

A Mixed Methods Evaluation of a 4-week Geriatrics Curriculum in Strengthening Knowledge and Comfort Among Orthopaedic Surgery Residents

Adrian Chan (✉ adrianch.chan@mail.utoronto.ca)

University of Toronto Faculty of Medicine 2 University of Saskatchewan College of Medicine,
Department of Medicine <https://orcid.org/0000-0003-1211-6564>

Victoria Chuen

University of Toronto

Andrew Perrella

University of Toronto

Guillaume Limfat

Western University

Karen Ng

University of Toronto

Vicky Chau

University of Toronto

Research article

Keywords: Orthogeriatrics, Orthopaedic surgery, Geriatric Medicine, Postgraduate medical education, Curriculum, Evaluation, Mixed methods

Posted Date: August 26th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-59597/v1>

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Abstract

Background: In 2016, the University of Toronto Faculty of Medicine implemented a 4-week “Orthogeriatrics” rotation for orthopaedic surgery residents. We sought to assess the rotation’s impact on trainees’ knowledge, attitudes, and behaviours toward caring for older adults, and explore areas for improvement.

Methods: We used a mixed methods concurrent triangulation design. The Geriatrics Clinical Decision-Making Assessment (GCDMA) and Geriatric Attitudes Scale (GAS) compared knowledge, attitudes, and behaviours between trainees who were or were not exposed to the curriculum. Rotation evaluations and semi-structured interviews with trainees and key informants explored learning experiences and the curriculum’s impact on resident physician growth and development in geriatric competencies.

Results: Among trainees who completed the GCDMA (n=19), those exposed to the rotation scored higher in knowledge compared to the unexposed cohort (14.4±2.1 vs. 11.3±2.0, p<0.01). The following themes emerged from the qualitative analysis of 29 stakeholders: Increased awareness and comfort regarding geriatric medicine competencies, appreciation of the value of orthogeriatric collaboration, and suggestions for curriculum improvement.

Conclusion: These results suggest that the Orthogeriatrics curriculum strengthens knowledge, behaviour, and comfort towards caring for older adults. Our study aims to inform further curriculum development and facilitate dissemination of geriatric education in surgical training programs across Canada and the world.

Introduction

Approximately 92% of hip fractures occur in adults aged 65 years and older.¹ Compared to other orthopaedic injuries, they are more strongly associated with mortality after one year,^{2,3} postoperative delirium,⁴ loss of independence,^{5,6} and prolonged mobility limitations.²

Models of orthogeriatric care

Orthogeriatric co-management care models were developed in the 1960’s to address these poor outcomes.⁷ Briefly, orthogeriatric care involves the interdisciplinary management of elderly patients with fragility fractures,⁸⁻¹¹ including geriatricians and specialized allied health teams on admission.¹² Literature comparing geriatric consult models with orthogeriatric ward-based care showed the latter was associated with reduced surgical wait times,¹³ postoperative falls and complications,^{14,15} hospital length of stay,^{13,16,17} as well as short- and long-term mortality.^{16,18}

Unfortunately, geriatricians in Canada remain scarce and concentrated in urban centers. Many older adults are therefore unable to receive the benefits of co-managed care.¹¹ In a recent survey, surgical

trainees reported a lack of formal teaching about perioperative management of older surgical patients.¹⁹

Orthogeriatrics Education

In 2014, the University of Toronto Department of Orthopaedic Surgery launched a 4-week Orthogeriatrics curriculum for postgraduate year 1 (PGY1) orthopaedic surgery residents throughout the year. Curricular components comprised: geriatric preoperative assessment, perioperative management of frail older adults with multimorbidity, inpatient and clinic-based geriatric assessments, and formal geriatrics educational seminars (Table 1).

Table 1
Orthogeriatrics Curriculum Components

Activity	Description
Clinical	<p>Inpatient</p> <p>2 weeks perioperative assessments:</p> <ul style="list-style-type: none"> • Orthopaedic elderly patients and management of medically frail, complex older adults <p>2 weeks inpatient geriatric consultation:</p> <ul style="list-style-type: none"> • Comprehensive geriatric assessments on the Orthogeriatrics and surgical services <p>Outpatient</p> <p>1 day Perioperative Assessment Clinic</p> <p>½ day Falls Prevention Clinic</p> <p>½ day Geriatric Day Hospital Clinic</p> <p>½ day Geriatric Medicine Clinic</p>
Educational Content	<p>Perioperative Teaching Rounds (Perioperative Risk Assessment, Evidence Based Medicine, Perioperative Management e.g. Anticoagulation)</p> <p>Geriatric Giant Seminars (Dementia, Delirium, Falls, Incontinence, Constipation, Polypharmacy)</p> <p>Allied Health Seminars (Gait aids, Community Support Services, Capacity, Wound care)</p>
Evaluation	<p>In-Training Evaluation Reports (ITERS)</p> <p>360 feedback</p> <p>Exit interviews</p>

This study sought to answer the following research questions:

1. What is the impact of the Orthogeriatrics curriculum on the residents' knowledge and attitudes pertaining to the management of elderly patients?

2. What are the areas of improvement within the current curriculum that will allow for further development?

Methods

Our mixed methods concurrent triangulation design involved the simultaneous collection and analysis of quantitative and qualitative data (Fig. 1). We assessed residents using validated geriatric knowledge and attitude evaluations and converged these findings during data analysis with themes that emerged from semi-structured interviews with the residents and key informants. The rationale for this approach was that corroboration between the two types of data would strengthen the validity of the program evaluation, and more robustly facilitate curriculum improvement.

Study participants

We collected data using a convenience sampling method from three participant groups: junior residents (PGY1-3) who had completed the rotation, senior residents (PGY4-5) who had not completed the rotation, and key informants (nurses, orthopaedic surgeons, and geriatricians) who worked closely with the residents.

Quantitative data

Junior and senior orthopaedic residents completed the University of Michigan Geriatrics Clinical Decision-Making Assessment (GCDMA) and the University of California Los Angeles Geriatric Attitudes Scale (GAS) in June 2017. The GCDMA is a validated 20-item multiple-choice test which emphasizes inpatient care and common geriatric syndromes designed for medical and surgical residents.²⁰ The GAS is a 14-item Likert questionnaire developed to assess healthcare providers' attitudes towards caring for older patients.^{21,22}

We also collected formal evaluations (In-Training Evaluation Reports [ITER] filled out by staff and Rotation Effectiveness Scores [RES] filled out by the junior residents) during the completion of their Orthogeriatrics rotation (Appendix – ITER, RES).

Qualitative Data

A research assistant [AC] conducted formal semi-structured interviews with all three study participant groups (Appendix – Interview Questionnaires). Junior and senior trainees were asked about their opinions on geriatric education in the orthopaedic surgery residency program, as well as their feelings of preparedness in caring for the elderly. Likewise, key informants were asked about any perceived changes in the attitudes and practices of orthopaedic surgery residents as a result of the Orthogeriatrics rotation.

Data Analysis

An independent-samples t-test was used to quantitatively compare the mean scores of knowledge and attitudes between junior and senior residents. Interviews were audio-recorded, transcribed verbatim, and qualitatively analyzed using grounded theory.²³ A research assistant [AC] and PIs [VC, KN] independently read all of the transcripts and met periodically to refine the coding structure until it was deemed stable. We then coded all transcripts and examined key themes that emerged.

Results

Quantitative Data

12 of 31 junior residents (39%) and 7 of 24 (29%) senior residents completed the GCDMA and GAS (see Table 2).

Table 2
Comparison of junior vs. senior resident scores on geriatric knowledge and attitudes

	Number of Participants	GCDMA (mean ± SD) /20	GAS (mean ± SD) /70
Junior Residents	12	14.4 ± 2.1	51.8 ± 4.9
Senior Residents	7	11.3 ± 2.0	51.7 ± 8.1
<i>p</i> -value		0.009*	0.979
GCDMA = Geriatric Clinical Decision-Making Assessment; GAS = Geriatric Attitudes Scale			

Knowledge and Attitudes: Junior residents scored statistically significantly higher on the GCDMA when compared to senior residents (14.4 ± 2.1 vs. 11.3 ± 2.0, *p* = 0.009). No difference was found between the two groups on the GAS (51.8 ± 4.9 vs. 51.7 ± 8.1, *p* = 0.979).

Rotation Effectiveness Scores: Residents provided the following evaluations for the Orthogeriatrics rotation: 3.95 (2014–2015), 3.93 (2015–2016), and 4.25 (2016–2017). The scores, which are averaged out of 5, assess the curriculum’s overall organization, educational design, learning supports, climate, experience, and facilities (Appendix - RES).

Qualitative Data

Interviews were conducted with junior residents (JR; *n* = 5), senior residents (SR; *n* = 7), charge nurses (CN; *n* = 6), orthopaedic surgeons (OS; *n* = 5), and geriatricians (G; *n* = 6). The emerging themes are outlined below:

Awareness and comfort in geriatric competencies

Junior residents felt comfortable in their geriatric medicine competencies, particularly in the initial management of the *geriatric giants*. They were also able to extrapolate their knowledge to work through

issues during a patient's hospital stay.

"I am comfortable in taking the first steps in getting them (older adults) optimized." (JR4)

"It really makes you feel more confident moving forward in terms of how to deal with these ward issues." (JR3)

In contrast, senior residents had mixed comfort in geriatric medicine competencies. Some felt their knowledge and skills were "probably a little limited" (SR5) and "would not be sufficient to provide a standard of care." (SR6) Nursing staff also commented that senior residents were sometimes "not sure how to proceed because of all the medical complications." (CN1)

Geriatric competencies strengthened by the curriculum

Among the geriatric competencies, three sub-competencies appeared to be positively affected by the Orthogeriatrics curriculum.

1. *Sensitization to Holistic Care & Medical Complexity*: Junior residents recognized the importance of comprehensive care, given the medical complexity of older surgical patients. As residents "learned to assess older adults more holistically", they began to see beyond the "mechanical" and "surgical" aspects of orthopaedic care (JR6). They also spoke of transferring their knowledge acquired from the geriatrics rotation to their surgical training:

"It's not just the surgery, it's the patient as a natural person that has [...] dementia or social problems. And now, when you get back into more surgical training, it's actually in your mind." (JR5)

2. *Communicating with Older Adults*: Junior residents also appeared to interact with older adults with improved bedside manner. Role-modelling appeared to play a significant role in developing these communications skills.

"Seeing how much time the internists and geriatricians spend really validates the fact that I might spend an extra bit of my time on the overnight call talking with them." (JR2)

Since the Orthogeriatrics curriculum, charge nurses observed "more conversation" (CN5) and "one-to-one patient time spent from the MDs." (CN6)

3. *Collaborative Relationships*: Understanding the role of the geriatrician and allied health professionals involved in patient care appeared to strengthen interprofessional appreciation among junior residents.

"It (Orthogeriatrics rotation) gives you more tools to know when to refer ... it gave me the potential to appreciate how important it is, and what to expect in a referral, and how to better prepare a patient before the geriatric team sees a patient." (JR5)

Improving the Orthogeriatric curriculum

The Orthogeriatrics rotation focused on managing older adults with emergent hip fractures. One suggestion was to teach about “perioperative assessments” (G2) for patients undergoing elective procedures.

“There should be an emphasis more on the pre-op assessment. So pre-ops for [...] all the elective cases - the elective knee replacements, hip replacements - they probably need more teaching and experience around that.” (G3)

In addition, disposition planning within complex psychosocial situations “to help deal with caregivers and family” (OS4) could be integrated more into the curriculum.

“... whatever setting orthopaedic residents are going to end up practicing in, that they have collaborative relationships [...] and make sure that their communication is open with the families and caregivers.” (OS1)

Discussion

Growth in knowledge

Most striking for us was the apparent knowledge difference in geriatric competencies between junior and senior residents, as evidenced by the GCDMA scores. This difference was further corroborated by input from key informants that the junior cohort of residents appeared stronger in managing complex medical issues in the older adult patient.

Geriatric knowledge assessment among surgical residents appears to be a relatively new phenomenon. Acknowledging the difficulty in drawing comparisons given the paucity of studies using standardized scales, our junior resident mean score of 72% on the GCDMA is similar to that of geriatric fellows and senior internal medicine residents *after* their completion of a geriatrics-palliative care rotation.^{22,24}

Growth in comfort

Our interviews reinforced the positive impact of the curriculum on comfort in geriatric medicine competencies, and more specifically, the residents’ appreciation for holistic and multidisciplinary care, as well as optimization of collaborative relationships and enhanced communication with older adults.

Another evaluation of a geriatric curriculum for general surgery residents noted increased comfort in accessing community resources and multidisciplinary care.²⁵ While we and others did not find an objective impact on attitudes towards older adults on the GAS, our qualitative analysis demonstrated an overall embrace for the Orthogeriatrics curriculum from program stakeholders.²²

Sustainability of geriatrics curricula

Several barriers in the design and implementation of a geriatric curriculum for residents were identified in the literature,²⁶ including limited geriatric faculty and services, an uncompromising curriculum, and lack of faculty or resident interest. Our educational program is sustained through existing orthogeriatric care

models and geriatric clinical services, which fortunately have required minimal additional resources or administrative support.

Study Limitations

This study had several limitations from a research methodology perspective. First, it was challenging to recruit an adequate number of orthopaedic surgery residents. As such, the statistical comparison of geriatrics knowledge and attitudes between cohorts may not be statistically robust. Secondly, the University of Michigan GCDMA as an assessment of geriatric knowledge has been criticized for being outdated and concentrated on inpatient medicine.^{27,28} However, we employed this tool as an indicator of the knowledge growth generated by our curriculum, rather than reliance on a final numerical score. Finally, although our study utilized a validated test to evaluate the effect of a curriculum on resident knowledge, it did not explore its impact on clinically significant outcomes (e.g. adverse patient events, such as postoperative delirium, lengths-of-stay, or hospital readmissions).

Conclusion

Our comprehensive evaluation demonstrates that residents have increased knowledge and comfort with managing geriatric issues on the wards following the completion of the 4-week Orthogeriatrics curriculum. Future steps for this curriculum include integrating the suggestions identified in our evaluation study and expanding geriatrics education programs to other surgical residency programs. We hope that our pilot work may serve as a model to other medical institutions to ultimately build capacity for stronger surgical training towards providing care for older adult patients.

Declarations

Ethics approval and consent to participate:

Ethics approval for the study was granted through the University of Toronto Research Ethics Board (protocol #33469).

Consent for publication:

All study participants signed a consent form for the collection, analysis, and publication of their data during the time of recruitment. These forms are available from the corresponding author on reasonable request.

Availability of data and materials:

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

Funding:

In 2016, the RTO/ERO Foundation awarded \$24,655 to Mount Sinai Hospital and the University of Toronto to support aging research and the training of post-secondary students in geriatrics and gerontology. This generous grant was used to fund the project as well as its research trainees' conference-related registration and travel fees.

Authors' contributions:

AC collected, analyzed, and interpreted the data, and was a major contributor in writing the manuscript. VC, AP, and GL were major contributors in designing the study and writing the manuscript. KN and VC were major contributors in designing the study, analyzing and interpreting the data, and writing the manuscript. All authors read and approved the final manuscript.

Acknowledgements:

We thank the Retired Teachers of Ontario Foundation for their generous grant, without which we would not have been able to expedite and disseminate the Orthogeriatrics curriculum. We would also like to thank the Savlov/Schmidt Scholars Program in Geriatrics for providing postgraduate and medical students with mentorship and research opportunities working with older adults. Finally, this important work would not be possible without the close partnership between the Sinai Health System and University Health Network Hospitals' Divisions of Geriatric Medicine and Orthopaedic Surgery. We thank Dr. Samir Sinha, Dr. Vicky Chau, Dr. Karen Ng, Dr. Peter Ferguson, and Dr. Dan Stojimirovic for their key role in the development of the Orthogeriatrics curriculum.

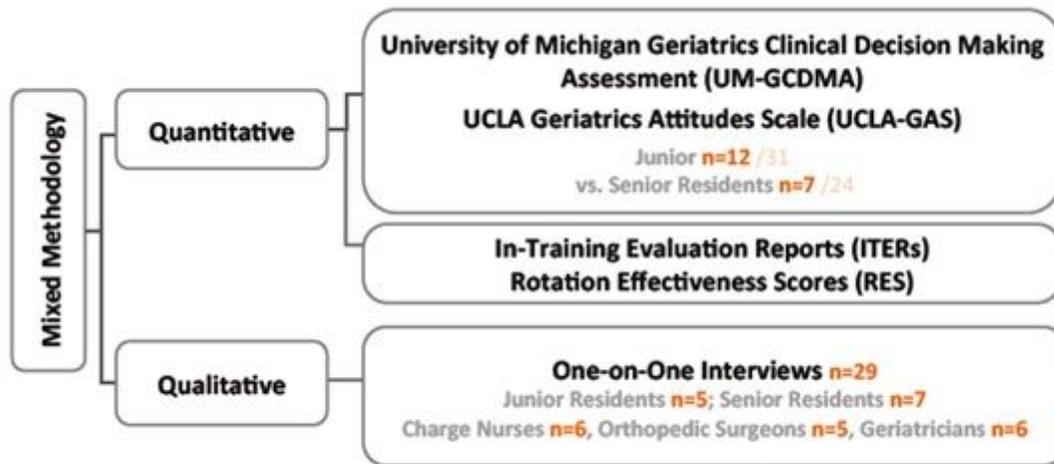
References

1. Pillai A, Eranki V, Shenoy R, Hadidi M. Age related incidence and early outcomes of hip fractures: a prospective cohort study of 1177 patients. *Journal of Orthopaedic Surgery Research*. 2011 Dec;6(1):5.
2. Prestmo A, Hagen G, Sletvold O, Helbostad JL, Thingstad P, Taraldsen K, Lydersen S, Halsteinli V, Saltnes T, Lamb SE, Johnsen LG. Comprehensive geriatric care for patients with hip fractures: a prospective, randomised, controlled trial. *The Lancet*. 2015 Apr;25(9978):1623–33. 385(.
3. Leibson CL, Tosteson AN, Gabriel SE, Ransom JE, Melton LJ III. Mortality, disability, and nursing home use for persons with and without hip fracture: a population-based study. *J Am Geriatr Soc*. 2002 Oct;50(10):1644–50.
4. Bruce AJ, Ritchie CW, Blizzard R, Lai R, Raven P. The incidence of delirium associated with orthopedic surgery: a meta-analytic review. *Int Psychogeriatr*. 2007 Apr;19(2):197–214.

5. Braithwaite RS, Col NF, Wong JB. Estimating hip fracture morbidity, mortality and costs. *J Am Geriatr Soc.* 2003 Mar;51(3):364–70.
6. Schnell S, Friedman SM, Mendelson DA, Bingham KW, Kates SL. The 1-year mortality of patients treated in a hip fracture program for elders. *Geriatric Orthopaedic Surgery Rehabilitation.* 2010 Sep;1(1):6–14.
7. Devas MB, Irvine RE. The geriatric orthopaedic unit. A method of achieving return to independence in the elderly patient. *Brit J Geriatr Prac.* 1969;6:19–25.
8. British Orthopaedic Association. The care of patients with fragility fracture. London: British Orthopaedic Association. 2007 Sep:8–11.
9. Sabharwal S, Wilson H. Orthogeriatrics in the management of frail older patients with a fragility fracture. *Osteoporosis International.* 2015 Oct 1;26(10):2387-99.
10. Cunningham M, Kates S, Blauth M. Using a commitment to change tool for evaluation and planning of a global competency-based curriculum in orthogeriatrics. *Journal of Continuing Education in the Health Professions.* 2014 Apr;34(2):123–30.
11. Abrahamsen C, Nørgaard B, Draborg E, Nielsen D. Reflections on two years after establishing an orthogeriatric unit: a focus group study of healthcare professionals' expectations and experiences. *BMC Health Serv Res.* 2017 Dec;17(1):602.
12. Folbert EC, Hegeman JH, Vermeer M, Regtuijt EM, van der Velde TD, Ten Duis HJ, Slaets JP. Improved 1-year mortality in elderly patients with a hip fracture following integrated orthogeriatric treatment. *Osteoporosis International.* 2017 Jan 1;28(1):269 – 77.
13. Gupta A. The effectiveness of geriatrician-led comprehensive hip fracture collaborative care in a new acute hip unit based in a general hospital setting in the UK. *JR Coll Physicians Edinb.* 2014 Jan 1;44(1):20 – 6.
14. Friedman SM, Mendelson DA, Bingham KW, Kates SL. Impact of a co-managed Geriatric Fracture Center on short-term hip fracture outcomes. *Archives of Internal Medicine.* 2009 Oct 12;169(18):1712-7.
15. Stenvall M, Olofsson B, Lundström M, Englund U, Borssén B, Svensson O, Nyberg L, Gustafson Y. A multidisciplinary, multifactorial intervention program reduces postoperative falls and injuries after femoral neck fracture. *Osteoporosis International.* 2007 Feb 1;18(2):167 – 75.
16. Grigoryan KV, Javedan H, Rudolph JL. Ortho-geriatric care models and outcomes in hip fracture patients: a systematic review and meta-analysis. *J Orthop Trauma.* 2014 Mar;28(3):e49.
17. Khasraghi FA, Christmas C, Lee EJ, Mears SC, Wenz SJ. Effectiveness of a multidisciplinary team approach to hip fracture management. *Journal of Surgical Orthopaedic Advances.* 2005;14(1):27–31.
18. Pajulammi HM, Pihlajamäki HK, Luukkaala TH, Jousmäki JJ, Jokipii PH, Nuotio MS. The effect of an in-hospital comprehensive geriatric assessment on short-term mortality during orthogeriatric hip fracture program – which patients benefit the most? *Geriatric Orthopaedic Surgery Rehabilitation.* 2017 Dec;8(4):183–91.

19. Shipway DJ, Partridge JS, Foxton CR, Modarai B, Gossage JA, Challacombe BJ, Marx C, Dhesi JK. Do surgical trainees believe they are adequately trained to manage the ageing population? A UK survey of knowledge and beliefs in surgical trainees. *Journal of Surgical Education*. 2015 Jul 1;72(4):641-7.
20. Williams BC, Fitzgerald JT. Brief report: brief instrument to assess geriatrics knowledge of surgical and medical subspecialty house officers. *J Gen Intern Med*. 2006 May;21(5):490-3.
21. Reuben DB, Lee M, Davis JW Jr, Eslami MS, Osterweil DG, Melchiorre S, Weintraub NT. Development and validation of a geriatrics attitudes scale for primary care residents. *J Am Geriatr Soc*. 1998 Nov;46(11):1425-30.
22. Ahmed NN, Farnie M, Dyer CB. The effect of geriatric and palliative medicine education on the knowledge and attitudes of internal medicine residents. *J Am Geriatr Soc*. 2011 Jan;59(1):143-7.
23. Charmaz K. *Constructing grounded theory: A practical guide through qualitative analysis*. Sage; 2006 Jan 13.
24. Kishimoto M, Nagoshi M, Williams S, Masaki KH, Blanchette PL. Knowledge and attitudes about geriatrics of medical students, internal medicine residents, and geriatric medicine fellows. *J Am Geriatr Soc*. 2005 Jan;53(1):99-102.
25. Barbas AS, Haney JC, Henry BV, Heflin MT, Lagoo SA. Development and implementation of a formalized geriatric surgery curriculum for general surgery residents. *Gerontology geriatrics education*. 2014 Oct;35(4)(2):380-94.
26. Gazewood JD, Vanderhoff B, Ackermann R, Cefalu C. Geriatrics in family practice residency education: an unmet challenge. *Fam Med*. 2003 Jan;35(1)(1):30-4.
27. Siegler EL, Jalali C, Finkelstein E, Ramsaroop S, Ouchida K, Carmen TD, Logio L. Assessing effectiveness of a geriatrics rotation for second-year internal medicine residents. *Journal of Graduate Medical Education*. 2014 Sep;6(3):521-5.
28. Kalender-Rich JL, Mahnken JD, Dong L, Paolo AM, Hayley DC, Rigler SK. Development of an ambulatory geriatrics knowledge examination for internal medicine residents. *Journal of Graduate Medical Education*. 2013 Dec;5(4):678-80.

Figures



June 2017 Cohorts: "Senior Residents" (PGY4-5) no exposure to PGY1 Orthogeriatrics; "Junior Residents" (PGY1-3) exposed to PGY1 Orthogeriatrics

Figure 1

Summary of the data collected using a mixed methods triangulation design

Supplementary Files

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- [AppendixInterviewQuestionnaires.docx](#)
- [AppendixRES.pdf](#)
- [AppendixITER.pdf](#)