How government policies influence Nurse Practitioner and Physician Assistant deployment: protocol for a realist evaluation mixed-method study

Ellen J.C.M. Dankers-de Mari[a b], Patrick P.T. Jeurissen[a], Ronald Batenburg[c d] and Anneke J.A.H. van Vught[e]

[a] *Radboud University Medical Center, Radboud Institute for Health Sciences, Scientific Center for Quality of Healthcare (IQ healthcare), Postbus 9101, huispost 114, 6500 HB Nijmegen, The Netherlands*
[b] *Advisory Committee on Medical Manpower Planning, Postbus 20051, 3502 LB Utrecht, The Netherlands.*
[c] *Netherlands Institute for Health Services Research; NIVEL, Postbus 1568, 3500 BN Utrecht, The Netherlands*
[d] *Radboud University Nijmegen, Department of Sociology, Postbus 9104, 6500 HE, Nijmegen, The Netherlands.*
[e] *HAN University of Applied Sciences, School of Health Studies, Kapittelweg 33, 6525 EJ Nijmegen, The Netherlands.*

Corresponding author at: Radboud University Medical Center, Radboud Institute for Health Sciences, Scientific Center for Quality of Healthcare (IQ healthcare), Postbus 9101, huispost 114, 6500 HB Nijmegen, The Netherlands. Phone: +31 (0)24 3615305. E-mail address: ellen.dankers-demari@radboudumc.nl

To cite: Dankers EJCM, Jeurissen PT, Batenburg R, Van Vught AJAH. How government policies influence Nurse Practitioner and Physician Assistant deployment: a protocol for a realist evaluation mixed-method study. Zorgmasters.nl. 2021 June. Available from: *Zorgmasters.nl/kennis/arbeidsmarkt*

Keywords: Realist evaluation, interviews, surveys, physician assistant, nurse practitioner, healthcare, policy, workforce, skill mix, micro-macro links

Abstract

Introduction: Governments, purchasers and healthcare organizations see task reallocation as part of the solution for the increasing demand for care, increasing healthcare costs, and workforce shortages. Internationally, many governments are implementing policies regarding deployment of nurse practitioners (NPs) and physician assistants (PAs). Thus, insights into how public policies affect NP/PA deployment and training are needed. This study aims to gain insight into: 1) the decision-making process within healthcare organizations regarding employing and training NPs and PAs, 2) how relevant actors within healthcare organizations interpret and act upon governmental policies, 3) which (organizational) circumstances affect NP/PA employment and training, and 4) how governmental policy contributes to NP/PA employment and training.
Methods and analysis: We have designed a protocol for a mixed-method study that draws upon realist evaluation principles. It consists of five steps: 1) development of an initial theory, 2) analyze interviews on the decision-making process within healthcare organizations regarding NP/PA employment and training (qualitative data on contexts, actors, mechanisms and outcomes) and compare with the initial theory 3) reassess and validate the theory, 4) retest the modified theory for a larger group by analyzing 651 completed surveys conducted among decision-making participants (quantitative data on contexts, actors, mechanisms and outcomes) and finally, 5) adjust the initial theory to a testable framework.
Discussion: This study is conducted in the Netherlands. Variation in (government) policy, context and actors will lead to different outcomes in other countries.

Introduction

Governments are looking for ways to deal with increasing shortages of healthcare professionals, increasing healthcare costs, and an increasing demand for healthcare. Nurse practitioners (NPs) and physician assistants (PAs) are broadly regarded as ways to reduce the pressure on the healthcare system. NPs and PAs are at the interface of the medical professions and their scope-of-practice can result in task shifting and task reallocation (1). This is an important reason for governments to pursue and implement policies to promote the employment of these professions in their healthcare systems.

Ever since the start of the NP and PA training programs in the Netherlands two decades ago, the government has taken measures to facilitate the implementation of these professions. The overall objectives of these policies concern a more efficient organization of care and sufficient supply on the healthcare labor market, as task reallocation reduces the demand for (scarce) doctors and offers care staff more career perspectives (2, 3). The government has implemented a broad toolkit of policy measures: knowledge and consultation platforms, (evaluation) research, inclusion of the professions in the Individual Health Care Professions (IHCP) Act, granting NPs/PAs legal authority regarding specified reserved medical procedures, granting them permission to financially claim their activities and subsidizing training places (4).

Few studies have addressed the effect of such policies at a national level (5, 6). Dankers et al. show that two specific policy measures coincide with trends in the intake in training programs of NP/PA's, namely: 1) in a negative sense the tightening of healthcare budgets; and 2) in a positive sense the number of subsidized training places. Other policy measures, do not seem to coincide with the intake in training programs nor the size of the workforce (4). This does not have to mean that there exists no effect. Many social policies and programs require repeated action to be effective and some take years to manifest (7).

However, full practice authority combined with a shortage in physicians does associate with a higher number of NPs in U.S. rural areas in primary care (8, 9). Other situational factors, such as conditions in a specific organization and managerial and professional preferences, also have an impact on NP/PA deployment (10). Motives of care providers whether or not to employ or train an NP and/or PA vary between healthcare sectors as does the size of NP/PA-deployment (4, 11-14). This makes it plausible that organizational contexts do influences the effect of national policy. However, we lack insights into "how", for whom, in what context, and in what respects governmental policies affect NP/PA deployment. To gain these insights we conduct a mixed-methods study.

Study aim

We aim to provide insight into how, for whom, in what context and in what respect governmental policies affect NP/PA deployment. This paper describes a protocol to achieve this goal and to answer the following research questions:

1. How is the decision-making process regarding employing and training NPs and PAs structured within healthcare organizations?
2. How do relevant actors in healthcare organizations interpret and act upon governmental policies?
3. Which circumstances, apart from government NP/PA policies, do affect NP/PA employment and training?
4. How do governmental policies contribute to NP/PA employment and training?

Design

Dankers et.al. (under review) showed that a substantial number of policy measures do not coincide with changes in the intake in either the NP/PA training programs, nor the actual employment of these professions. To find out why some policy measures seem to have no effect while others seem to do so, and why NP/PA deployment varies strongly between healthcare sectors, we conduct a realist evaluation study (4). In contrast to traditional evaluation methods that examine whether or not a predefined outcome has been achieved by a specific intervention, the realist approach seeks to answer how, why, and when interventions do work (15, 16). Therefore the realist evaluation approach explains how context mediates the actual outcomes of interventions (17). Realist approaches are particularly focused on uncovering causal processes rather than simply outcomes and may be most effective when dealing with issues of complexity, that is, where many causal factors interact (18).

Realist evaluation considers that interventions work (or not) because actors respond to what is provided by the intervention (or not). This interaction between 'intervention' and 'actors' in specific 'contexts' therefore triggers mechanisms that lead to outcomes (19). We tested and specified theories by examining how situational factors, like labor market shortages (Context), influence NP/PA employment and training (Outcomes) based on the reasoning and behavior of participants (Actors) in the decision-making process within care organizations regarding NP/PA deployment, following governmental policy measures (Intervention). At which Mechanisms lie within the combination of resources (constraints and/or opportunity) and reasoning (20). One of the aims of realist research is to make explicit the ways in which the various contexts interact and affect the

outcomes of an intervention via the triggering or inhibiting of key mechanisms (16, 18).

The data was collected in 2019 within a research program of the Advisory Committee on Medical Manpower Planning (ACMMP). 50 interviews were conducted with sector organizations and participants in the decision-making process within healthcare organizations, such as managers, medical specialists and employers (collecting qualitative data on contexts, actors, mechanisms and outcomes). In addition, a survey with 651 responses was conducted among participants in the decision-making process within healthcare organizations. The data was collected for initial advice to the Ministry of Health, Welfare and Sport on the intake required in training programs for NPs and PAs to keep a balance on the labor market.

The following steps are taken in this study:

1. develop an initial theory and ICAMO-configuration;
2. analyze 50 interviews on the decision-making process within healthcare organizations, sectoral and professional associations and training coordinators to see which patterns can and which cannot be explained by the initial theory;
3. reassess ICAMO configuration and further elaborate the theory.
4. test the modified theory in a larger group by analyzing 651 completed surveys conducted among relevant actors within healthcare organizations (collecting quantitative data on contexts, actors, mechanisms and outcomes);
5. refine the theory.

This study protocol contains an elaboration of step 1 and describes the following steps (2-5) that were taken. We use RAMESES II reporting standards for realist evaluations (21) and Good Reporting of A Mixed Methods Study (GRAMMS) (22).

Developing an initial theory and ICAMO-configuration

The policy program consists of a chain of measures/interventions implemented over almost two decades, starting with subsidy on NP/PA training in 2003 (4, 23). Our initial program theory describes 'how' the policy program works for whom and in what circumstances. It is based on (a) eliciting key theories assumed in the construction of the policy program, (b) influences on NP/PA deployment reported in previous research, followed by (c) the identification of mechanisms, outcomes, intervention, actors and context factors.

To provide a comprehensive analytical tool to account for (or explain) aspects of the policy program (Intervention) that provides the mechanisms and the actors through whom the program works, we considered an intervention-context-actor-mechanisms-outcome (ICAMO) configuration (19, 20, 24).

a. Key theories policy program

Dankers, et.al. contains an overview of policy measures that have been taken with regard to NPs and PAs in the Netherlands (4). Objectives of these government policies concern: more efficient organization of care, sufficient supply on the healthcare labor market and meeting rising healthcare demand. Task reallocation is an instrument for this, as it reduces the demand for (scarce) doctors and offers care staff more career perspectives. Preconditions are availability and accessibility of affordable good-quality healthcare (2-4, 25).

We elicited key theories assumed in the construction of the policy program, of how policies influence peoples' reasoning. The underlying ideas of the policy program are that task reallocation and offering career prospects to college level professionals can be achieved by facilitating NP/PA professions via:

1. facilitating cost-effective training and deployment of NP/PAs *(measures: subsidy on training, regulations concerning reimbursement)*
2. providing knowledge on among others quality of care and patient satisfaction *(measures: funding knowledge and consultation platforms and (evaluation) research)*
3. removing restrictions in the professional practice, including scope-of-practice *(measures: granting authority for reserved medical procedures / extending scope-of-practice, and legal acknowledgement of professional and educational level).*

In the introduction we discussed the potential effects of governmental policies on NP/PA deployment, regarding subsidies on training, granting of full practice authority, and economic austerity (4, 8, 9). The decrease of intake in NP-PA training programs coinciding with economic austerity illustrates that policy might have intentional and non-intentional effects.

b. *Influences on employment and training*

Next to these institutional factors Niezen et al. (2014) state that other facilitators and barriers to task reallocation are: professional boundaries, organizational environment, and knowledge and capabilities (interpersonal skills and self-knowledge, like insight into own limitations and confidence). Shifting professional boundaries is reported as an important barrier and potential facilitator in task reallocation regarding NPs. Identified subcategories are: type of task reallocation (complementary to or substitute of the medical role), trust (related to the amount of supervision, NPs' perceived competencies and the type of NP/physician collaboration), NPs' qualification (educational standardization) and physicians' education and job security. The more traditional physicians' education, the more hierarchical and defined the work structure is organized and the more the nurses' autonomy level is restricted (26). Also, medical staff can have reservations about future boundaries, as transferring medical knowledge involves giving up an exclusive claim to this knowledge (26, 27).

In addition, the organizational environment imposes a set of factors, which influence the successful implementation of NPs in a healthcare setting: organizational policy support, complexity of cure and care provided and the possibility to formalize cure in protocols or to select specific patient groups, facility and employment arrangements, familiarity with the (regulatory) environment and NPs, type of health setting, and (inter)professional collegiality and support (26). Wallenburg et al. (2015) also stated that NP/PA roles depend on (1) the circumstances in the specific organization (such as care setting and scheduling), (2) preferences of managers and professionals in an organization (based on experience and mutual trust) and (3) local agreements that can be adjusted or renegotiated as knowledge, skills and trust of and in the NP or PA increases (10).
In addition to these facilitators and barriers Burrows et al. (2020) mention: the initial investment required to train a PA for the needs of a clinic, knowledge on PA funding, regulation and independent liability, physicians' work-life balance, patient satisfaction, clinic's need, improvement of continuity and quality of care and increasing access to care, governmental billing framework, (lack of) regulation, and multiple-source funding (28, 29).

Differences and similarities in between sectors in the institutional and organizational factors mentioned above, probably explain the large variation in NP/PA deployment at sector level in the Netherlands (4). Also, it is plausible that sector-related labor market factors, such as shortages in medical specialists, accelerate NP/PA deployment. Relatively more NPs are employed in healthcare sectors with known shortages in medical specialists (4). In addition, the available capacity of NPs and PAs on a sectoral level may play a role in NP/PA deployment. For example, in 2019 there were only slight shortages of NPs and PAs at a national level while in elderly care, increasing shortages were noted (30, 31).

Further, determinants to NP/PA employment and training vary between healthcare sectors:

- In GP care, the willingness to employ NPs/PAs was highly influenced by an employees' motivation to start the master's program and GPs' prior experience with PAs/NPs (11). There were several themes influencing the decision to employ an NP/PA: (1) organizational factors (like financial certainty); (2) factors regarding professional relations (willingness to meet the concerns of the GP cooperation by offering a job opportunity to an NP/PA during office hours, or maintaining an appreciated team member); (3) factors regarding GPs' workload and job satisfaction (more complex caseload); (4) GPs' previous experience with the NP/PA profession; (5) vision of the NP/PA profession (lack of knowledge, curiosity); and (6) insecurities regarding the NP/PA profession (uncertainties about financial reimbursement and legislation/scope of practice). Influencing factors, for the negative viewpoint among GPs are the lack of support from GPs' professional associations or not being convinced of the added value of NPs/PAs in primary care (11).
- In hospital care, important determinants to PA employment are desired improvement of continuity of care, shortage of residents and the expectation that PA involvement will disburden the physician and hospital management support. Barriers to employ and continue PA employment were mostly a consequence of locally arranged restrictions by hospital management and staff physicians. Also, resistance from

professional associations of medical specialists was mentioned as a factor which influences the decision to not employ a PA (12). Financial motives also influenced the decision to deploy an NP or PA. Hospitals and medical specialist companies debate about the percentage of wage costs that medical specialists pay. Often medical specialist companies pay a higher percentage of wage costs for the PA than for the NP. As a result, healthcare professionals have been appointed on the basis of financial motives (13).

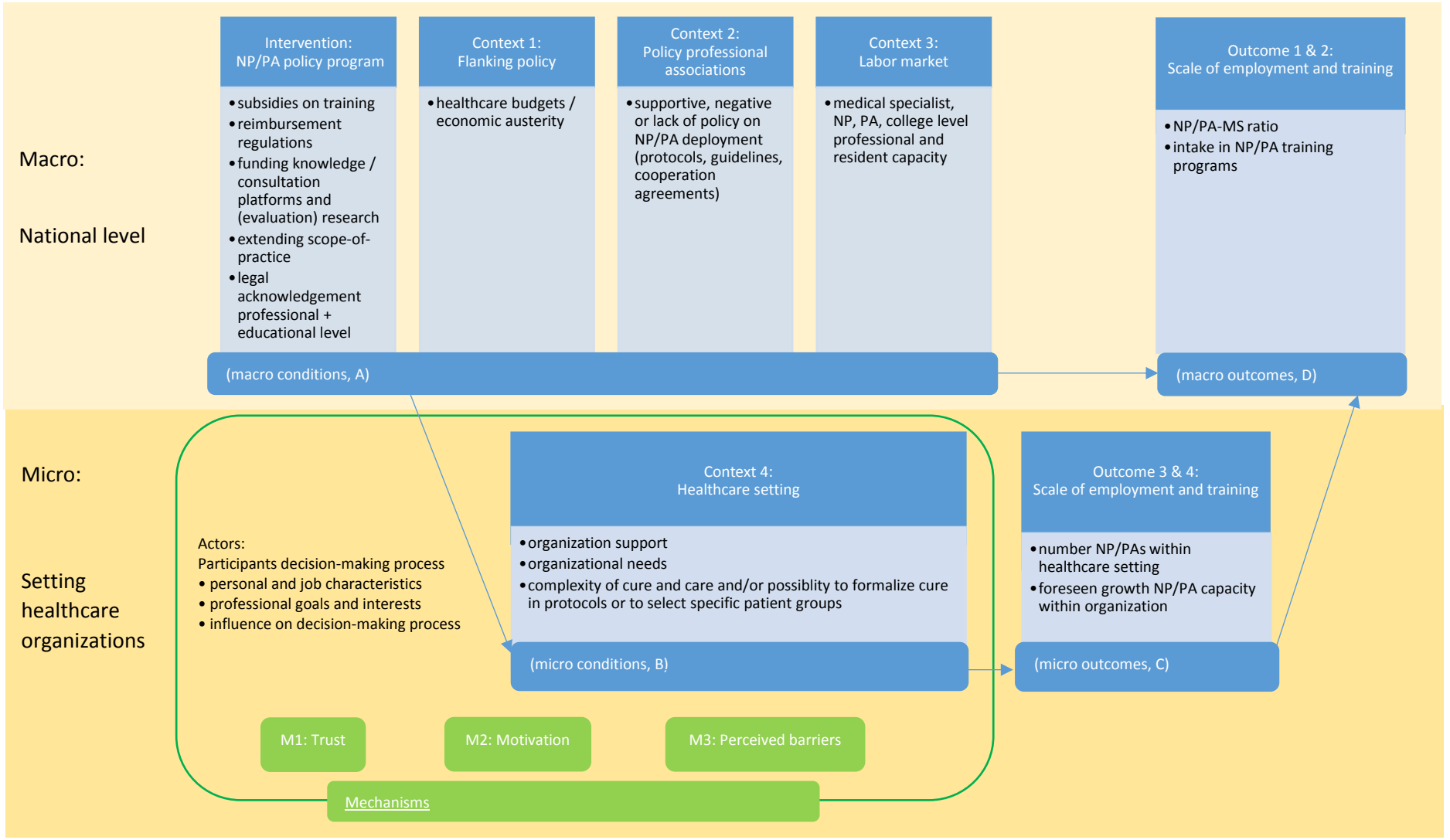
- In elderly care, in many cases the decision to employ an NP, PA, or registered nurse is more or less the result of coincidence, such as grants for training of NPs and PAs or a shortage in elderly care physicians. Skill mix change in nursing homes is further influenced by lack of acceptance of NPs and PAs by colleagues and patients, and by providers' personal ideas (32). Collaborating between medical specialists and NPs and PAs is based on trust; being proactive, decisive and communicative and being empowered by organizational leaders (14).

While the above shows that NP/PA deployment, facilitators and barriers, and motives differ between healthcare sectors, it does not explain 'why' these differences exist. It stays unclear 'how' reasoning and behavior of participants in the decision-making process within care organizations is affected by governmental policy measures.

a. Identification of configuration elements

An initial ICAMO-configuration was constructed to indicate how the policy program affects mechanisms amongst whom and in what conditions, and to explain outcome variations (Fig. 1). In line with the principles of realist evaluation, the underlying assumption in this study is that national policies (macro level) influence the extent of NP/PA deployment through decision-making within care organizations (micro level) about hiring and training these professions. For this reason we used Colemans' scheme, a standard tool for representing micro-macro models. His scheme represents propositions describing conditions and outcomes on a macro and on a micro level. It also represents assumptions on how actors' behavior generates macro outcomes (33).

Fig.1 Initial micro-macro level ICAMO-configuration – deployment and training NPs and PAs



Below we further explain our initial theory on how we expect governmental policies to affect NP/PA employment and training within healthcare organizations.

Mechanisms

Mechanisms describe what it is about programs and interventions that bring about any effects (34). Programs work by changing the decisions made by participants (7). The key explanatory element in realist evaluation is the generative mechanism, which elucidates the reasoning the actors attribute to the resources, opportunities and/or restraints provided by the intervention that leads to action. A generative mechanisms in realist logic can thus be represented as:

Resources (constraints and/or opportunity) + Reasoning = Mechanism (20, 35)

Intervention resources are introduced in a context, in a way that enhances a change in reasoning. This alters the behavior of participants, which leads to outcomes This can be expressed as:

Mechanism (Resources) + Context → Mechanism (Reasoning) = Outcome (35)

Policy can influence NP/PA deployment depending on how it changes the reasoning of participants within the decision-making process in healthcare organizations regarding NP/PA employment and training. Further, this process is not located in an vacuum. There are ongoing interactions of participants with the world outside the healthcare organization, for example with professional associations. For a policy program to have effect, it has to affect the reasoning of all participants who are of influence on the outcome of the decision-making process. This requires not only changes on an individual level, but also on an organizational and institutional level (policies and protocols of professional associations). So, an NP/PA policy program can only be effective when it not only changes the minds of individuals, but when it has the potential to change the social system.

Based on the aforementioned steps, we identified three mechanisms that explain how policies have (or do not have) effect. Activation of mechanisms operates along a continuum, […] where intensity varies in line with an ever evolving context (35):

1. Trust (M1)
   When actors are familiar with (trainee) NPs and PAs and have positive experiences with the level of skills, intellect, competencies of and quality of care provided by them, this will stimulate their trust in NP/PA deployment. Thereby increasing the chance they want to employ or train an NP or PA and use resources provided by the policy program. On the other hand, a lack of experiences or negative experiences will have an inhibitory effect.
2. Motivation (M2)
   Actors can be motivated to employ or train NPs/PAs by different reasons like striving for quality improvement or better continuity of care, running a profitable cost-efficient organization, providing a work-load relief of medical specialists, maintaining professional relations, offering career perspective or improving work satisfaction. Possible contextual factors that enhance (extrinsic) motivation are (imminent) discontinuity of care, tight budgets or a shortage of college level professionals.
3. Perceived barriers (M3)
   Various perceived barriers can inhibit actors from employing and training NPs/PAs: poor quality of care, discontinuity of care, exceeding budgets, competition on labor market / job insecurity medical specialists and financial, legal or time-consuming barriers or insecurities. Contextual impediments might be a lack of treatment rooms, overcapacity of medical specialists, traditional physicians' education, lack of reimbursement or absence of protocols on NP/PA deployment.

Outcome

Outcome patterns comprise the intended and unintended consequences of programs, resulting from the activation of different mechanisms in different contexts. Outcome patterns can take many forms and programs should be tested against a range of output and outcome measures (34). The focus of this research is on the effect of policy on the scale of NP/PA deployment. Therefore, the outcome patterns of interest are:

On a macro level:

- NP/PA-MS ratio (O1)
- intake in NP/PA training programs (O2)

On a micro level:

- number of NP/PAs within healthcare organization (O3)
- foreseen growth in NP/PA capacity within healthcare organization (O4)

Intervention

We included the intervention into the configuration to show how we expect the policy program as a whole (and various components of the program), to determine the mechanisms and in this way affect NP/PA deployment within healthcare organizations. Components of the policy program are: subsidies on training, reimbursement regulations, funding knowledge and consultation platforms, funding (evaluation) research, extending scope-of-practice, legal acknowledgement of professional and educational level. Most components are implemented in all healthcare sectors, like subsidies on training, extending scope-of-practice and legal acknowledgement of professional and educational level. A few components vary between healthcare sectors. For example, sector specific reimbursement regulations, funding a knowledge and consultation platform and (evaluation) research (4).

Actors

Governments operate in a network-like environment. A government agency developing a new policy needs the support of other agencies, societal organizations or the target group (36). Programs do not work passively, they work only with the acquiescence of participants (34) (actors), and provide resources, opportunities or constraints of some kind that influence the target person's decision-making (37, 38).

Many projects, strategies or modification decisions fail due to various reasons, an important one could be because of lack of support of the key actors (39). Organizations can also take on the character of a multi-actor network: many relatively autonomous units that may have different interests but are interdependent. A hospital with many specializations, provides a complete picture of a network: many autonomous units, which are interdependent and which in turn have interdependent relations with their managers (36).

Within our study we want to provide insights into how this process is modelled: who are the actors, how do they influence the process and what are differences between healthcare sectors? We expect the internal decision-making process regarding NP/PA employment and training within healthcare organizations to function as a multi-actor network. If an actor needs the support of others, he finds himself in a network. A network can be defined as (1) a number of actors with (2) different goals and interests and (3) different resources, (4) who depend on each other for the realization of their goals (36).

The first step to take in any decision-making process, is to identify the actors (39). Based on previous research known actors are physicians/medical specialists, managers, NP/PAs and college level professionals who are interested in up taking NP/PA training (10-13, 26, 29). Roles that seem to be fulfilled are decision-maker, initiator and influencer (39, 40) (10-13, 26, 29). Because of their different goals and interests not all actors will be influenced via the same mechanisms. For example, a (financial) manager will likely be influenced by other policy measures than a medical specialist. We also expect their level of influence on the decision-making process to vary, given different resources, number of involved actors and interdependencies. Further actors' personal experience, knowledge, position and even character will play a role. Personal and job characteristics we expect to be of influence are: familiarity and previous experiences with NP/PAs or candidate trainee (knowledge on deployment, training and regulatory environment), job (in)security and perspective, workload/job satisfaction, physicians education and curiosity and NP/PA's own knowledge and capabilities.

Based on the above we expect the various policy measures to affect NP/PA deployment and training because the program provides opportunities and resources to enhance trust and motivation and lower perceived barriers.

Context

However, as noted before, NP/PA deployment and motives for deployment vary strongly in between healthcare sectors. Whether and to what extent government policy has an effect, will strongly depend on the circumstances. According to realist evaluation programs are parts of 'open systems'. Programs cannot be fully isolated or kept constant (34). Certain contexts will be supportive to the program theory and some will not (34). Also, the same mechanism can produce different results in different contexts. This suggests that while the same intervention might instigate the same mechanism(s), the differences in the outcome(s) of an intervention in different settings could be largely associated with differences in the context within which the intervention is implemented (20). We aim to understand in what contexts, i.e. circumstances the policy program works or not.

We expect participants in the internal decision-making process to interpret and act differently upon policies considering varieties in their context on a macro- and organizational level. Next to the policy program, the focus in our configuration on a macro level is on flanking policy measures, policies of professional associations and on labor market capacity, which is associated with scope-of-practice policies (8, 9). Education and patients' perception are not included as contextual factors, but within the Mechanisms Trust and Motivation, because, however relevant, research does not specify these as dominant facilitators or barriers to task reallocation in the Netherlands. Identified contextual factors (enablers and constraints) are:

On a macro level:

1. flanking policy measures: healthcare budgets / economic austerity (C1);
2. policies of professional associations: protocols, guidelines, cooperation agreements (C2);
3. labor market: capacity of medical specialists, NPs, PAs, college level professionals and residents (C3)

On a micro level:

4. healthcare setting (C4):
   - organizational support: organizational policy and employment arrangements, (inter)professional collegiality and support, previous experiences/group knowledge and facility arrangements;
   - organizational needs: improving continuity and quality of and access to care and/or cost efficiency
   - complexity of cure and care and/or the possibility to formalize cure in protocols or to select specific patient groups

Initial program theory

Fig. 2 shows how we expect the policy program (intervention) in relation to supportive and inhibiting circumstances (context) to influence the reasoning (mechanisms) of the participants within the decision-making process (actors), leading (or not leading) to NP/PA employment and training. Based on our initial theory, we expect to find a majority of (blue) supportive circumstances and a minority of (red) inhibiting circumstances within healthcare sectors with relatively high NP/PA deployment. When most or multiple circumstances are red and/or little or none circumstances are blue, we expect NP/PA deployment to be low. The initial program theory can be summarized as follows:

If the policy program (intervention) is implemented where there is 1) no economic austerity, 2) supportive policy on NP/PA deployment from professional associations, 3) low capacity of medical specialists, residents and college level professionals and a high or sufficient NP/PA capacity (context-macro level)

Then participants (actors) within the decision-making process with non-traditional physicians training which are familiar with NPs/PAs will likely (advocate to) employ and train NPs/PAs (outcomes), within healthcare organizations which are 1) supportive to NP/PA deployment, and/or 2) have the need to improve continuity/quality of or access to care and/or cost-efficiency and 3) have low care/cure complexity tasks and/or the possibility to formalize cure in protocols or to select specific patient groups (context -micro level)

Because 1) their familiarity with NPs and PAs makes them likely to trust their skills, intellect, competencies and quality of care, 2) they are motivated to NP/PA deployment as it complements organizational needs and/or 3) legal, financial, organizational and professional association support, facilities and agreements lowers perceived barriers and insecurities (mechanisms)

The extended formula based on Dalkin et al. (2015) (35) reads:

Intervention + Context → (Actors (Mechanisms)) = Outcome

Methods

To gain insight into how policy influences the deployment and training of NPs and PAs on a macro and micro level, we use a realist approach in combination with mixed methods study. Using a transformative mixed-method design, we analyze qualitative and quantitative data within a theoretical framework (41). For the framework we draw upon the initial theory as described above. Data were collected from a 2019 ACMMP research program and include results of interviews followed by surveys. In this program, 50 respondents were interviewed about the NP/PA employment and training process and influencing factors. To reduce the chance of random results and to gain more insights into various healthcare settings, the findings will be tested with survey data collected among a larger group of 651 respondents. Integration of the mixed methods occurs within this study's 'circular' setup (step 1-5). Following data analysis, we return to the initial theory and refine it further.

Data analysis

When analyzing the interviews the initial theory and identified contextual factors, mechanisms and outcomes will be systematically tested using a framework approach (42). We analyze the data by deductive coding, using a structured matrix codebook based on the concepts of the initial theory. Relevant data that do not fit the matrix will be analyzed with inductive content analysis, resulting in new categories (43). A codebook based on DeCuir-Gunby will be used to code the interview transcripts, increasing the reliability of this process (44). We use the computer program ATLAS.ti for analysis. The surveys will be quantitatively analyzed using the computer program SPSS. Data will be analyzed using descriptive statistics.

Fig.2 Elaborated ICAMO-configuration of the NP/PA policy program

Int.*	Context		Actors	Mechanisms**	Outcome
	Supportive to NP/PA deployment	1) Stable or rising healthcare budgets/no economic austerity	medical specialists manage-ment NP/PAs and/or college level profes-sionals	• Lowers perceived barriers about investing in new employees or trainees (PB)	Macro level: • high NP/PA-MS ratio • high intake NP/PA training programs Organizational level: • high number of NP/PA • high foreseen growth NP/PA capacity
		2) Policy of professional associations on NP/PA deployment		• Policy on NP/PA deployment from trusted professional associations enhances actors' trust in NP/PA deployment (T)	
		3a) Shortages in and high workload of medical specialists and/or residents		• Actors are motivated to provide workload relief for medical specialists by NP/PA deployment (M) • Alleviates concerns about labor market competition and job insecurity for medical specialists (PB) • Actors are motivated to maintain or improve continuity of care (M)	
		3b) Shortages in college level professionals		• Actors see NP/PA training as a way to retain employees by offering career perspectives (M)	
		3c) High or sufficient NP/PA capacity		• Actors are likely to know about NP/PA professions, deployment and training and are more likely to link it to opportunities for their own organization, enhancing trust and motivation (T, M) • Familiarity will be higher reducing perceived financial, legal and time-consuming barriers (PB)	
		4a) Organizational support (policy and employment arrangements, support, previous experiences/group knowledge and facility arrangements)		• Actors are likely to know about NP/PA professions, deployment and training and are more likely to link it to opportunities for their own work, enhancing trust and motivation (T, M) • Alleviates concerns about financial, legal and time-consuming barriers (PB)	
		4b) Organizational need to maintain or improve continuity and quality of and/or access to care and/or tight organizational budgets		• Actors are motivated to maintain or improve continuity and quality of and access to care by NP/PA deployment or to improve cost efficiency by employing professionals with a lower salary than medical specialists who can provide a part of medical specialist' care (M)	
		4d) Low complexity of cure and care and/or possibility to formalize cure in protocols or to select patient groups		• Lowers actors concerns about loss of quality of care by allocating tasks (PB)	
Subsidies on training				• Contributes to motivation to run a profitable cost-efficient organization (M) • Reduces concerns about perceived financial barriers NP/PA training (PB)	Scale of NP/PA employment and training
Reimbursement regulations				• Increases motivation, because it contributes to running a (cost)efficient organization when care provided by NP/PA is reimbursed (M)	
Funding knowledge and consultation platforms on NP/PA deployment and (evaluation) research				• Information provided by these platforms and research results on effects of NP/PA deployment alleviate concerns about loss of quality of care, patient satisfaction and perceived financial, time and legal barriers (PB)	
Extending scope-of-practice				• Contributes to trust within quality of care (T) • Removing restrictions in professional practice reduces concerns about perceived legal barriers (PB)	
Legal acknowledgement professional and educational level				• Contributes to trust within quality of care (T) • Removing restrictions in professional practice reduces concerns about perceived legal barriers (PB)	
	Inhibiting to NP/PA deployment	1) Economic austerity		• Increases actors' worries about exceeding budgets when investing in a new employee/trainee (PB)	Macro level: • low NP/PA-MS ratio • low intake NP/PA training programs Organizational level: • low number of NP/PA • low foreseen growth NP/PA capacity
		2) Lack of or conservative policy of professional associations on NP/PA deployment		• Lowers trust in NP/PA deployment (T) • Increases concerns about quality of care, patient satisfaction & financial, time or legal barriers (PB)	
		3a) Surplus of medical specialists and/or residents		• Actors fear labor market competition & job insecurity for medical specialists when deploying new NP/PA (PB)	
		3b) Sufficient college level capacity		• Actors are less motivated to invest in NP/PA training as career perspective (M)	
		3c) Low NP/PA capacity		• Actors are not likely to know about NP/PA professions, deployment and training and are less likely to link it to opportunities for their own organization, inhibiting trust and motivation (T, M) • Unfamiliarity enhances concerns about financial, legal and time-consuming barriers (PB)	
		4a) Lack of organizational support (policy and employment arrangements, support, previous experiences/group knowledge and facility arrangements)		• Actors are not likely to know about NP/PA professions, deployment and training and are less likely to link it to opportunities for their own work, inhibiting trust and motivation (T, M) • Unfamiliarity enhances concerns about financial, legal and time-consuming barriers (PB)	
		4b) Good continuity and quality of and access to care and/or generous to sufficient organizational budgets		• Actors are not motivated to further improve continuity and quality of and access to care or cost efficiency by NP/PA deployment (M)	
		4d) High complexity of cure and care and/or impossibility to formalize cure in protocols or to select patient groups		• Enhances actors worries about loss of quality of care by allocating tasks (PB)	

** Intervention / policy program*

*** T= trust, M= motivation, PB= perceived barrier*

Discussion

With this study we aim to provide insight into how, for whom, in what context and in what respect governmental policies affect NP/PA deployment. These insights help governments, purchasers and healthcare organizations to effectively make policy regarding task reallocation and facilitate NP/PA professions, as part of the solution for the increasing demand for care, increasing healthcare costs, and workforce shortages.

When testing our initial theory we expect actors will report a majority of supportive (blue in Figure 2) circumstances and a minority of inhibiting (red) circumstances within healthcare sectors with relatively high NP/PA deployment. Based on the number of FTEs which NP and PAs work to every 100 FTEs in medical specialists we expect circumstances to be opportune in (nursing) home care, care for the disabled followed by hospital care, with ratios of respectively 26.8, 14.4 and 7.8 for NPs. Within these first two sectors medical specialists shortages are reported to be exceptionally high (45, 46). However, ratios for PAs are lower with 4.4 for PAs in hospital care and 1.9 in (nursing) home care. The absolute number of PAs within care for the disabled is estimated on 5-10, and is too low to calculate a ratio. Given the ratios in GP-care, circumstances are likely to be mostly red, in other words, inhibiting. In 2019 2.1 FTEs of NPs worked in GP-care relative to every 100 FTEs in GPs in this sector. For PAs this ratio is 1.0/100 (4).

Although this is the first mixed-method study that is carried out across several sectors in consultation with stakeholders and in which a relatively large group of respondents is questioned on this particular topic, there are a few points for attention and limitations to be noted. As a start, we tested our initial theory on a group of 50 respondents. However, given the different circumstances on sector level the sample group was relatively small. To reach a larger group of participants we used surveys. Although this method is suitable for mapping the extent to which actors believe that the particular context influences have an impact on the adoption and training of NP / PAs, this method is less suitable for testing the validity of the mechanisms.

Further, only a small part of the respondents interviewed was involved in an ongoing decision-making process about NP/PA appointment or training at the time of the interview. Other respondents reflect on previous experiences or knowledge that they have gained through others. Answers, reflections and interpretations of the interviewed may have been affected by this.

The subject group of NP/PAs were not specifically included in this study. We propose further research to focus on their perspective on the influence of organizational support on NP/PA deployment.

In addition, this study was conducted in the Netherlands. Governmental policy, labor market circumstances and policies of professional and sectoral associations will vary from other countries. Although we assume that the same mechanisms play a role, variation in context, actors and government policy will lead to different outcomes.

Ethics approval and consent to participate

According to the Radboud University ethics committee criteria, no ethical approval was required for this research (47). Participants were informed and asked for their informed consent, both written and verbally. Findings are disseminated by publication in a peer-revied journal and via national professional organizations and policy partners.

Consent for publication

Not applicable.

Competing interests

There are no competing interests.

Funding

The data was collected within a research program of the Advisory Committee on Medical Manpower Planning (ACMMP) ('Stichting Capaciteitsorgaan' in Dutch). No additional funding was acquired.

References

1. Maier CB, Batenburg R, Birch S, Zander B, Elliott R, Busse R. Health workforce planning: which countries include nurse practitioners and physician assistants and to what effect? Health Policy. 2018;122(10):1085-92.
2. Ministry of Health Welfare and Sport. Letter of the minister of Health, Welfare and Sport. The Hague 31-10-2003.
3. Ministry of Health Welfare and Sport. Standpunt op de rapporten “De Zorg van Morgen, flexibiliteit en samenhang” (Commissie Implementatie Opleidingscontinuüm en Taakherschikking, 2003), “De arts van straks, een nieuw medisch opleidingscontinuüm” (KNMG, 2002) en “Taakherschikking in de gezondheidszorg” (RVZ, 2002). Attachment to: Letter of the minister of Health, Welfare and Sport. 29 282. 31-10-2003. The Hague 31-10-2003.
4. Dankers EJCM, Laurant M, Batenburg R, Van Vught AJ, Van der Velde F, Jeurissen P. Nurse Practitioners and Physician Assistants in the Netherlands: the influence of policies on the workforce 2000-2019. UNDER REVIEW.
5. Peters F. Evaluatie van de ‘Subsidieregeling opleiding tot advanced nurse practitioner en opleiding tot physician assistant. 2014 [cited 08-01-2020]. Nijmegen: Kenniscentrum Beroepsonderwijs en Arbeidsmarkt, [cited 08-01-2020]. Available from: ttp://capstone.nl/wp-content/uploads/sites/164/2014/09/Eindrapport_evaluatie_subsidieregeling_NP-PA1.pdf.
6. Peters F. Tweede evaluatie van de ‘Subsidieregeling opleiding tot advanced nurse practitioner en opleiding tot physician assistant. Nijmegen: Kenniscentrum Beroepsonderwijs en Arbeidsmarkt; 2016.
7. Westhorp G. Understanding Mechanisms in Realist Evaluation and Research. Doing Realist Research: SAGE Publications; 2019. p. 41-58.
8. Yang BK, Johantgen ME, Trinkoff AM, Idzik SR, Wince J, Tomlinson C. State Nurse Practitioner Practice Regulations and U.S. Health Care Delivery Outcomes: A Systematic Review. Med Care Res Rev. 2020:1077558719901216.
9. Xue Y, Kannan V, Greener E, Smith JA, Brasch J, Johnson BA, et al. Full Scope-of-Practice Regulation Is Associated With Higher Supply of Nurse Practitioners in Rural and Primary Care Health Professional Shortage Counties. Journal of Nursing Regulation. 2018;8(4):5-13.
10. Wallenburg I, Janssen M, Bont A. De rol van de verpleegkundig specialist en de physician assistant in de zorg. 2015.
11. van der Biezen M, Derckx E, Wensing M, Laurant M. Factors influencing decision of general practitioners and managers to train and employ a nurse practitioner or physician assistant in primary care: a qualitative study. BMC Fam Pract. 2017;18(1):16.
12. Timmermans MJ, van Vught AJ, Maassen IT, Draaijer L, Hoofwijk AG, Spanier M, et al. Determinants of the sustained employment of physician assistants in hospitals: a qualitative study. BMJ Open. 2016;6(11):e011949.
13. Kleven P, Leferink N, Van den Brink G, Kouwen A. De financiële effecten van taakherschikking. Een hermeting gericht op de effecten van de inze van physician assistants en verpleegkundig specialisten in financieel-economisch perspectief. Nijmegen: Hogeschool van Arnhem Radboudumc; 2019.
14. Lovink MH, Laurant MG, van Vught AJ, Maassen I, Schoonhoven L, Persoon A, et al. Substituting physicians with nurse practitioners, physician assistants or nurses in nursing homes: a realist evaluation case study. BMJ Open. 2019;9(5):e028169.
15. Ranmuthugala G, Cunningham FC, Plumb JJ, Long J, Georgiou A, Westbrook JI, et al. A realist evaluation of the role of communities of practice in changing healthcare practice. Implement Sci. 2011;6:49.
16. Pawson R, Tilley N. Realistic evaluation. London; 1997.
17. Abimbola S, Baatiema L, Bigdeli M. The impacts of decentralization on health system equity, efficiency and resilience: a realist synthesis of the evidence. Health Policy Plan. 2019;34(8):605-17.
18. Shearn K, Allmark P, Piercy H, Hirst J. Building Realist Program Theory for Large Complex and Messy Interventions. International Journal of Qualitative Methods. 2017;16(1).
19. Marchal B, Giralt AN, Sulaberidze L, Chikovani I, Abejirinde IO. Designing and evaluating provider results-based financing for tuberculosis care in Georgia: a realist evaluation protocol. BMJ Open. 2019;9(4):e030257.
20. Mukumbang FC, Van Belle S, Marchal B, van Wyk B. An exploration of group-based HIV/AIDS treatment and care models in Sub-Saharan Africa using a realist evaluation (Intervention-Context-Actor-Mechanism-Outcome) heuristic tool: a systematic review. Implement Sci. 2017;12(1):107.
21. Ebenso B, Huque R, Azdi Z, Elsey H, Nasreen S, Mirzoev T. Protocol for a mixed-methods realist evaluation of a health service user feedback system in Bangladesh. BMJ Open. 2017;7(6):e017743.
22. O'Cathain A, Murphy E, Nicholl J. The quality of mixed methods studies in health services research. J Health Serv Res Policy. 2008;13(2):92-8.

23. Ecorys S. Taakherschikking: een toepassing via de opleiding van Verpleegkundig Specialisten en Physician Assistants. Eindrapportage beleidsdoorlichting Artikel 4.2 thema 3B.; 2016.
24. Mukumbang FC, Marchal B, Van Belle S, van Wyk B. Using the realist interview approach to maintain theoretical awareness in realist studies. Qualitative Research. 2019;20(4):485-515.
25. Hoogeveen TSPAMoH, Welfare and Sport. . Personal communication. 2021.
26. Niezen MG, Mathijssen JJ. Reframing professional boundaries in healthcare: a systematic review of facilitators and barriers to task reallocation from the domain of medicine to the nursing domain. Health Policy. 2014;117(2):151-69.
27. Tye CC, Ross FM. Blurring boundaries: professional perspectives of the emergency nurse practitioner role in a major accident and emergency department. Journal of Advanced Nursing. 2000;31(5):1089-96.
28. Burrows KE, Abelson J, Miller PA, Levine M, Vanstone M. Understanding health professional role integration in complex adaptive systems: a multiple-case study of physician assistants in Ontario, Canada. BMC Health Serv Res. 2020;20(1):365.
29. Burrows KE, Abelson J, Miller PA, Levine M, Vanstone M. Professional, Practical and Political Opportunities: Optimizing the Role of Ontario Physician Assistants in Family Medicine. Journal of Canada's Physician Assistants. 2020;1(4):17-33.
30. Capaciteitsplan 2021-2024. Deelrapport 9a. Physician Assistant. Utrecht: Capaciteitsorgaan; 2019.
31. Capaciteitsplan 2021-2024. Deelrapport 9b. Verpleegkundig Specialist Algemene Gezondheidszorg (AGZ). Utrecht: Capaciteitsorgaan; 2019.
32. Lovink MH, van Vught A, Persoon A, Koopmans R, Laurant MGH, Schoonhoven L. Skill mix change between physicians, nurse practitioners, physician assistants, and nurses in nursing homes: A qualitative study. Nurs Health Sci. 2019;21(3):282-90.
33. Raub W, Buskens V, Van Assen MALM. Micro-Macro Links and Microfoundations in Sociology. The Journal of Mathematical Sociology. 2011;35(1-3):1-25.
34. Pawson R, Tilley N. Realist Evaluation. 2004.
35. Dalkin SM, Greenhalgh J, Jones D, Cunningham B, Lhussier M. What's in a mechanism? Development of a key concept in realist evaluation. Implement Sci. 2015;10:49.
36. De Bruijn H, Ten Heuvelhof E. Management in networks: on multi-actor decision making. 1 ed. London: Routledge; 2008.
37. Mukumbang FC, van Wyk B, Van Belle S, Marchal B. 'At this [adherence] club, we are a family now': A realist theory-testing case study of the antiretroviral treatment adherence club, South Africa. South Afr J HIV Med. 2019;20(1):922.
38. Westhorp G, Stevens K, Rogers PJ. Using realist action research for service redesign. Evaluation. 2016;22(3):361-79.
39. Okoro F. Actors and roles in decision-making process. Alta Scuola Politecnica; 2016.
40. Associates SC. Roles in the buying decision-making process (detailed). In: Chase S, editor.
41. Ozawa S, Pongpirul K. 10 best resources on ... mixed methods research in health systems. Health Policy Plan. 2014;29(3):323-7.
42. Huberman A, Miles M. The Qualitative Researcher's Companion2002.
43. Elo S, Kyngas H. The qualitative content analysis process. J Adv Nurs. 2008;62(1):107-15.
44. DeCuir-Gunby J, Marshall P, Mcculloch A. Developing and Using a Codebook for the Analysis of Interview data: An Example from a Professional Development Research Project. . Field Methods 2011;23(2):136-55.
45. Capaciteitsorgaan. Capaciteitsplan 2021-2024: Deelrapport 5. Specialist Ouderengeneeskunde. Utrecht: Capaciteitsorgaan; 2019.
46. Capaciteitsorgaan. Capaciteitsplan 2021-2024: deelrapport 6. Arts voor Verstandelijk Gehandicapten. Utrecht: Capaciteitsorgaan; 2019.
47. University R. Research Ethics Committee [Available from: https://www.ru.nl/science/research/about-our-research/ethics-committee/.