Universität Basel
Medizinische Fakultät
Departement Public Health

La Source.
Institut et Haute
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SUPSI

Large-scale, data-driven quality improvement strategies in long-term care facilities for older people:

Best practices and insights from Canada, Australia, and New Zealand

Final report - Work Package 2 / Sub-aim 2

NATIONAL IMPLEMENTATION PROGRAMME – STRENGTHENING QUALITY OF CARE IN PARTNERSHIP WITH RESIDENTIAL LONG-TERM CARE FACILITIES FOR OLDER PEOPLE

NIP-Q-UPGRADE

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Authors: Emmanuelle Poncin, Simon Thuillard, Bastiaan Van Grootven, Jianan Huang, Nereide Alhena Curreri, Lucie Vittoz, Serena Sibilio, Brigitte Benkert, Sonja Baumann, Laurie Corna, Franziska Zúñiga, Nathalie IH Wellens

On behalf of the NIP-Q-UPGRADE Consortium

National Implementation Programme – Strengthening quality of care in partnership with residential long-term care facilities for older people (NIP-Q-UPGRADE), commissioned by the Federal Quality Commission (FQC) to ARTISET with the industry association CURAVIVA and senesuisse – Laufende Programme und Projekte (admin.ch).

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The NIP-Q-UPGRADE supports long-term care facilities in data-driven quality improvement based on the national quality indicators.

The National Programme is implemented using implementation science approaches. ARTISET and senesuisse have delegated the scientific management of the programme to their collaboration partner, the University of Basel, Institute for Nursing Science (INS). For its part, the INS works collaboratively with the Institut et Haute École de la Santé La Source (La Source), University of Applied Sciences and Arts Western Switzerland in Lausanne and the Centro Competenze Anziani, Scuola universitaria professionale della Svizzera italiana (SUPSI) to implement the programme nationally and has delegated different sub-aims to the partner institutions. The research institutes' interpretation of the scientifically substantiated results, their conclusions and recommendations to the trustee and to the Federal Quality Commission EQC may differ from the trustee's point of view.

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List of abbreviations

Abbreviation	Explanation of abbreviation
ADL	Activities of Daily Living
AUS	Australia
CAN	Canada
CIHI	Canadian Institute of Health Information
CFIR	Consolidated Framework for Implementation Research
CCRS	Continuing Care Reporting Systems
EHR	Electronic Health record
IRRS	Integrated interRAI Reporting System
LTCF	Long Term Care Facility
NZ	New Zealand

Abstract

Project description: This project aims to identify and examine processes and best practices in planning, implementing, and sustaining large-scale, data-driven quality improvement strategies in long-term care facilities for older people in different countries.

Methods: Collective case study informed by scientific and grey literature and five semi-structured interviews with eight experts actively involved in quality programs.

Results: Sparking a quality culture is at the heart of data-driven quality improvement strategies in long-term care, as illustrated by the experiences of Canada, New Zealand, and Australia. We identified elements as key to sparking this culture, including:

(i) deploying continuous efforts to promote and sustain data-driven quality culture at government level;
(ii) building strong partnerships between government or government-mandated agencies and long-term care facilities, including capacity-building, trust and engagement with indicator data and indicator domains; and
(iii) using the same data to inform person-centred care, care planning, quality monitoring, and case-mix funding – instead of recording different data in parallel – which would promote data reliability and resource efficiency.

Summary

Mission

This sub-project of the NIP-Q-UPGRADE program aims to examine processes and practices of planning, implementing, and sustaining data-driven quality improvement strategies in long-term care facilities for older adults across various countries. It focuses on understanding large-scale quality indicator initiatives and identifying their governance and key features.

Background

This work brings to light best practices and insights from international examples, which Switzerland can build upon to further develop and improve its national quality indicator initiative. Since 2019, Swiss long-term care facilities have been legally required to report on six quality indicators in four domains: pain, malnutrition, physical restraints and polypharmacy. To support the expansion of the Swiss initiative, the NIP-Q-UPGRADE is assessing additional indicators, including pressure ulcers, medication review and advance care planning.

However, challenges have emerged around questions of data reliability, reporting timeliness, results availability and accessibility and use of data for quality improvement. By studying more mature quality indicator initiatives in other countries, Swiss policymakers and long-term care stakeholders can learn from their experiences. They can further consider whether some of their key features and best practices may be relevant and applicable to the Swiss context.

Method

This study adopts a collective case study approach, informed by scientific and grey literature and supplemented by semi-structured interviews with eight experts actively involved in national quality programmes.

Results

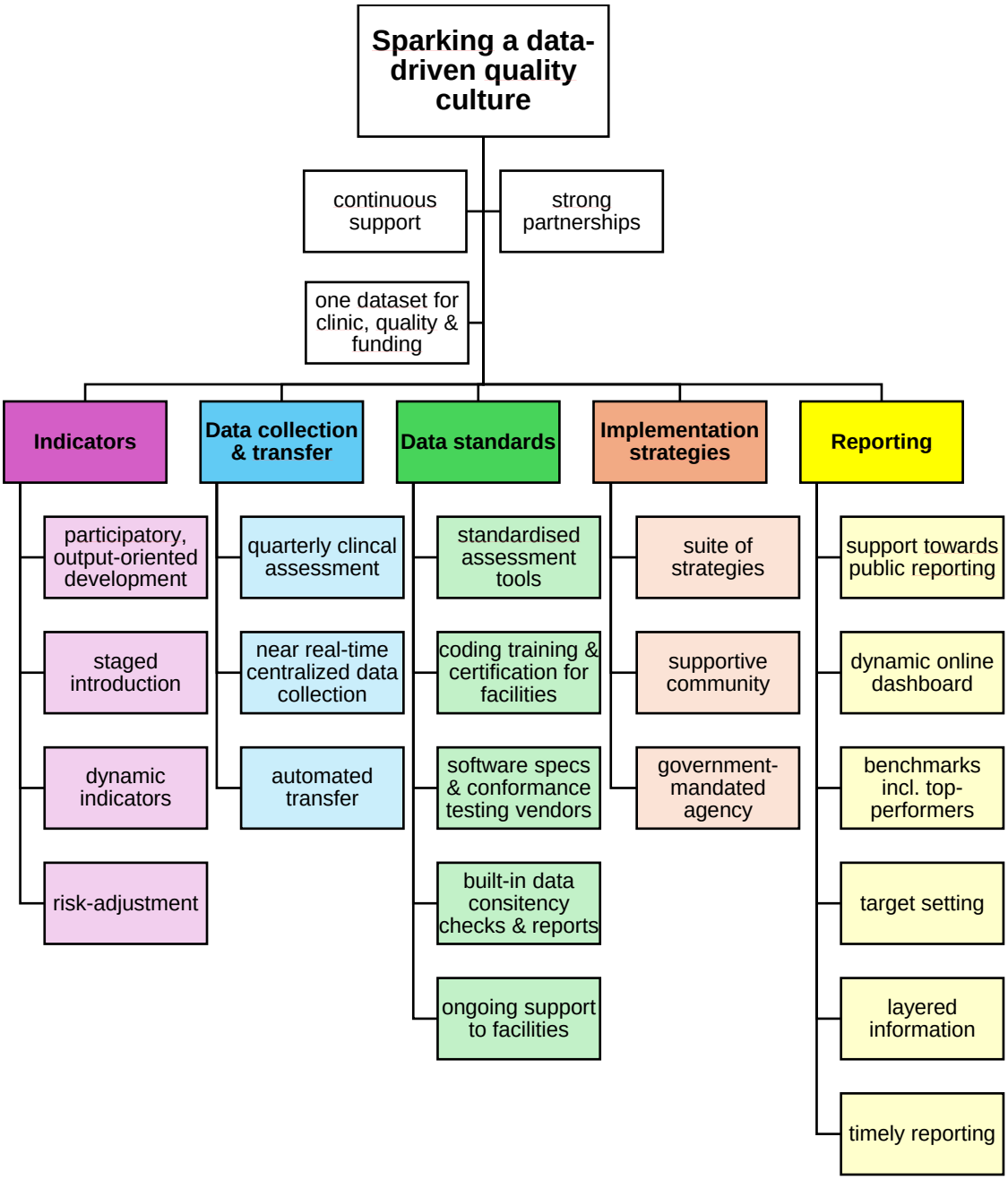
Sparking a quality culture is central to successful data-driven quality improvement strategies in long-term care facilities, as demonstrated by the cases of Canada, New Zealand, and Australia. These examples were selected on the basis of pre-established criteria of programme maturity, coverage and documents accessibilities. They may also be regarded as amongst the most accomplished quality indicator initiatives worldwide and have inspired the Swiss long-term care quality indicator model.

Key elements to sparking a quality culture include:

I. **Government support**: continuous efforts to foster and sustain a data-driven quality culture in long-term care at government level.
II. **Strong partnerships**: building robust partnerships between government (-mandated) agencies and long-term care facilities, emphasizing capacity-building, trust and engagement with indicator data and indicator domains.
III. **Unified data use**: utilising the same data to inform person-centred care, care planning, quality monitoring, and case-mix funding – instead of recording different data in parallel for care, quality and funding, for instance – to enhance data reliability and resource efficiency.

These elements are relevant and, for the most part, applicable to the Swiss context. Their application would strengthen the quality culture in Swiss long-term care facilities – benefiting residents, relatives and professionals working in the sector.

In the examined countries, central bodies responsible for implementing and supporting quality indicator initiatives are typically not-for-profit organisations, regulated and/or (partially) funded by (sub-)national governments. Their responsibilities span over the five axes highlighted in the figure below, namely indicators, data collection and transfer, data standards, implementation strategies, and reporting.



Developing publicly available resources and materials to promote, support, regulate, diffuse and enhance the data-driven quality culture is essential for large-scale quality improvement. They go beyond reports and benchmarks, adopting various formats – from written materials to videos and live events – and cover a broad range of topics – from the clinical to the technical domain. Such resources and materials can take the form of trainings, eLearning, webinars,

infographics, data extractions, strategic plans, roadmaps, checklists, technical factsheets, promotional videos, best-practices cases, portals and platforms, newsletters, glossaries, and libraries, for instance. They are centralised on a public website and regularly updated to ensure the reliability and trustworthiness of indicator data.

At the grassroots level, collaborative, peer-to-peer initiatives illustrate how long-term care facilities may empower each other to practice evidence-based care quality improvement. These initiatives use reliable, risk-adjusted indicator data and share success stories. They foster a commitment to resident-centred care and innovative quality improvement approaches.

Combining bottom-up initiatives, for and by long-term care facilities, with top-down support, is particularly promising in promoting large scale quality improvement. A central body dedicated to ensuring timely, reliable quality indicator results and empowering the sector to practicing data-driven quality improvement is also crucial.

Conclusion and Recommendations

Drawing from the experiences of Canada, Australia and New Zealand, we recommend that:

1. the Federal Office of Public Health and Federal Commission for Quality, with other key stakeholders, clarify who is responsible for which aspect of the Swiss quality indicator strategy, attribute mandates and/or build and finance appropriate bodies. This entails planning for ongoing efforts, updates and improvements of the Swiss initiative over time and setting up a dedicated team.
2. the Swiss national indicator programme (i) promotes quality indicators as clinical assessment tools, notably by embedding them at the point-of-care, and (ii) adopts a single dataset for clinical use, care planning, quality monitoring and case-mix funding.
3. the Swiss national strategy focuses on building strong partnerships with long-term care stakeholders and energising communication with the sector and the public, raising awareness and motivating quality initiatives.
4. further focus is directed towards: (i) developing risk-adjusted, dynamic indicators; (ii) assessing residents quarterly and data automatically transferred to a central repository with nearly real-time processing; (iii) strengthening data standards, e.g. through coding training and software conformance testing ; (iv) building a supportive quality improvement community, with government-mandated agencies taking the lead for regulations, monitoring, and support; and (v) supporting facilities with public reporting and developing reporting tools such as an interactive online dashboard with up-to-date data, benchmarking and target setting features.
5. stakeholders such as CURAVIVA/senesuisse or cantonal associations identify potential grassroots initiatives and consider how to best support them.
6. the Federal Quality Commission explores in greater depth the best ways to report data.

As per its objective, this report provides an overview of international best practices for large-scale, data-driven quality improvement strategies in long-term care facilities for older adults. Forthcoming sub-projects of the NIP-Q-UPGRADE will consider questions of which best practices are most relevant and applicable to the Swiss context and how to introduce, implement and sustain them.

In so doing, we will strive to promote the twin-aim of providing the long-term care sector with timely, reliable, and easily accessible quality indicator data, whilst empowering long-term care actors to use this data to drive better care quality.

1. Introduction

Throughout high- and middle-income countries, quality indicators initiatives are becoming increasingly widespread in the residential long-term care sector as means to drive evidence-based clinical decision-making and care quality improvement (1). This collective case study seeks to understand how quality indicators initiatives have emerged and evolved, and what their governance and key features are.

Since 2019, Swiss long-term care facilities have been under the legal obligation to report on six quality indicators in four domains – pain, malnutrition, physical restraints and polypharmacy. On the one hand, the Swiss quality indicator programme is evolving and expanding to cover additional domains. In this regard, the NIP-Q-UPGRADE is assessing the inclusion of pressure ulcers, medication review and advance care planning as additional quality indicators. On the other hand, the implementation of the programme has proven challenging at times, with issues noted at the levels of data reliability, report availability and timeliness, and use for care quality improvement notably.

In terms of data quality for instance, a study undertaken as part of sub-project 3 of work package 1 of the NIP-Q-UPGRADE programme has concluded that the quality of national quality indicator data is sub-optimal (2). It uncovered a diversity of data collection and recording practices throughout Switzerland. These are notably rooted in the diversity of perceptions and practices amongst long-term care professionals, as well as in contrasting structural and systemic characteristics of facilities. The study further highlighted needs for (i) building of an environment that makes it easier to code correctly; (ii) training in quality indicator coding and interpretation; and (iii) providing accessible, timely and thrust-worthy reports. Lastly, it identified problems at the level of needs assessment instruments and electronic health record vendors, such as the presence of errors in algorithms and differences in algorithms used by different vendors, concluding that all these factors participate in influencing data quality (2).

Against this backdrop, it is important to examine quality indicator initiatives in different countries to learn from their experiences and consider whether some of the features and practices that characterise them might be relevant and applicable to the Swiss context.

2. Aim

This study aims to describe processes and practices of planning, implementing, and sustaining large-scale, data-driven quality improvement strategies in long-term care facilities for older people in countries with national or regional policy initiatives. In so doing, it seeks to bring to light best practices and insights from other countries, which Switzerland can build upon to further develop and improve its national quality indicator initiative.

3. Methods

Research design

We undertook a collective case study (i.e. involving multiple cases) design with desk-based literature consultation supplemented by semi-structured interviews with eight international experts actively involved in quality indicator programmes.

We selected a collective case study design to “generate an in-depth, multi-faceted understanding of a complex issue in its real-life context” (3). Our case study approach was

characterised by two main elements: (i) iterative consultation of the scientific and grey literature to identify cases and, once identified, investigate them (sub-aim 2.1); and (ii) semi-structured interviews with experts in case study countries, to examine cases beyond the information found in the literature (sub-aim 2.2). The combination of data from the literature and from expert interviews is particularly suited to answer questions such as how quality indicators initiatives are designed, implemented, and governed, as well as identify their key procedural and contextual features. As such, our literature searches were fully embedded in our overarching case study design.

Sample

To identify cases, we first asked: what are international examples of large-scale, data-driven quality improvement strategies in long-term care facilities? To answer, we searched the scientific literature, using key words such as “long-term care” and "quality indicator*" and limiting our search to 2020 to present, as detailed in Appendix 1. We aimed to select countries with nationwide policy programmes utilising quality indicators and benchmarking, amongst other elements, to drive large-scale quality improvement in the sector.

We planned on select two to four cases. Here, an individual case refers to a large-scale, evidence-based quality improvement initiative, typically implemented in one country. We used a purposeful sampling approach, selecting initiatives or programmes based on (i) their age and level of maturity (i.e. considering programmes that had been in place for at least two years and over at least one cycle of improvement), (ii) their coverage (national or regional) , and (iii) the accessibility of documents by the research team (i.e. availability of data sources, such as public websites, in English, French, or Dutch). We confirmed our selection through consultation with the consortium.

Case description

To provide detailed descriptions of the cases, we performed desk-based research and semi-structured interviews with long-term care quality improvement experts in case countries. Desk-based research was mainly informed by scientific articles and public websites presenting national quality indicator initiatives and the materials developed as implementation strategies. The data yielded was organized on an Excel matrix, with domains and categories inspired by the updated Consolidated Framework for Implementation Research or CFIR (4).

The experts interviewed for each case study were identified through the consortium’s professional network and through snowballing. We also developed an interview guide for use with experts in each country case study (see Appendix 2), seeking to uncover how selected long-term care quality indicators programmes had unfolded, and what their main features were.

More specifically, we asked about the following 7 themes.:

(i) the emergence and evolution of the programme;

(ii) processes of quality indicators development and/or selection;

(iii) data standards and collection;

(iv) dos and don’ts for data-driven quality improvement;

(v) critical incidents and best practices;

(vi) implementation strategies; and

(vii) informal, overall programme assessment.

These themes were developed based on expert knowledge from the consortium, and scientific and grey literature searches – including consultation of websites presenting public quality indicator initiatives in Canada, Australia and New Zealand.[1]

Case analysis

To analyse cases, we identified key insights and best practices in planning, implementing and sustaining evidence-based quality improvement in long-term care. The materials we analysed consisted of semi-structured interview transcripts, grey and scientific literature – including additional literature provided by our interviewees.

We analysed cases inductively (i.e., seeking to generate insights and best practices from the data rather than test hypotheses). We also followed recommendations for collective case studies, analysing individual cases prior to performing cross-case comparison and reporting findings. To ensure quality in the design, conduct, and reporting of this study, we used the twelve questions guiding researchers undertaking case studies developed for the DESCARTE (DESign of CAse Research in healThcarE) model (5), as presented in Appendix 3.

4. Results

4.1 Case selection

We selected three countries, namely Canada, New Zealand, and Australia. The list of countries we considered after literature search, and the main reason for their exclusion from this study, can be found in Appendix 4. Based on our literature search, we considered 11 countries. Seven were excluded based on the maturity or coverage of their quality indicator programme, or accessibility of materials. Amongst the remaining four, the United States of America were excluded as we already extensively examined its quality indicator initiative through other literature reviews (WP1.1 and WP2.1).

In the three case countries, quality indicator programmes are adopted nationwide, with regional variations in Canada (e.g. Québec has its own programme). In Australia and New-Zealand, the program is mandatory. However, in Canada, each jurisdiction (province or territory) decides whether to participate and may mandate participation for all facilities within their jurisdiction. These 3 programmes may also be regarded as amongst the most accomplished quality indicator initiatives worldwide and have inspired the Swiss long-term care quality indicator model.

The number of indicators varies from 11 in the Australia National Aged Care Mandatory Quality Indicator Program (6) to 31 indicators covering nine domains for Aged Residential Care in New Zealand and 35 indicators in Canada. Canada and New Zealand use interRAI instruments – a

[1] These included reports, infographics, manuals, webinars, videos, training material, excel data extractions, technical orders, checklists, procedures, strategic plans, action plans, checklists, newsletters, factsheets, FAQs, glossaries, libraries and data recording templates, for instance.

set of validated, standardised "*evidence-based assessment instruments*" (7(p.2),8). Australia developed its own set of quality indicators for the residential long-term care sector (9).

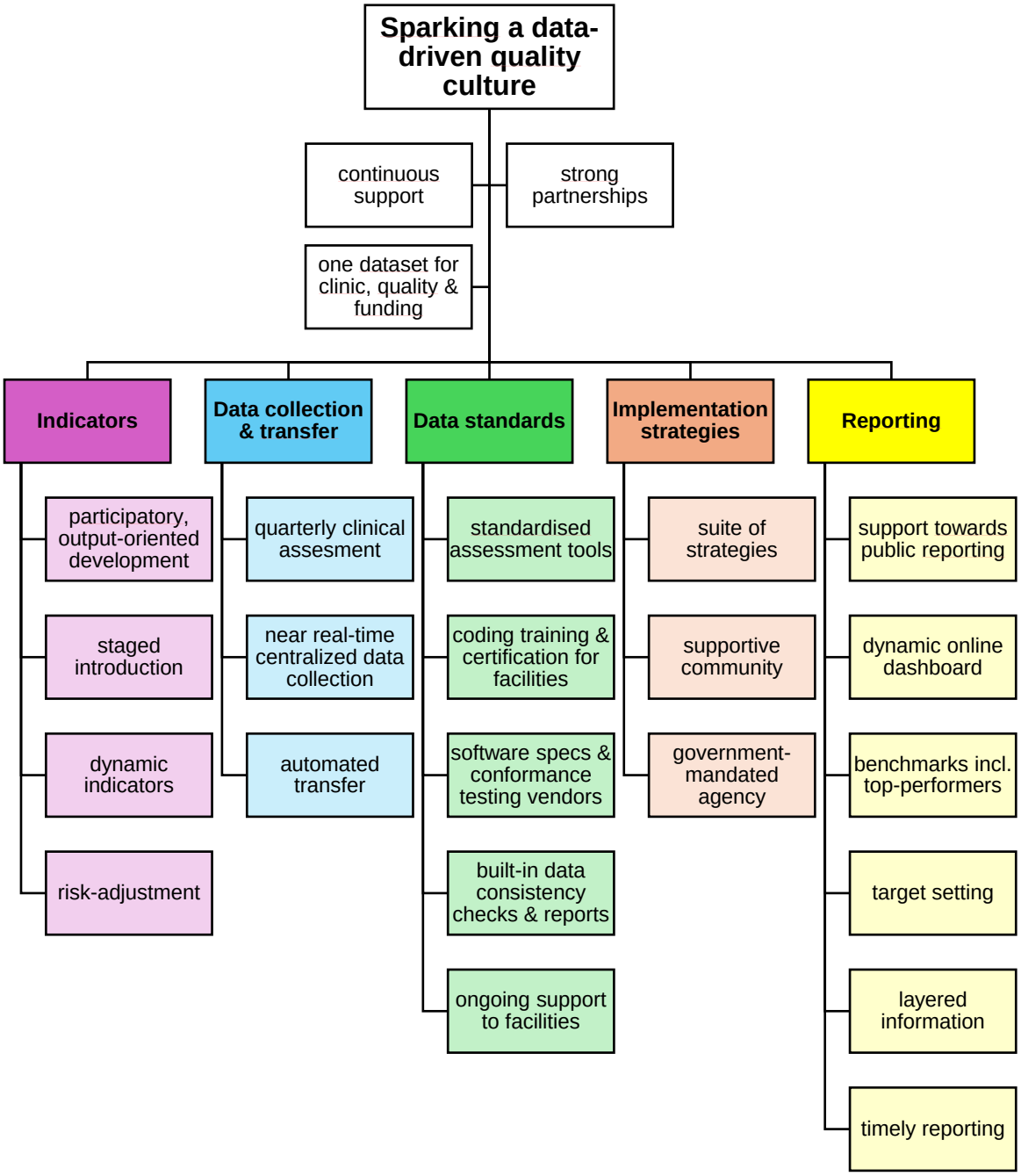
In the three countries, quality indicators initiatives have been regarded as overall successful. In Australia, the national programme was described in a scientific evaluation as "*a major stride towards a culture of quality promotion, improvement and transparency*" (9(p.2073)). In Canada, the use of quality indicator, interRAI data for long-term care has been recognised as key to driver of positive policy change and initiatives (notably a large reduction in the use of physical restraints) (8). In New Zealand, the mandatory nationwide implementation of nationwide standardized assessments for care planning and eligibility prior to quality indicators introduction has led to solid training, support, monitoring, reporting and use for decision-making (10). As such, it is possible to derive best practices based on the experience of these three countries.

To collect data for our three country cases beyond the scientific and grey literature, we conducted five online semi-structured interviews with eight experts (four in Canada, two in Australia and two in New Zealand) employed in government, a government-mandated organisation and a university, as detailed in Appendix 5.

4.2 Best practices

The cases of Canada, New Zealand, and Australia highlight best practices in terms of (i) quality indicators selection and development; (ii) quality indicator data; (iii) implementation strategies deployed in indicator programmes; (iv) reporting; and (v) sparking a quality culture. They are shown in Figure 1 and described in further details hereafter.

Figure 1: Best practices around quality indicators



Our findings highlight that in Canada, New Zealand and Australia, many strategies are being developed to regulate, report, promote and support all users and stakeholders in using and interpreting quality indicator results in a reliable, user-friendly manner. Illustrating this point, most materials are publicly available and free, with a minority of password protected materials.

More specifically, based on the experiences of Canada, New Zealand, and Australia, three key elements were identified by the experts we interviewed as key to **sparking a quality culture**, namely**:**

- deploying continuous efforts to promote and sustain data-driven quality culture at government level
- building strong partnership between government or government-mandated agencies and long-term care facilities, including capacity-building, trust and engagement with indicator data and indicator domains
- using the same data to inform person-centred care, care planning, quality monitoring, and casemix funding, instead of recording different data in parallel for care and funding, for instance (as currently done in Switzerland). Using the same data for multiple purposes would promote data reliability, notably by discouraging gaming, and resource efficiency.

In terms of **indicators selection and development**, the four following points were brought to light:

- adopting an evidence-based, participatory and output-oriented indicator development process (i.e. considering how quality indicator outputs will be used and listen to the facilities to understand their needs and select actionable, influenceable outputs)
- stepwise introduction of additional indicators (i.e. not introducing many indicators at once)
- developing or adopting indicators highlighting improving or worsening resident outcomes – based on longitudinal comparison between two time points per resident, instead of overall transversal prevalence at one yearly time point, for instance
- risk-adjusting indicators

Best practices in terms of resident **data collection and transfer** include three main elements:

- quarterly clinical assessments at resident level
- near real-time centralized data collection and processing
- automated data transfer from facility to central repository

In turn, best practices for **data standards** entail the following:

- standardised clinical assessment tools for use by facilities
- coding training for facilities with certification for attendance and/or competency testing
- specifications for software vendors and conformance testing of software products of health information systems; these can be general Electronic Health Records or assessment instrument-specific software (i.e. software that integrated the interRAI Long-Term Care Facilities)
- built-in data consistency checks in the software and data quality reports. Observed data issues can be addressed in trainings or in reminders.
- ongoing support to facilities using a wide range of strategies (e.g. FAQs, helpdesk, newsletter, website, refresh training, updates on coding guidelines, roadshow across the country)

In terms of **implementation strategies**, important elements include:

- adopting a suite of strategies such as training, expert support, champions and reference persons, communities of practice, and communication
- building a large, supportive community including facilities, regional and national authorities, and long-term care organisations
- government-mandated agencies playing an essential role for regulations, monitoring, training, and support, in addition to data processing and reporting

Lastly, the following points emerged as key to public and protected **reporting**:

- time and support for facilities, from government departments or long-term care organisations for instance, to move towards public reporting (avoiding to “shame and blame” facilities for instance); this can take the form of a gradual evolution, starting with private, named reports before moving to public ones, including data preview and embargo periods prior to release so potential issues can be flagged and discussed.
- data visualisation in dynamic online dashboard
- benchmarking at national and sub-national level, across time, and against top-performers
- target setting, by facilities themselves and / or by government entities
- layered information display – with a first level displaying publicly accessible summary information for the general public, a second, publicly accessible level with more detailed information intended for decision makers, and a third private, password-protected level with detailed data for facilities, for instance
- timely reporting of up-to-date data (preferably no older than 6-month), which is key to fostering acceptability, use and trust in reporting by facilities

4.3 Insights from Canada, New Zealand and Australia

More in-depth insights from the three countries can be found in the five tables below, based on grey literature and interviews with experts from Canada, New Zealand and Australia. As such, it is important to note that these insights reflect the views and experiences of the experts we interviewed and have not necessarily been the object of scientific enquiries. Our aim here is to provide readers with an overview of the practices and experiences of long-term care quality improvement strategies in Canada, New Zealand and Australia, highlighting their richness and breadth – rather than going into detailed descriptions of each topic. In interpretation, contextual differences in Switzerland must be taken into account.

Table 1a: Sparking a quality culture: do's

	Key insights	Explanation
Sparking a quality culture: dos		
AUS	gain the support of the majority in the long-term care sector	show facilities that the aim of the quality indicator programme is quality improvement, i.e. that it is in their best interest (11)
	pilot indicators	
CAN	using one single data system for clinical use at the point-of-care, planning, quality monitoring, and casemix funding	facilities should be encouraged by provinces/ territories to use interRAI standards at the point of care (12–14), for person-centred care planning, and funding; in so doing, if interRAI data are regarded as clinical for care planning, this leads to better quality data: Promote the use of aggregated data for data-driven decision making on different levels: clinicians, health managers, policy-makers (14,15)
	have data to drive improvement	alongside expert support
	robust, harmonised data standards	alongside education to support quality
	champions/reference person	in the field, so that the best facilities can mentor the struggling ones
	communities of practice	establishing networks of facilities to build up expertise (16,17)
	robust methodology for testing data quality	

	mobilise dataset and rally people around it	
NZ	partnership with universities	for research on nationwide datasets, with an annual day of knowledge exchange for stakeholders and researchers (18)

Table 1b: Sparking a quality culture: don’ts

Sparking a quality culture: don’ts		
AUS	don’t introduce too many new indicators at once	too much work for facilities and government
CAN	don’t over-constrain the data collection system with data submission validation rules and rejections early on	best to tighten up rules over time
	don’t be complacent in terms of check and balances in the system	
	don’t shame and blame facilities for poor performance	
NZ	don’t introduce too many new indicators at once	

Table 2: Quality indicators selection and development, and indicators most amenable to change

	Key insights	Explanation
Indicators selection and development		
AUS	bottom-up process	national stakeholder consultation followed by expert consultation and indicator testing with care providers and stakeholders
	and/or top-down process	adapt indicator to government policy focus (19)
CAN	participatory, output-oriented indicator development	consider how outputs will be used and listen to the facilities to understand their needs and select outputs
	actual QIs	Factsheets on 35 indicators for long-term care facilities (20). The resident outcomes are the QIs form the interRAI system based on the clinical interRAI LTCF (or former RAI NH) assessment.
	focus on dynamic outcome indicators	highlighting worsening or improvement of resident outcomes by comparing two data points for each resident overtime (example: improved behavioural symptoms (21), experiencing worsened pain (22))
	crafting a composite indicator	work is in progress of a scientific study examining based on large data bases if 10 to 15 individual indicators can be summarized into a summary score
NZ	selection of interRAI indicators most suited to the country	initial selection of 30 indicators, down to 25 currently, as it is statistically more practical to have regrouped indicators
	dynamic, outcome-based indicators that focus on longitudinal information rather than cross-sectional information	Indicators that compare at resident-level the changes between two data points with a time interval (e.g. worsening of pain over 6 months for a specific resident, improvement of pain over 6 months for a specific resident) highlighting improving or worsening resident outcomes. The aggregated data on facility level would show a percentage of residents with improved pain.

Indicators most amenable to change		
AUS	linkages with other Government initiatives	Data may reflect improvements when combined with other Government initiatives, for example inclusion in the QI Program and specific policy reforms.
CAN	key dimensions to consider: 1. prevalence 2. severity 3. modifiability	• indicators with low rates may not prove particularly useful and tend to be unstable (e.g. pressure ulcers) • process indicators are easier to change than outcome-based ones, which are tied to residents' clinical characteristics (feasible for some, e.g. mood, pain) • Quality indicator data shows improvements linked to policy initiatives such as coaching and communities of practice for instance (e.g. on restraints use, antipsychotics), not directly to the indicator initiative • Example of quality indicator with important change: potentially inappropriate use of antipsychotics in long-term care (23)
NZ		

Table 3: Quality indicator data

	Key insights	Explanation
Facility-level data reporting and data standards		
AUS	delivery of aggregated facility level data	long-term care facilities send the aggregated data in a data recording template through the Government Provider Management System (24). The template includes instructions and automatically calculates and aggregates data for each indicator.
	report at facility level on a quarterly basis	need to balance the freedom and independence of residents, for whom quarterly satisfaction surveys might be burdensome, which is why it is voluntary for residents to take part in the Consumer Experience and Quality of Life surveys that form part of the QI Program.

	data entry on secure online form or offline data recording via template	reporting instructions detailed in programme manual (24)
	person responsible for data control at facility level	varies depending on facilities, e.g. director of nursing, chief financial officer, assistant nurses, admin person
CAN	resident level data centralized for QI calculation at facility level	
	quarterly data quality report	this enables to timely spot quality issues, such as records counts and missing/late records (25)
	promote stakeholders' engagement	
	envision near real-time, automated data quality monitoring	
	service agreement and designated reference persons per long-term care facility	all long-term care organizations need to sign a service agreement with CIHI that outlines terms and conditions for accessing and using reports. Per long-term care facility one responsible person is designated for managing access to the secure online services, e.g. data submission services, retrieve reports (26).
	internal data quality policies and procedures on long-term care facility level	to ensure that the transferred data are complete and accurate, recommendations are provided on how long-term care facilities can establish internal data quality policies and procedures. *Prior to data transfer*: a checklist of internal audit on the clinical assessment data (e.g. person identifiers, time frames, completeness, coherence between related items, valid values) At submission: check of submission file (e.g. record count, definition of organization identifier, quarter, fiscal year) *After submission:* review submission reports (e.g. check acceptance of data delivery, data calculation). *Continued:* monitor data quality checks on ongoing basis (e.g. compliance with deadlines, track submission acceptance, measure and monitor outcomes after data quality initiative implementation). Review procedures regularly and update if necessary (27).

	long-term care info	info on metadata on long-term care databases (Continuing Care Reporting Systems CCRS and Integrated interRAI reporting System IRRS) and much more (28)
	broader vision on different types of health data standards	content standards (data required to produce information), code systems (standardized terms or codes that represent related concepts), information standards (required health system information), data exchange standards (data flow requirements), privacy and security standards (data protection requirements (29))
	information Quality Framework	information quality programme for data suppliers and users. 5 dimensions of data quality: relevance, accuracy and reliability, timeliness and punctuality, comparability and coherence, accessibility and clarity (30). With definition of quality principles based on user needs, shared responsibilities in the data supply chain, user feedback, assurance at every step of the data life cycle, organizational culture, adaptive process, prevention of data issues, etc.
	toolkit for Health data and information governance and capability framework	toolkit with descriptions of processes, stakeholder engagement, roadmaps, self-assessments, etc (31)
	indicator library	lists of definitions and coding methodologies per indicator per health sector (20) filter by type of care = long-term care to get information on all long-term care quality indicators + some contextual measures
	IRRS Integrated interRAI Reporting System	switch of data standard: from the old generation RAI MDS data to interRAI Suite that is guarantees the continuity of data standards across care settings (e.g. interRAI Home Care, interRAI LTCF). IRRS initiated in 2019-2020, the legacy system (CCRS) will be decommissioned by 2026 (32).
NZ	resident level data centralized for quality indicator calculation at facility level	
	competency requirements: assessor certification by annual exam, audit controls, limited software access	obligation to maintain competency and remain an approved assessor: - maintain an annual practising certificate from professional body - complete an interRAI assessment at least every six months - complete annual methodology exams in interRAI Learning and Development (iL&D) - meet the requirements of a quality review/audit on random selection If no annual certificate obtained: the software changes automatically the access in read-only. The person can view records but not complete assessments (33).

	build-in data consistency checks	embedded in the nationally used software for interRAI assessments and quality indicator data to look for inconsistencies across the item coding
	annual data quality reports	data are analysed using descriptive statistics to demonstrate reliability and stable trends in internal consistency. High quality data means that stakeholders can make well informed and evidence-based decisions for service quality improvement, research, planning and service delivery (34,35)
	tailored reports	quality indicator reports separately tailored for region, districts, and for individual aged care facilities, for instance
	annual knowledge exchange day	
	technical updates, newsletter, regular quiz, and reference persons per facility	security certificates and technical updates (36,37), methodology quiz testing correct coding (38), newsletter (39)
	coding manuals	each aged care facility is allocated at least one set of interRAI manuals (40,41).
	interoperability	an Application Programming Interface is provided to connect the mandatory Momentum software with other health data software including interRAI care plan reports in pdf format (36) Interoperability barriers if the national software does not connect with other internal systems on top of it, with no control over who buys which additional system

Data transfer		
AUS	business to government system	soon to commence for software vendors with compatible software, automatic data transfer to the government. Currently, residential aged care facilities record aggregated data in a data recording template (24), upload data at individual service level, via bulk upload (42) or through a benchmarking company on the Government Provider management System.

CAN	system-to-system communication	since 2019, which increases interoperability, enabling direct data transfer between submitter (e.g. facility, region or province) and IRRS. In some provinces/territories, the data flows directly from the facility to IRRS. In others, it flows from the facility to the province and province submits to IRRS.
	sub-national government autonomy	provinces have dataset with the same data and can build their own system; CIHI returns data quarterly back to each provincial/territorial ministry of health
	license agreements for commercial and non-commercial software vendors	they are both licensed to distribute software with interRAI content and have passed conformance testing. In total 14* health information software vendors have passed annual Canadian Institute for Health Information testing requirements and have a signed licence agreement (43). **Some health information have developed separate interRAI specific products, some vendors developed the interRAI system as basis for her electronic health record content, some have integrated both systems.*
	support to long-term care facilities in software vendor choice	Providing considerations for software vendor selection (44) , and vendor contract (45), compliance checks, evaluation of facility's' IT capacity (46), considerations in case of vendor change (47), etc
	guidelines on how to integrate interRAI assessment data (for quality indicator definitions) into electronic health records	the aim is to support efficient and accurate integration of interRAI assessment data into electronic health records and the ability to share, connect and use health information across care systems. Checklists are available with essential issues: data sharing standards (e.g. HL7, FHIR), taxonomy and classification standards (ICD-10, Loinc, SNOMED-CT), auto-population of items (e.g. birthdate, medications, weight, length are automatically transferred from the electronic health record) , storage, workflows and business processes, etc (48).
	data flow models according to health regions or jurisdictions	1) long-term care facility to Canadian Institute for Health Information's centralized data repository 2) long-term care facility to Regional Health Authority to Canadian Institute for Health Information's centralized data repository 3) long-term care facility to Regional Health Authority to Ministry of Health to Canadian Institute for Health Information's centralized data repository
	data submission tools	resources to help long-term care facilities submit data (e.g. guidelines, database manuals, coding directions, user guides (49))

NZ	one single platform for assessment records (interRAI) and one mandatory software vendor countrywide (Momentum)	live data warehouse enabling data collection without any extra efforts for data transfer (7). assessments done online -> source system -> data warehouse (cleans and organizes datasets)
	data services strategies	(7)
Risk adjustment*		
** Note: The principle of risk-adjustment is that it is based on resident characteristics. That means that in calculation, for each resident separately and for each QI separately, fixed definitions and algorithms decide if a certain resident is included or not in the QI facility result. The result is on group level, based on calculations on resident level.*		
AUS	no risk adjustment currently applied	aggregated data is reported at a facility level.* ** For each QI, one number is reported.*
CAN	new generation of risk-adjusted QIs developed by interRAI	technical description of risk adjustment methodology (50) to provide users with understanding of the statistical theory and technical details of risk-adjustment procedures. This includes stratification, direct/indirect standardization, outlier trimming, etc. Note: software vendors are not expected to include risk adjustment procedures in software.
NZ	risk adjustment to compare scores to other facilities	training module (51)
Benchmarking		
AUS	benchmarking at different levels	e.g. over time, against peers
	private benchmarking companies	they report on behalf of the care providers who have engaged their services
	detailed data analysis by government department	with quarterly analysis, annual reporting and benchmarking (at national and regional levels, by care provider type)
CAN	health system performance approach using national median or average	
	benchmarking at different levels	includes trends over time and top performers

	colour coded performance allocation, presented at different levels	includes facility, regional, provincial and national level in Your Health System (52)
NZ	voluntary benchmarking group of facilities with interest in indicators	goal to have more and more facilities on board
	interactive, layered dashboard	district by district comparisons with national trend
	privately provided dashboards	each facility part of the benchmarking group can see their own data at the individual facility level on the dashboard (confidential).
Setting performance targets for each quality indicator		
AUS	functionality to set targets available to facilities	The Government Provider Management System provides option for target setting at indicator level for each aged care service. There is no feedback available on how target setting is used by the facilities.
CAN	targets set by provinces	
NZ		Unknown

Table 4: Implementation strategies

	Key insights	Explanation
Implementation strategies		
AUS	factsheets	(53)
	weekly newsletter to every aged care home	
	interactive modules	on the website with short videos and pop ups (e.g., dos and don’ts to create more accurate reporting)
	programme manuals	two manuals: One manual with legislated guidance on the programme, collection and reporting requirements and definitions (53). One manual with a range of tools and resources to support continuous quality improvement including PDCA for each of the quality indicators (54)

	no specific training provided at government level	training provided by the sector regulator, the Aged Care Quality and Safety Commission, and possibly inhouse for large facilities
	regular review of indicators	at government level to check their suitability, e.g. whether the data matches the original policy intent
	to address data quality issues with specific indicators, sending information out to the sector by answering inquiries and issuing an FAQ document on website	data quality issues relating to polypharmacy and antipsychotic indicators was caused by lack of understanding by care providers in terms of definitions. Through further education, this was successfully addressed
	webinars and case-studies	the webinar (55) shares practical Star Ratings and Quality Indicator Programme examples and advice to support long-term care facilities to improve quality and achieve better resident outcomes. Case-studies (56,57) highlight continuous quality improvement work from exemplary long-term care facilities.
CAN	materials and trainings	e.g., data user guides, job aids with coding areas, FAQs, client support forum with electronic support with eQuery tool, implementation toolkit (58) including readiness to change and change management checklists, video's (59–61). These support tools evolve and expand over time based on user-feedback in surveys and questions to respond to the stakeholder needs.
	quarterly client-support sessions	Predefined topics based on coding questions and coding issues, clinical case-studies, updates on specifications, data elements. On invitation without registration. Material is shared for in-house refresh sessions on initiative of the LTCFs.
	helpdesk	2-entry points: a centralised email box system and an eQuery tool on the education platform. Triage of demands according to clinical or technical questions and monitoring by clinical and technical teams. Analytics on types of questions. eQuery tool builds a knowledge base.
	programme development assistance	by the Canadian Institute for Health Information, to provinces/ jurisdictions
	training, with e-learning courses	Learning centre (62) with instructor-led web conferences, in-person workshops and e-learnings courses covering data collection, quality and use for quality improvement; competency assessment tools to test competencies of coders, and change management (differentiated for clinicians and administrators), data submission, reporting and use. Variety of forms and formats to accommodate different learners with different needs. Curriculum map of all courses to differentiate modules per type of user and level of information of interest.

		Certification of completion of the course, but no central competency testing (some provinces mandate required competency testing to a company)
	conferences around quality	
	increasing use of data-centred materials, including reports (vs. videos or narrative reports)	
	exchanges of success stories and lessons learnt between facilities	for instance, the Seniors Quality LEAP Initiative (SQLI) by voluntary North American long-term care facilities (both USA and Canada) to enhance quality of life and quality of care by utilizing a structured approach to quality and performance improvement and disseminating recommendations. Use of benchmark performance data and design and testing of collaboratively designed approaches for performance improvement, and to support a culture of innovation (16)
	current efforts to identify examples of indicators that facilities have successfully used for quality improvements	Superusers, case managers, RAI coordinators (in some provinces a funded position in each long term care facility)
	datasets publicly available for analysis	to facilitate research and analysis, data exports (63) in csv/excel format are available including demographics, clinical and functional residents characteristics, treatments and medications, resource utilization, admission, and discharge in long-term care.
NZ	online training on clinical assessments	comprehensive free-of-charge training programme for managers (37,64) and clinicians including nurses, physiotherapists, social workers, speech language therapists and occupational therapists. Fixed 6-weeks training programme with 2 days virtual classroom time on competencies to reach the data standards including 5 clinical assessments under supervision followed by an annual open book examination as competency test; used to involve mostly face-to-face training (65), all online since covid. Specific education programs for facilities with problems, support from Health NZ. For the e-learning system, one single international vendor contracted by the government (7).
	quality indicator training	to enable facilities to do their own monitoring, before audits; help facilities understand what they have since they have to use the tool anyway for casemix funding (66–69)
	skills boosters and support sessions	to keep skills up to date. E-learning self-directed modules available without bookings or scheduled online session with educator (70).

	reviews on the clinical assessments	some residents' clinical assessments are selected for review. Selection of audit cases is based on the built-in consistency reports in the software. The observed data quality issues during these audits can also become subject for (additional) education sessions on problematic cases. Continued data quality improvement is strived for.
	auditing body	to ensure that the care plan matches the needs of the resident to safeguard against gaming
	point-of-care	the assessment is encouraged to be used for care planning with decision-support properties to inform care Common language across care settings by the mandatory implementation of the interRAI Suite (e.g. home care, long-term care)
	roadshows and active communication with sector	to engage facilities to join benchmarking group and to motivate them to look at the data reports on a regular basis
	toolkit to assist staff in undertaking quality improvement	available online, includes PDCA cycle checklist (71)
	iterative pilots and projects	with engagement of key stakeholders (7) and establishment of a group of highly respected representatives from key government and non-governmental organisations who had the ability to influence change during implementation
	engage policy makers and researchers	a national research network has been established, providing a medium for researchers to form relationships and collaborate on interRAI research with a goal of translating routinely collected interRAI data in a live national database to improve clinical care, patient experience, service development, and quality improvement (7,72).
	collection of information once, in a live national database	The centralised database can be used for many purposes, such as understanding the needs of the assessed population, making evidence-based decisions, understanding of health outcomes (equity), allowing case mix funding and resource planning.

Table 5: Reporting

	Key insights	Explanation
Reporting		
AUS	public reporting at national level	quarterly report for indicators (publicly available online, cut down in some instances by state and territory) The QI definitions, information on national variation over time, technical notes, and data tables, etc are publicly available (73).
	aggregated publicly reported data on QIs and data quality	the Annual Report (74) describes the QI findings of 4 quarters, along with insights into data completeness and data quality, and technical notes. Supplementary material (75) is available on states/territories, remoteness, coverage, etc. Some facilities use it as their benchmarking; did not trigger strong reactions from facilities as it is aggregated
	Star Rating System	publicly available interactive portal (76) to compare care providers (77), with the five original quality indicators feeding into the system; sector focus on how results would look, which led to improvements in indicators results and data quality (notably resulting from government work on validating individual data points and avoiding gaming)
CAN	interactive web tool on regional or facility level	Your Health Systems (52): quality indicators publicly reported in a web tool for the health sector and general public. View comparable and interactive data for Canadians on up to 45 indicators at national, provincial/territorial, regional and facility levels. Layered information with partly password protected indicator results: “In Brief”, “In depth”. The latter, includes results for 9 long-term care quality indicators at national, provincial/territorial, regional, corporation and facility level (with performance allocations),
	Quick Stats Reports	a series of free publicly available reports providing aggregate-data (78). filtering by CCRS to get latest 5 years of data at provincial/territorial level; includes results for 19 long-term care quality indicators
	scientific literature shows greater improving trends among publicly reported indicators than non-publicly reported ones	analysis indicates that “the association between publication of data and improvement is stronger among indicators for which there was no improvement prior to publication and among the worst performing facilities” (79)

	giving provinces/ facilities time to evolve towards public reporting	At CIHI - public reporting started at province/territory level in 2007 for LTC in Quick Stats and facility level for LTC in public reporting started in 2015 through YHS. Including data preview and embargo periods prior to release so issues can be flagged. Success of public reporting illustrated by drop in potentially inappropriate use of antipsychotic
	communication with stakeholders, especially facilities and local government	e.g., through briefing prior to release
	facilities' capacity-building for quality improvement	with expert support by the Canadian Institute for Health Information to understand the results and use the data
	stakeholders' engagement in indicator and trust in data	
	adapt indicators labels to be publicly understandable	
	quality indicators suitable for public reporting with stable statistical estimate	e.g. pain, mood, falls, antipsychotic, cognitive and ADL decline, improvements in mood and behaviour, delirium, infections
	indicators with low and fluctuating values are less interesting for public reporting	they can be used for accreditation instead (e.g., pressure ulcers)
NZ	no public reporting on facility level	and no plan to start public reporting
	interactive web-based tool anonymised aggregated quality indicator data is publicly available (not at the facility level)	visualisation of national QI information is at district level and can be compared against national trend. Filters in interactive (80) tool: year, quarter, care level group (dementia, psycho-geriatric, rest home without medical care, hospital level care in long-term care facilities, quarter (80) A users' guide (81)
	quarterly reports for policy makers and managers	all districts receive quarterly reports for cross-district and national comparison with quality indicators aggregated data (82). Separate reports with aggregated are produced for districts, regions, large care provider groups and facilities

Further information pertaining to the stated aims and milestones of the quality indicators initiatives in the three countries can be found in Appendix 6.

5. Recommendations

Based on the experiences of Canada, Australia and New Zealand, this study has outlined best practices and insights that can participate in further developing and improving the Swiss national quality indicator initiative. We have formulated seven recommendations that we believe encapsulate the elements of successful, large scale quality improvement initiatives, which are presented in Table 6 below.

Table 6: Recommendations

	Recommendations	**Rationale**	**Link with NIP-Q-UPGRADE**
1	We recommend that the Federal Office of Public Health and the Federal Quality Commission, with cantons and other key stakeholders, clarify who is responsible for which aspect of the Swiss quality indicator initiative once the NIP-Q-UPGRADE is over, to attribute mandates and/or build and finance corresponding bodies and responsibilities (including subnational government levels, e.g. cantons, health districts, regional branch associations). This would entail at least two major endeavours: - planning for ongoing efforts, updates and improvements of the **Swiss quality indicator strategy** over time. This could, for instance, take the form of a public ten-year plan including targets for data quality, public reporting, training and support, co-developed with long-term care facilities. - setting up **a dedicated team** working on quality indicators, with communication specialists at hand, training, data quality control, regulations, stakeholder engagement.	The management of national quality indicators needs to take the next step beyond publishing factsheets on a website, processing delivered data and publishing a yearly report with outdated data. The three cases underscore the importance and usefulness of having a non-profit government-mandated organism as an authority to centralise, release, regulate, control, train, guide, monitor and support quality indicator-related aspects for a large community of stakeholders. The aim is to have reliable, trusted data that lead to data-driven decision making on clinical, management and policy levels. Moreover, the initiatives presented in this report have taken decades of continuous monitoring, support, and improvements and demand continued engagement and evolution.	To be considered for scale up after NIP-Q-UPGRADE ends
2	We recommend that the Swiss national indicator programme through the branch associations, the Federal Quality Commission, and the Public Health Departments of the cantons (i) promotes the use of the clinical assessment potential of quality indicators, notably by	As highlighted by a previous NIP-Q-UPGRADE sub-project (Work Package 1.3), some long-term care staff and managers deplore a lack of usefulness of the quality indicators, and a need to enter the same data multiple times.	Sub aim 3 of Work Package 1

	embedding clinical assessments at the point-of-care, and (ii) adopts a single dataset for clinical use, care planning, quality monitoring and casemix funding.	Using the same data for multiple purpose would participate in solving these issues. It would also help to prevent gaming (i.e. fixing the numbers to obtain more funding or better results).	
3	The Swiss national strategy, including CURAVIVA and senesuisse, pursue and intensify their efforts to (i) building strong **partnerships** with stakeholders in the long-term care sector, first and foremost facilities, especially when it comes to preparing them for public reporting; (ii) engaging **stakeholders** when additional quality indicators are introduced; and (iii) energising **communication** with the long-term care sector and the public to raise awareness and stimulate quality initiatives, following the best practices highlighted throughout this report (e.g. interactive websites, newsletters, webinars, FAQs, videos, manuals, strategic reports, toolkits, checklists…). In term of communication and support, we further recommend that CURAVIVA/ senesuisse continue to ensure (including perhaps exploring the use of artificial intelligence tools) that all materials are available in the three national Swiss languages.	Upcoming sub projects can explore to which extent practices from other countries can be transposed to the Swiss context, when building the quality improvement programmes. As a country with three national languages, it is important to take the necessary time and deploy efforts to ensure that linguistic regions can all have access to the same level of information	Amendment in Work Package 3 for introduction of additional quality indicators Sub-aim 6 of work package 1: Optimization of the interpretation and communication of quality indicators Scale up after the end of NIP-Q-UPGRADE
4	Furthermore, we recommend that the Federal Office of Public Health and the Federal Quality Commission, together with CURAVIVA/ senesuisse, deploy efforts on five main axes, namely: 1. **indicators**, which should be *risk adjusted,* developed in a participatory manner and *highlight improving or worsening resident outcomes* 2. **data collection and transfer**, with *quarterly* clinical assessment at resident level and *automated data transfer* from facility to central	These five axes have been identified as crucial to focus on, based on the cases of Canada, Australia and New Zealand, and supported by the literature of sub-aim 1.1 on communication and sub-aim 2.2 implementation strategies.	Scale up after the end of NIP-Q-UPGRADE

	repository. Ideally the frequency moves towards a *near real-time centralised data collection and processing* enhanced by a *dashboard*. 3. **data standards**, including standardised clinical assessment tools and coding training for facilities with *certification for attendance* and/or competency testing , *specifications for software vendors and conformance testing of software* of health information systems, built-in data consistency checks in software and data quality reports and *ongoing support* to facilities using a wide range of strategies 4. **implementation strategies**, notably adopting *a suite of strategies, building a large, supportive community, and government-mandated agencies* taking the lead for regulations, monitoring, training, and support 5. **reporting**, with support for facilities to move towards public reporting, data *visualisation in dynamic online dashboard, benchmarking at different levels, including sub-national level and against top-performers, target setting*, layered information display and *timely reporting of up-to-date data*		
5	We recommend that stakeholders such as CURAVIVA/ senesuisse or cantonal associations map out the long-term care landscape to identify **potential grassroots initiatives**, and how to best support them. The NIP-Q-UPGRADE will also consider whether best practices can be identified at the grassroots level, in partnership with stakeholders, when developing a programme to support data-driven quality improvement.	Collaborative, peer-to-peer initiatives illustrate how long-term care facilities may empower each other to practice evidence-based care quality improvement, based on reliable, risk-adjusted quality indicator data, strengthening each other's commitment to resident-centred care and to testing innovative approaches to quality improvement.	Sub-aim 4 of work package 2: Development of a quality improvement programme Scale up after the end of NIP-Q-UPGRADE

	It will further consider identifying ambassador facilities in sub-projects to come.		
6	We recommend that the Federal Quality Commission explores in greater depth the best ways to **report data**, and whether Work Package 4 of NIP-Q-UPGRADE should take place.	The case studies have shown that countries have set up interactive portals and website tools with layered or drill-down reporting with distinction between publicly accessible information and more detailed, privately accessible information. It is key to find out what would be best adapted to the Swiss context to communicate around quality indicator results, notably based on the examples of other countries. Timely reports on recent data at a quarterly or bi-annual frequency are key.	Work Package 4: Dashboard Sub-aim 6 or work package 1: Optimization of the interpretation and communication of quality indicators

6. Conclusion

This study aimed to describe processes and practices of planning, implementing, and sustaining large-scale, data-driven quality improvement strategies in long-term care facilities for older people in countries with national or regional policy initiatives. In so doing, it sought to bring to light best practices and insights from other countries, which Switzerland can build upon to further develop and improve its national quality indicator initiative.

Sparking a quality culture is at the heart of data-driven quality improvement strategies in long-term care facilities. As noted throughout these pages, key elements to sparking this culture include strategies to regulate, report, promote and support all users and stakeholders in using and interpreting quality indicator results in a reliable, user-friendly manner. This can be done through publicly available and free materials available on a dedicated website in combination with active guidance for long-term care facilities and software stakeholders, for instance. More generally, at government level, deploying continuous efforts to promote and sustain data-driven quality culture is of paramount importance. So is building strong partnership between government or government-mandated agencies and long-term care facilities, including capacity-building, trust and engagement with indicator data and indicator domains. In addition, using the same data to inform person-centred care, care planning, quality monitoring, and casemix funding would promote data reliability, notably by discouraging gaming, and resource efficiency – instead of recording different data in parallel for care and funding, for instance (as currently done in Switzerland).

Beyond these key elements, efforts need to be deployed on five main axes, namely:

1. **indicators**, which should be risk adjusted, developed in a participatory manner and highlight worsening and also improvement of resident outcomes

2. **data collection and transfer**, with quarterly clinical assessment at resident level, automated data transfer from facility to central repository, and ideally nearly real-time centralised data collection
3. **data standards**, including standardised clinical assessment tools and coding training for facilities with certification for training attendance and/or competency testing. Furthermore, specifications for software vendors and conformance testing of software products of health information systems, built-in data consistency checks in software and data quality reports and ongoing support to facilities using a wide range of strategies
4. **implementation strategies**, notably adopting a suite of strategies, building a large, supportive community, and government-mandated agencies taking the lead for regulations, monitoring, training, and support
5. **reporting**, with time and support for facilities to move towards public reporting, data visualisation in dynamic online dashboard, benchmarking at different levels, including sub-national level and against top-performers, target setting, layered information display and timely reporting of up-to-date data

The combination of bottom-up initiatives, for and by long-term care facilities, with top-down support, for instance through a central body dedicated to guaranteeing the timely availability of reliable quality indicator data and to empowering the long-term sector to practicing data-driven quality improvement, is particularly promising in promoting large scale quality improvement in long term care for older people.

Illustrating bottom-up initiatives, some long-term care facilities have organised into communities of practices, such as the US-Canadian Seniors Quality Leap Initiative, which uses quality indicator results to drive care quality improvement initiatives and has demonstrated improvements in the area of pain notably (16). Such collaborative, peer-to-peer initiatives illustrate how long-term care facilities may empower each other to practice evidence-based care quality improvement, based on reliable, risk-adjusted quality indicator data, strengthening each other's commitment to resident-centred care and to testing innovative approaches to quality improvement. To spark such grassroots initiatives, the NIP-Q-UPGRADE will consider identifying ambassador facilities in sub-projects to come, which would inspire, encourage, and support their peers in utilising quality indicators results to drive care quality improvement.

More generally, best practices from Australia, New Zealand and Canada are well aligned with findings from the literature, which we discussed in previous NIP-Q-UPGRADE reports in terms of communication and implementation strategies notably (83,84). This suggests that such practices are desirable and effective, beyond the unique experiences of the case study countries. To ascertain this, the opportunities and risks of adopting some of the approaches and initiatives described above in Switzerland will be assessed in future sub-projects of the NIP-Q-UPGRADE. These include sub-aims 1.7 and 2.4, for example, through which we will build programmes to improve data quality and foster data-driven care quality improvement in Swiss long-term care facilities.

In so doing, we will strive to promote the twin-aim of providing the long-term care sector with timely, reliable, and easily accessible quality indicator data, whilst empowering long-term care actors to utilising this data to drive better care quality. In other words, the NIP-Q-UPGRADE will strive to make quality indicators work for residents, their relatives and professionals, having better long-term care for all.

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8. Appendix

Appendix 1: Ovid Medline Search

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions 1946 to May 23, 2024

(Classic Search Menu)

1

Quality Indicators, Health Care/ or "quality indicator*".mp.

2

exp Nursing Homes/ or Homes for the Aged/ or Long-Term Care/ or ("long-term care" or (home* adj1 aged) or "nursing home*" or "residential home*" or "residential facilit*" or "nursing facilit*" or "institutional care" or "skilled nursing facilit*" or "care home*" or "residential care" or "residential aged care" or "aged care" or "institutional elderly care").mp.

3

1 AND 2

4

Limit 3 to abstracts

5

Limit 3 to yr="2020 -Current"

Results: 155

Appendix 2: Interview guide

Topic	Question
Quality indicator programme general	Could you tell us about how the **national quality indicator programme** emerged and evolved?
Development/ selection of quality indicator areas	Which **quality indicator area** did you start with and why? In your experience, which quality indicator areas are particularly amenable to data-informed quality improvement in long-term care facilities, and which are not?
Data standards & facility-level data collection	Which **data standards** are in place to record and transfer QI data? How well are these data standards followed by facilities and software vendors? In your experience, how to best support facilities in terms of reliable recording and transfer? How are data **centralised**?
Communication	How went **public reporting** from the start of the programme until today? How went **benchmarking** from the start of the programme until today? Overall, how did facilities "cope" with the release of public reports/ benchmarks? Has public reporting led to any change in terms of care practices and care quality?
Do's and don'ts for data- driven quality improvement	Data-driven programs aim to improve care practice in a measurable way. Have you identified **"best practices" or "lessons learned"** in (a) sparking and supporting data-informed quality improvement **at facility level**? (b) set up, implementation, sustainment of **the national programme**? After discussing the "do's", we'd like to discuss **the "don'ts**": Are there any key don'ts for the programme that hinder (a) data-informed quality improvement **at facility-level**? (b) set up, implementation, sustainment of **the national programme**?
Critical incidents and best practices at the programme level	Has there been any critical incident linked with the programme set up, implementation or scale up? Any advice for us, a country where quality indicator programs are fairly new (since 2019)? What would you have done differently when setting up, implementing or scaling up your programme? What do you consider as the programme's major achievements? When we think about sustainment on the long term, what needs to be in place to make it work (contextual elements)?
Implementation strategies: Training and coaching	In national quality indicator programs, training is often a key implementation strategy. Which kind of training and/or coaching are provided? What would be an ideal training / coaching programme? Who develops training material? Who organises the training? Any other strategies, e.g. champions, to promote data-informed quality improvement?

Quality indicator programme evaluation	How would you define the success of the national quality indicator program? What do you measure or what would you advise to measure?
Materials	Any materials that could be shared?

Appendix 3: DESCARTE (DESign of CAse Research in healThcarE) model – questions guiding case study researchers

Stages of the DESCARTE Model	**Guiding Questions for Researchers**	
Situating the research and the researcher	1. What is my philosophical approach?	Social constructivism
	2. How do I situate my "self" in this research?	Self as actively participating in creating knowledge (through interviews) and analysing available information (through inductive analysis)
	3. What are the ethical dimensions of this research?	To ensure the accuracy of our information, we sent relevant sections of our preliminary report to interviewees. We also took this opportunity to confirm that they consented to this information being included in the present report
Determining the components of the case study design	4. How is the case defined?	An individual case refers to a large-scale, data-driven quality improvement initiative (see also point 8) purposeful sampling approach
	5. How is context defined?	The context is considered as key in understanding the emergence, evolution and perception of quality indicators programmes in different countries.
	6. What is the purpose of the case study?	Bring to light best practices and insights from countries with relatively mature quality indicators initiatives, which Switzerland can build upon to further develop and improve its own national quality indicator initiative
	7. What is the conceptual/theoretical framework for the case study?	Collective case study as defined by Crowe and colleagues, e.g. as yielding "in-depth, multi-faceted understanding of a complex issue in its real-life context" (3)

Stages of the DESCARTE Model	Guiding Questions for Researchers	
	8. What is my sampling approach?	Purposeful sampling approach
	9. What is the rationale for my choice of data sources?	Semi-structured interviews to obtain “behind the scenes” information key in answering our research question, completed with academic and grey literature for greater accuracy and triangulation
Data analysis—Adopting the three stances	10. Is data analysis congruent with the philosophical approach?	Yes, social constructivism and indictive analysis are well aligned
	11. Is my analysis adopting a case-based or a variable analysis-based approach?	Variable analysis-based approach
	12. How and why is data integrated during data analysis and interpretation?	As the analysis is inductive, the analysis and interpretation are rooted in the data

Appendix 4: List of countries considered for case study

(based on the results of the Ovid Medline Search, detailed in Appendix 1)

Country	Eligible country	Main reasons for exclusion:	
		Lack of maturity	Difficulty accessing materials based on language
United States	x		
Canada	x		
Australia	x		
Japan		x	x
China		x	x
Norway			x
South-Korea		x	x
Belgium		x	x
Netherlands		x	x
New Zealand	x		
Sweden			x

Appendix 5: Interview details

Date	Participant country	Participant organisation	Organisation type and	website
22.03.2024 31.05.2024	Canada	CIHI - Canadian Institute for Health Information, 3 participants interviewed	independent, not-for-profit organization that aims to provide essential information on Canada's health system and the health of Canadians	www.cihi.ca/en
11.04.2024	Canada	University of Waterloo, School of Public Health Sciences, 1 participant interviewed	Academic	https://uwaterloo.ca/
29.04.2024	Australia	Aged Care Quality and Assurance Division, Australian Government Department of Health and Aged Care, 2 participants interviewed	Government department dedicated to “better health and wellbeing for all Australians, now and for future generations”	www.health.gov.au/
19.04.2014	New Zealand	Te Whatu Ora - Health New Zealand, 2 participants interviewed	Governmental organisation “dedicated to ensuring excellent healthcare for the people of New Zealand”	www.tewhatuora.govt.nz/

Appendix 6: Stated aims and milestones of quality indicators initiatives

Stated aim of the programme	
AUS	• for care providers to have robust, valid data to measure and monitor their performance and support continuous quality improvement in the care they provide to aged care recipients • to give older Australians, care recipients and the community transparent information about quality in aged care to assist decision making; and • for government to have system-level measures of quality in aged care and an evidence-based to inform policy and regulation.
CAN	• deliver comparable and actionable information to accelerate improvements in healthcare, health system performance and population health across the continuum of care • expanded offering of analytics, indicators and tools to support health system decision-making and provide the insight needed to drive better health outcomes across Canada's health systems • better equip health information users • measurement of health system performance refers to a structured approach to assessing how well health systems are functioning and to understanding where improvements could be made. • indicators and reporting tools, in conjunction with the Health System Performance Measurement Framework, can help identify the key factors to consider when monitoring performance within a sector or of the system as a whole
NZ	• Te Tāhū Hauora supports the aged residential care (ARC) sector through strong stakeholder (85,86) relationships to build a culture of continuous learning and development and ultimately improve resident's experience of care. • We want to keep the need for data collection as low as possible and will be looking at how we can use data from existing sources to inform our quality improvement work.
Programme Milestone	
AUS	• 2016**:** programme started on a voluntary basis with three indicators: pressure injuries, unplanned weight loss and physical restrained • 2019: programme mandatory for all nursing homes • 2021: expanded with two new indicators: medication management, and falls and major injuries; tweaks to existing indicators' data points to ensure the right data was captured • 2023: six new indicators: activities of daily living, incontinence, hospitalization, consumer experience, work force, and quality of life • As of 2024: reviewing all indicator to see if they are meeting their purpose and whether they should be capturing different data • 2025: looking to introduce three new staffing indicators
CAN	• 2003: launched Continuing Care Reporting System (CCRS) database in two jurisdictions • 2007: first public reporting with online excel table annually refreshed at province / territory level

	• 2015: launched indicators in “Your Health System” with two publicly available sections and one with secure reporting where facilities can drill into the results at lower levels to understand what drives them • 2026: switch to Integrated InterRAI Reporting System (IIRS) only
NZ	• 2002: Ministry of Health signals the intent to improve assessment systems (7) • 2003: an independent Tools Review (87) identified interRAI as best meeting New Zealand’s needs. • 2011–2014: Ministry of Health and Aged Care Association piloted the interRAI LTCF • 2012: started training assessors • 2015: interRAI Suite becomes mandatory in Aged Residential Care with 3-year implementation • 2016: start of the national team of educators (lead practitioners from every district, create and deliver material for training and so on) • 2017: introduction of the first set of quality indicators (about 30) • 2019: start of benchmarking group with voluntary facilities as a trust-model