors.

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Competing interests

The authors declare no conflicts of interest.

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